

**NUTRITION KNOWLEDGE, ATTITUDES AND PRACTICES OF CHILDREN
FROM ISINYA AND NKOILE PRIMARY SCHOOLS IN KAJIADO DISTRICT,
KENYA**

**VELMA NYAPERERA (B.ED Hsc &Tech)
REGISTRATION NUMBER: H60/10301/2008**

**ATHESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF MASTERS OF SCIENCE DEGREE IN THE SCHOOL OF
APPLIED HUMAN SCIENCES OF KENYATTA UNIVERSITY**

JUNE, 2012

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or any other award.

Signature.....Date.....

VELMA NYAPERA
Department of Foods, Nutrition and Dietetics

This thesis has been submitted with our approval as University Supervisors.

1. Signature.....Date.....

DORCUS MBITHE (PhD)
Department of Foods, Nutrition and Dietetics
Kenyatta University

2. Signature.....Date.....

SOPHIE OCHOLA (PhD)
Department of Foods, Nutrition and Dietetics
Kenyatta University

DEDICATION

To God for His faithfulness, love and kindness and to my parents and siblings for their moral support and encouragement.

ACKNOWLEDGEMENTS

I extend my sincere gratitude to the following whose efforts have contributed to the success of this research. I acknowledge Dr. Dorcus Mbithe and Dr. Sophie Ochola of Kenyatta University as well as Dr. Tom Vandenbosch and Mrs. Lut Fox of Flemish Association for Development Cooperation and Technical Assistance (VVOB) for their tireless efforts in supervision and guidance which have immensely contributed to the success of this work. My gratitude also goes to the Healthy Learning Programme for awarding me the fellowship to undertake the field research.

I am also indebted to the staff and my colleagues of the Department of Foods, Nutrition and Dietetics, Kenyatta University for their contribution and support during the conceptualisation, development of the proposal and actualisation of the study. As well I would like to extend my appreciation to the research assistants Moses Partsau and Jackson Nyapera and the Statistician Dr. Festus Kiplamai for their untiring support during data collection and analysis respectively. Special thanks also to the teachers, study pupils and parents of the Isinya and Nkoile Primary Schools for allowing and supporting me to carry out research in their schools. Finally, I would like to express my gratitude to my family and friends for their continuous support in ensuring that my Masters programme is a success.

TABLE OF CONTENTS

TITLE PAGE	i
DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ACRONYMS AND ABBREVIATIONS	xi
ABSTRACT.....	xii
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background information	1
1.2 Statement of the problem	2
1.3 Purpose of the study.....	4
1.4 Study objectives	4
1.5 Hypotheses	5
1.6 Significance of the study.....	5
1.7 Delimitations of the study.....	6
1.8 Limitations of the study	6
1.9 Conceptual framework of the study	6
1.10 Operational definition of terms	8
CHAPTER TWO: LITERATURE REVIEW	9
2.1 Introduction.....	9
2.2 Nutrition education in schools	10
2.3 Importance of learning nutrition in early school years	11
2.4. School and community as a learning environment for appropriate nutrition practices	12

2.5 Pupil’s sources of nutrition information	14
2.6 Pupils’ nutrition knowledge, attitudes and nutrition practices.....	15
2.7 Summary of the literature review	17
CHAPTER THREE: METHODOLOGY	19
3.1 Research design	19
3.2 Study variables.....	19
3.3 Location of the study	19
3.4 Target population	20
3.4.1 Inclusion criteria	20
3.4.2 Exclusion criteria	21
3.5 Sample size determination and sampling procedure.....	21
3.5.1 Sample size determination	21
3.5.2 Sampling technique and procedures	22
3.6 Data Collection instruments.....	23
3.7 Data collection procedures.....	24
3.7.1 Training research assistants	26
3.8 Pre-testing of research instruments.....	27
3.8.1 Validity	27
3.8.2 Reliability of questionnaires	27
3.9 Data analysis	28
3.10 Logistical and ethical consideration.....	29
CHAPTER FOUR: FINDINGS AND DISCUSSIONS	30
4.1 Socio-demographic and socio-economic characteristics of pupil’s households.....	30
4.1.1 Socio-demographic characteristics of pupil’s households.....	30
4.1.2 Socio-economic characteristics of pupil’s households	33
4.2 Nutrition knowledge among study pupils	37

4.2.1 Knowledge on hygiene and sanitation	37
4.2.2 Knowledge on nutrition deficiency diseases.....	39
4.2.3 Knowledge on functions of food nutrients.....	39
4.2.4 Knowledge on food choice, preparation and storage.....	41
4.3 Pupil’s Sources of nutrition information.....	45
4.3.1 Source of nutrition information	45
4.3.2 Ranking of sources of nutrition information.....	47
4.3.3 Preference of the sources of nutrition information	48
4.4 Factor’s associated with nutrition knowledge.....	51
4.4.1 Nutrition knowledge and the demographic and socio-economic status of the pupils’ households.....	51
4.4.2 The relationship between nutrition knowledge and source of nutrition information	52
4.5 Pupils’ attitudes towards nutrition	53
4.5.1 Attitudes towards food choices, preparation and food consumption.....	53
4.5.2 Attitudes towards learning nutrition	56
4.5.3 Contribution of the Healthy Learning and School Feeding Programmes to nutrition knowledge attitudes and practices	59
4.5.4 Hygiene and sanitation.....	62
4.6 Nutrition-related practices among the pupils	64
4.6.1 Consumption of boiled drinking water	64
4.6.2 Occasions when hands are washed	66
4.6.3 Pupils’ participation in activities at home.....	68
4.6.4 Methods of refuse disposal	70
4.6.5 Food consumption patterns of pupils.....	70
4.7 Relationship between nutrition practice, nutrition knowledge and nutrition related attitudes	73

4.7.1 Relationship between nutrition practices and pupils attitudes	73
4.7.2 Relationship between nutrition practices and pupils nutrition knowledge	74
4.7.3 Predictors of appropriate nutrition practices.....	75
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.	78
5.1.1 Summary	78
5.1.2 Conclusions.....	78
5.1.3 Implications of the findings	80
5.1.4 Recommendations for policy	81
5.1.5 Recommendations for practice	82
5.1.6 Suggestions for further research	83
REFERENCES.....	84
APPENDICES	89
Appendix 1 Questionnaire	89
Appendix 2 Marking scheme for the test questions on nutrition knowledge	105
Appendix 3 Focus group discussion with parents.....	106
Appendix 4 Focus group discussion with teachers	107
Appendix 5 Focus group discussion with class one – three pupils.....	109
Appendix 6 Focus group discussions with class four pupils	111
Appendix 7 Observation checklist for use at the school and at home	113
Appendix 8 Clearance letter from Kenyatta University	115
Appendix 9 Clearance letter from National Council of Science and Technology.....	116
Appendix 10 Kajiado North research authourization	117

LIST OF TABLES

Table 4.1 Socio-demographic characteristics of pupil's households.....	31
Table 4.2 Socio-Economic Characteristics	34
Table 4.3 Knowledge on hygiene and sanitation	38
Table 4.4 Knowledge on nutrition deficiency diseases	39
Table 4.5 Knowledge on functions of food nutrients	40
Table 4.6 Knowledge on food choice, preparation and storage.....	41
Table 4.7 Nutrition Knowledge of the Pupils	43
Table 4.8 Sources of nutrition information.....	45
Table 4.9 Common sources nutrition of information.....	47
Table 4.10 Preference of the sources of nutrition information.....	49
Table 4.11 Attitudes towards Food Choice and food Consumption.....	54
Table 4.12 Attitudes towards learning nutrition	57
Table 4.13 Attitudes of pupils toward the Healthy Learning Programme and School Feeding Programmes	61
Table 4.14 Pupils Attitudes on Hygiene and Sanitation	62
Table 4.15 Pupils participation in activities at home.....	68
Table 4.16 Food consumption patterns of pupils.....	71
Table 4.17 Relationship between nutrition practices and nutrition-related attitudes.....	74
Table 4.18 Relationship between Nutrition Practice and Nutrition Knowledge	75
Table 4.19 Relationship between nutrition practice, nutrition knowledge and nutrition related attitudes..	76

LIST OF FIGURES

Figure 1.1 Factors affecting nutrition knowledge attitudes and practices among primary school children.....	7
Figure 3.1 Schematic Representation of the Sampling Techniques and Procedures	23
Figure 4.1 Proportion of pupils who drank boiled water	65
Figure 4.2 Occasions when hands are washed.....	66

LIST OF ACRONYMS AND ABBREVIATIONS

AMREF	African Medical and Research Institute
ASAL	Arid and Semi-Arid Lands
FAO	Food and Agriculture Organization
FGD	Focused Group Discussion
GOK	Government of Kenya
ICRAF	International Centre for Research on Agro-Forestry
KAP	Knowledge Attitudes and Practices
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
MOE	Ministry of Education
MOH	Ministry of Health
NALEP	National Agriculture and Livestock Extension Programme
NCAPD	National Coordinating Agency for Population and Development
NGO	Non-Governmental Organization
NCES	National Center for Education Statistics
OR	Odds ratio
SFP	School Feeding Programme
SPSS	Statistical Package for Social Scientists
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Education Fund
USAID	United States Agency for International Development
VVOB	Flemish Association for Development Cooperation and Technical Assistance
WAC	World Agricultural Center
WFP	World Food Programme
WHO	World Health Organization
4-K	Kuungana Kufanya Kusaidia Kenya

ABSTRACT

Nutrition Education is the process by which people gain knowledge, attitudes and skills necessary for developing appropriate dietary habits. Schools, families and communities are the main social contexts in which lifestyles are developed. They are excellent settings for promoting nutrition knowledge, attitudes and practices (KAP). In Kenya, there is scarcity of information on nutrition knowledge of primary school children. In addition, there is paucity of data on how nutrition knowledge influences their nutrition practices. The purpose of this study was to establish primary school pupil's nutrition knowledge, nutrition-related attitudes and practices in Kajiado District, Kenya. In addition, the study aimed at establishing the relationship between nutrition practice and nutrition knowledge and nutrition-related attitudes children. The study adopted a cross sectional analytical study design. A total of 280 randomly selected pupils from two schools; one urban and another rural were selected to participate in the study. To verify the self-reported practices, a 15% randomly selected sub-sample of the pupils were visited in their homes to observe nutrition-related practices. Focus group discussions were held with class 1-4 pupils, teachers and parents separately. The findings of the focus group discussion were used to explain the findings of the survey by providing in-depth information on nutritional knowledge, attitudes and practices. Data was analyzed using the Statistical Package for Social Scientists (SPSS) version 16. Correlations were used to establish the relationship between nutrition knowledge and practices such as washing hands as the data was continuous in nature. T-test was used to establish significant differences in knowledge and attitude mean scores. Chi-square was used to establish relationships between knowledge and attitude since the data was categorical. The overall nutrition knowledge was fair; the mean score was 13.8 out of a total of 20 questions. The nutrition knowledge of the children in Isinya Primary School was significantly higher (14.2 ± 2.69) than those of children from Nkoile Primary School (12.7 ± 2.33) $p = <0.001$. The pupils had an overall attitude mean score of 62.4 ± 11.73 . Nkoile Primary School had significantly higher mean attitude score compared to Isinya Primary School (69.7 ± 10.46) and (60.3 ± 11.25) respectively. There was no significant relationship between dietary diversity and the attitudes towards nutrition $r = 0.025$, $p = 0.069$. Therefore, the hypothesis that there is no significant relationship between the pupils' diet diversity and their nutrition-related attitudes is not rejected. In contrast, there was a negative correlation between nutrition knowledge and dietary diversity score $r = -0.133$, $p = 0.027$. Logistic regression analysis revealed that pupils who had a positive attitude and those whose performance was above average were more likely to undertake appropriate nutrition practices. Pupils who had positive attitude towards nutrition were 3 times more likely to wash hands before handling food (ODDS RATIO [OR] = 3.25; 95% Confidence Interval [CI] = 1.19-8.84; $P = 0.02$). This implies that Schools should inculcate positive attitudes towards nutrition among the pupils in order to encourage nutrition-related practices. Moreover, they should provide clean latrines, hand washing facilities with adequate amounts of soap and water in appropriate places to encourage hand washing. The findings of this study were not conclusive given that most variables were not positively associated with appropriate nutrition practices. As such, there is need to replicate a similar study on school children in other ASAL districts in Kenya in order to strengthen these research findings. The findings may be useful to organizations such as the Ministry of Education (MOE), Flemish Association for Development Cooperation and Technical Assistance (VVOB), International Centre for Research on Agro-Forestry (ICRAF), and other development partners dealing with education and health of school going children. The findings will also contribute to the existing body of knowledge in nutrition and health education.

CHAPTER ONE: INTRODUCTION

1.1 Background information

Good nutrition, health and education are key factors on the global agenda. None of these three factors alone, however, will suffice to achieve social and economic development; only in combination will they enable progress towards a world without poverty and hunger (Food Agricultural Organization [FAO], 2005a). Nutrition education is a significant factor in improving nutrition knowledge, attitudes and practices (KAP) of school children, family and the community at large (Contento, 2007). It is important to note however, that though nutrition education is an important entry point to teaching nutrition it is not the only source of nutrition knowledge. There are other entry points such as school environment, school meals, health and nutrition clubs and school gardens among others (Mbithe, 2008). In addition, the family and community play an important role in the acquisition of nutrition knowledge and nutrition-related practices. The school on the other hand is one of the main social contexts in which lifestyles are developed (FAO, 2005b). It offers an enabling environment to foster the indigenous nutrition Knowledge Attitudes and Practices the pupils have learnt from their homes and community (Eboh and Boye, 2006).

The nutrition knowledge acquired throughout school life is a factor of interaction between the school curriculum, school environment, the family and community (FAO, 2005b). To be effective in improving nutrition knowledge, nutrition education must address at least four fundamental areas: the classroom curriculum, the school environment, the family and community (FAO, 2003). The formal curriculum should be designed to provide adequate learning opportunities for learners to develop knowledge, attitudes and skills for adopting healthy eating behaviors (Valleau et al., 2004). Although the core objective of the schools is to provide education; it can also provide food through

school meals in order to improve children's diet and health, provide healthy influences such as availing clean drinking water, availing dust bins and compost pit, encouraging physical activity, hygienic latrines, soap and hand washbasins and leaky tins (FAO, 2003). All these contribute to nutrition knowledge, attitudes and practices.

In line with this, the Ministry of Education in Kenya in collaboration with Flemish Association for Development Cooperation and Technical Assistance (VVOB) and International Centre for Research on Agro-Forestry (ICRAF) established “The Healthy Learning Programme” in 2008. This programme supports capacity strengthening activities focused on improving the nutrition knowledge for school children at national, district, school and community levels. It facilitates the introduction of education school projects like school gardens, school meals, hygiene and sanitation, water management and other initiatives. This is done with the aim of supporting sustainable learning and food and nutrition security in primary schools and their surrounding communities, while simultaneously linking current school feeding programmes and school meals to local solutions. Based on this background, the study was intended to establish the status of pupils’ nutrition knowledge, attitudes and practices in two primary schools namely Isinya and Nkoile which were participating in the Healthy Learning Programme in Kajiado District.

1.2 Statement of the problem

Malnutrition is widespread among school children in many developing countries. Nutrition education contributes to acquisition of nutrition knowledge, attitudes and practices which may lead to improved nutrition status (World Health Organization [WHO]/FAO, 1998). Despite this, nutrition education which has a potential to address malnutrition has not been given much emphasis in the school curriculum in Kenya. In the

formal school setting, the teaching of nutrition-related subjects like Home science and Agriculture is declining. Home science covering nutrition education and agriculture covering food production and preservation among other topics have been removed from the syllabus. Only a few topics, with a reduction in content, are included in the science syllabus (Kenya Institute of Education [KIE], 2002). These include: Introduction to foods and nutrition, functions of nutrients, nutritional requirements for different groups of people, food hygiene, nutrient-deficiency diseases, food poisoning, food preservation and storage (KIE, 2002). Furthermore, there is no evidence that the science teachers were inducted on how to teach these nutrition topics (Mbithe, 2008).

In the school curriculum nutrition is not considered a core subject like Mathematics, Kiswahili and English and therefore it is allocated less time in the school timetable (KIE, 2002). A comparison of the FAO Guidelines for Nutrition Education in Primary Schools for Developing Countries and the Kenya Science Syllabus shows crucial deficits in the curriculum. The content coverage is narrow and not evenly distributed throughout the eight classes. Also, key topics such as Food and Emotional Development, Eating habits and Social Influences, Food and Production (*which contains some agricultural content*) and Consumer Aspects of Foods have been excluded from the Kenyan syllabus (FAO, 2005b). The deficits in the syllabus on coverage of nutrition education implies that nutrition knowledge and good hygiene and dietary practices could be lacking or need improvement among school children in Kenya (Mbithe, 2008). The limited nutrition education offered in primary schools focuses on increasing pupils' knowledge of good nutrition and passing examination, with less emphasis on motivation, attitude change and establishing good nutrition and health practices (FAO, 2005b). In addition, the role of the school environment, family and community has not been fully exploited to address gaps in nutrition knowledge, attitudes and practices of school children.

There is scarcity of information on primary school pupil's nutrition knowledge, attitudes and practices in Kenya. Similarly, there is scarcity of information on the relationship between nutrition practice and nutrition knowledge and nutrition related attitudes and nutrition-related attitudes in Kenyan primary schools. Appropriate nutrition knowledge, positive attitudes towards nutrition and appropriate nutrition practices are particularly important in Arid and Semi Arid Lands (ASAL) areas like Kajiado experiencing chronic food insecurity where malnutrition rates are consistently high and often exceeding the emergency threshold. Poor nutrition and health, inadequate water, poor sanitation and cultural issues in the district may not favour practices such as food production, food choices, consumption and appropriate hygienic practices like washing hands after visiting the toilet or before eating due to lack of adequate water. The Healthy Learning Programme is attempting to respond to this need by providing an enabling environment for the improvement of nutritional status of primary school pupils in Kajiado (VVOB/MOE, 2008a).

1.3 Purpose of the study

The purpose of this study was to establish the status of nutrition knowledge, attitudes and practices of primary school pupils in Isinya and Nkoile Primary Schools in Kajiado district. This study also established the relationship between nutrition-related practices and nutrition knowledge and nutrition-related attitudes.

1.4 Study objectives

The objectives of the study were:

1. To determine the socio-demographic and socio-economic characteristics of the pupils' household.

2. To determine the level of nutritional knowledge among pupils in Isinya and Nkoile Primary Schools in Kajiado.
3. To establish the sources of nutrition information for pupils.
4. To determine the attitudes of pupils towards nutrition.
5. To assess the nutrition practices of the pupils'.
6. To establish the relationship between nutrition-related practices, nutrition knowledge and nutrition-related attitudes of the pupils.

1.5 Hypotheses

The study tested the following hypotheses;

H₀₁: There is no significant relationship between the pupils' nutrition-related practices and nutrition knowledge.

H₀₂: There is no significant relationship between the pupils' nutrition practices and their nutrition-related attitudes.

1.6 Significance of the study

The findings may be useful to the study schools, Ministry of Public Health and Sanitation, Ministry of Education, Flemish Association for Development Cooperation and Technical Assistance (VVOB), International Centre for Research on Agro-Forestry (ICRAF), World Food Programme (WFP) and other development partners dealing with education and health of school going children in order to design interventions to improve nutrition-related practice.

The findings may be used to review or re-design policies and implementation strategies related to nutrition and health of school children. The findings will also contribute to the on-going research efforts on the role of nutrition education in improving nutritional

status of school children. It is also expected that the findings will be disseminated through publication in peer reviewed journals and references.

1.7 Delimitations of the study

The study was carried out among school children in Kajiado District, which is part of the Arid and Semi-Arid Lands (ASAL) in Kenya. Results can only be generalized to school children in similar situations.

1.8 Limitations of the study

Children are not the key decision makers on nutrition practices in school and at home hence most of their nutritional practices were not dependent on their choices. In addition, information on practices depended on self-reporting and not observation. Since the schools were in the Arid and Semi-Arid areas where population is sparse, some pupils' homes were very far from school and therefore it was not possible to visit all study pupils in their homes and thus only a sub-sample was visited to observe the nutrition-related practices.

The socio-demographic and socio-economic characteristics determined and discussed in this report were limited to household composition, education, occupation levels, and ownership of household items and sources of; food, lighting and drinking water. Information on income levels and household expenditure could not be obtained since pupils did not have this information.

1.9 Conceptual framework of the study

This study adapted a conceptual framework from Mbithe (2008) on Factors affecting the success of nutrition education interventions in Primary Schools. It focused on nutritional

knowledge illustrating the link between the school curriculum, school environment, community and nutrition knowledge of school children. It takes into consideration that the school cannot work in isolation stating that what is learnt in school is practised in schools, homes and the community. The community on the other hand influences the level of nutrition knowledge and supports school nutrition-related activities.

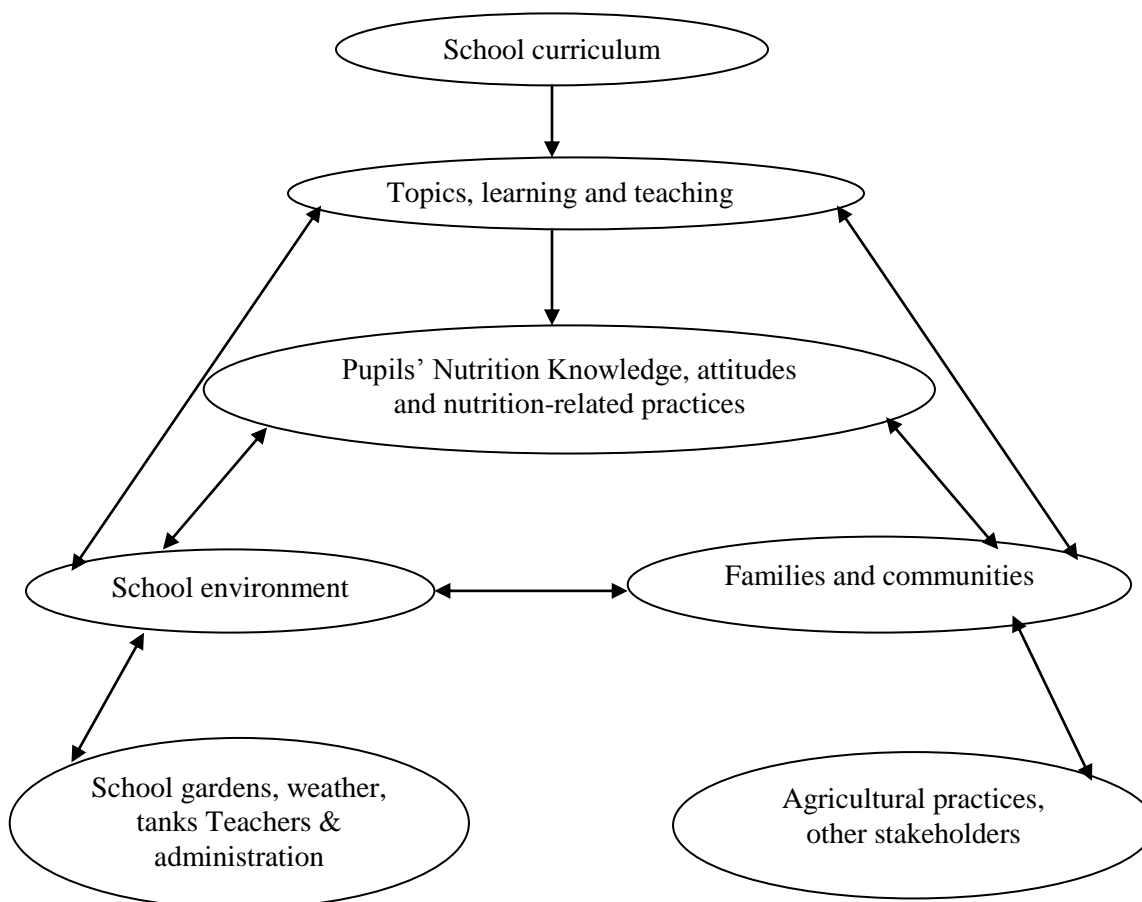


Figure 1.1: Factors affecting nutrition knowledge attitudes and practices among primary school children.

Source: Adapted and modified from Mbithe, 2008

The family as a basic unit in a society is a key source of nutrition knowledge and also provides a conducive environment to practice what is learnt in schools. What is taught in school is influenced by the school curriculum. Though the school curriculum plays a key role in improving pupils' knowledge it is obviously not an adequate source of knowledge, collaboration, of all the stakeholders is of importance if pupils are to achieve adequate

nutrition knowledge. The school environment on the other hand, is an excellent setting for learning and practicing what is taught in school and at home.

1.10 Operational definition of terms

Attitude towards nutrition: This represents an individual's degree of like or dislike or perceptions on nutrition knowledge, practice and Healthy Learning and School Feeding Programmes.

Curriculum: Refers to everything that runs or occurs under the auspices of a learning institution to address key learning areas. These areas are the ideas that focus on learning, learners, content and teaching and learning materials rather than on subjects as ends in themselves.

Nutrition Practices: Are those that are and can be influenced by nutrition knowledge and nutrition-related attitudes. In this study nutrition practices includes: dietary diversity score, food preservation, washing of hands before and after eating, washing of hands after visiting the toilet and washing fruits and vegetables before eating them.

Nutrition Knowledge: Refers to pupils', teachers' and parents' knowledge in the following areas covered in the syllabus: food nutrients; balanced diet; deficiency diseases; food preservation; storage hygiene and nutritional requirements for different groups.

Nutrition Education: Is the process by which people gain the knowledge, attitude and skills necessary for developing good dietary habits and other nutrition related practices conducive to health and well-being (Contento, 1995; FAO, 2005a).

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Nutrition education is linked to increase in nutrition knowledge, attitudes and practices necessary for developing a healthy lifestyle in school children. Nutrition education has the potential to significantly alter the behavior patterns of pupils and can thereby lead to improved outlook on nutrition and hygiene (Vivas et al., 2010). It has not only been shown to improve nutrition knowledge and skills but also dietary intake and physical activity as well as nutrition and health status (Shariff et al., 2008). Moreover, practices such as washing hands and washing of fruits and vegetables before eating are learned and retained. Nutrition knowledge is most effective if there is a supportive environment and if nutrition education is linked with practical food, nutritional and environmental activities. School meals, gardening and health and nutrition clubs and programmes offer unique opportunities for practical teaching and learning in nutrition (Vandenbosch, 2010).

Research has however, shown that nutrition knowledge is a necessary but not sufficient factor for changes in nutrition-related practices (Worsley, 2002). Nevertheless, studies suggest that nutrition knowledge may play a small but pivotal role in the adoption of healthier food habits (Worsley, 2002). Furthermore, Hendrie, Cox and Coveney (2008) found that nutrition knowledge is a significant predictor of dietary intakes, and that it is needed for better dietary intake habits. Nutrition practices of pupils are influenced by a number of factors such as the curriculum, school environment, nutrition knowledge, attitudes, cultural beliefs and norms (FAO, 2005a). Emphasis should also be placed on specific nutrition related practices such as washing hands and dietary intake (Sherman and Muehlhoff, 2007).

2.2 Nutrition education in schools

Nutrition, health and education are three important pillars, amongst others that form the basis of a thriving nation (FAO, 2005a). These three pillars are some of the major ways of addressing malnutrition, hunger and ill health. The positive effects of one of the three factors can be achieved only if accompanied by the other factors. Without proper health, for instance, good education is not possible; and without proper education, health suffers (FAO, 2005a). In comparison to the physical provision of food aid, teaching pupils' nutrition is more beneficial because it feeds people for life thus addressing malnutrition problems of the present and future time (Mbithe, 2008). Nutrition education is the process by which people gain the knowledge, attitude and skills necessary for developing good dietary habits. Studies show that interventions such as nutrition education, which address these three pillars, have a great potential to make a major contribution to a country's overall economic and social development (FAO, 2005a).

With the introduction of nutrition education programmes in the curriculum, pupils have opportunities to expand their nutrition knowledge and skills. Pupils learn to produce, select, consume healthy foods at home, and preserve harvested foods to prevent post harvest spoilage (Lytle, Stone and Knichaman, 1996). The goal of nutrition education is to reinforce specific nutrition-related practices or behaviors in order to change habits that contribute to poor nutrition and health. This is done by motivating change among people, to establish desirable nutrition behavior for promotion and protection of good nutrition and health (FAO, 1997).

Studies have shown that nutrition education offered in primary schools is effective in increasing pupil's nutrition and health knowledge (Eboh and Boye, 2006; Mbithe, 2008). It also has potential benefits that extend beyond the school environment to improve the

health, nutrition and well-being of households, communities and nations through choosing healthy diets, practicing hygiene and exercise (Graves, Farthing, Turchi, 1991; FAO, 2003). Nutrition education is however, different from other nutrition intervention programmes, since improved nutrition knowledge requires time to measure the effect (Margaret and Mamdouh, 1994). This is because people take long to change attitudes and adapt a new behaviour. Nutrition education interventions can therefore be evaluated through measurement of knowledge acquisition in the short term (Margaret and Mamdouh, 1994).

However, linking theory and practice in nutrition education seems to be a challenge. Research has shown that gains in knowledge and attitudes do not always result in positive changes in practice and that focusing on specific behavior such as: increased need to wash hands; eat a balanced diet among others appear to maximize the chance of changing nutrition-related practices (Sherman and Muehlhoff, 2007). To be effective, nutrition education should be part of a “whole-school” approach, where classroom learning is linked with practical action, endorsed by improvements in the school environment and community participation. It should have a considerable focus on individual practices and an active, learner-centered methodology (Sherman and Muehlhoff, 2007). Inadequate teaching resources still way down the education and practice of nutrition with teachers’ inability to innovate, improve and venture into more practical based opportunities (VVOB/MOE, 2008b).

2.3 Importance of learning nutrition in early school years

Early development of children’s intellectual, social and physical abilities has the potential to affect their long term achievement, beyond the initial introduction to the classroom, through their school lives and into adulthood. Being more receptive to learning children

are very likely to adopt healthy behaviors at a younger age (Vivas et al., 2010). Promoting nutrition early in life paves the way for healthy behavior and dietary habits during adulthood, as the knowledge and skills learned early in life are likely to be retained and practiced in the future (FAO, 2003).

Studies have shown that nutrition education and other interventions aimed at improving children's nutrition status are most successful early in life (Eboh and Boye, 2006). Schools are ideal settings for promoting nutrition KAP, because nutrition and education are closely linked, and because dietary, hygienic and exercise habits that affect nutritional status are formed during the school-age (Shariff et al., 2008). In school, pupils should therefore learn the benefits of good nutrition, value of a diverse diet, sanitation and the need to develop healthy eating habits among other disciplines at an early age (Mbithe, 2008).

Peers play an important role in a child's socio-emotional growth. Children act as change agents, they can help change the eating habits of their friends and families by demanding desirable food and when they themselves become parents in the future they can impart good dietary habits to their children (FAO, 1997). They can also be agents of change by spreading what they have learned in school to their family and community Members (Vivas et al., 2010).

2.4. School and community as a learning environment for appropriate nutrition practices

Nutrition education provides people with the knowledge, skills and motivation to make wise dietary and lifestyle choices, building a strong basis for a healthy and active life. Okorududu and Okobiah, (2004) suggest that an enabling school environment positively influences learners and gives them opportunities to expand nutrition knowledge and

practice what they know. Providing healthy meals and snacks, integrating nutritional themes such as healthy eating and physical exercises into lessons and emphasis on the benefits of good nutrition are good approaches to teaching nutrition (<http://wsd.waupaca.k12.wi.us/staff>, July 2009). Families may engage in schools through their involvement in family support groups, parent education classes, accessing resources from school; they may also benefit from school projects such as school gardens and farms as food sources (Anderson-Butcher et al., 2009).

According to FAO (2005a) though both the school and family are stakeholders in nutrition knowledge, the family is the basic unit/home where nutrition knowledge is practiced. Early parental influences can have long-term impact on a person's dietary practices. Parents can influence school children's dietary and health practices in the following ways: controlling availability and accessibility of foods and resources such as water and soap, food modeling, food socialization practices, and food-related parenting (Nicklas et al., 2001). Children chose to eat foods that they were served most often, and prefer what is available and acceptable in the parental household. What children eat at home and their families' attitudes and behavior regarding food and eating, represent children's idea of what is normal. What their parents say about nutrition represents, for a long time, the "truth" (FAO, 2005b).

Moreover, children do not always choose what they eat; very often parents decide and prepare food for them. Parents, peers and teachers can play a crucial role in shaping each child's outlook towards nutrition and health (Shah et al., 2010). Addressing nutrition KAP and health issues within the child's family environment involves: increasing parental awareness on ways to make healthy foods more available and accessible at homes for their children; avoiding excessive control of children's food intake and

modeling of healthy food behaviors (FAO, 2003). Community involvement in school activities is desirable but not always achievable. This has practical reasons; some parents are at work all day and have no time during school hours, some live far away and not all parents and community members support the school management. Nonetheless, all the stakeholders should work together in order to influence pupils understanding, beliefs and habits related to good nutrition and health.

There are programmes in Kenya which help address issues concerning nutrition and health in schools which include: WFP; WHO; UNICEF and The Healthy Learning Programme among others. The WFP, WHO and UNICEF in collaboration with the Ministry of Education and Ministry of Public Health and Sanitation provide food, water and toilet facilities within the school and community in-order to boost health and nutrition especially in arid areas like Kajiado. The Healthy Learning Programme on the other hand provides funds to support school-based projects that complement the School Feeding Programme in Isinya and Nkoile Primary Schools. The programmes however, face enormous challenges in trying to improve nutrition and health status of school children (Vandenbosch, 2009).

2.5 Pupil's sources of nutrition information

The school environment, classroom curriculum, families and communities are appropriate settings for introducing nutrition information and technologies to pupils. This information is necessary in advocating policies and services that promote good nutrition and health (WHO/FAO, 1998; FAO 2005b). In Ohio, Shoaf and McClellan (1996) suggested that the main sources of nutrition information are school physical education/health courses, and classroom curriculum.

Jacobson et al. (2001) reported similar sources in Ohio with an addition of magazines, friends, radio and television. Bedgrood and Tuck (1993) in Texas reported that 66% of teachers sourced nutrition information from journals and the internet. Activities such as group discussion on nutrition topics, demonstrations, nutrition contest, symposiums, and video presentations can also be included to enhance learning among the pupils (WHO/FAO, 1998) since they are good sources of nutrition information. For school age children the provision of quality school textbooks and teachers can provide adequate sources of nutrition information if the child is present, ready, and able to learn. In Kenya the sources of nutrition information among school children have not been fully investigated. This study provided information on the sources of nutrition information among school children.

2.6 Pupils' nutrition knowledge, attitudes and nutrition practices

Schools have a potential to reach a high proportion of school children, the school community and to provide opportunities to practice healthy eating, food safety and teach pupils on unhealthy social pressures since eating is a socially learned behavior that is influenced by social pressure (WHO/FAO, 1998; FAO, 2005a). One of the principal aims of learning nutrition is to provide people in rural and urban areas with adequate knowledge, skills and motivation to procure and to consume appropriate diets (FAO, 1997). According to Sherman and Muehlhoff, (2007) knowledge and behavior can be achieved among children and their families with an actively implemented classroom program backed by teacher training and parent involvement, even in the absence of school-based nutrition and health services.

According to FAO (2005a) however, in many countries schools do not offer nutrition education. Where it is offered, it often focuses on increasing pupils' knowledge of good

nutrition, with less emphasis on motivation and establishing healthy practices. In addition, it is important to note that scholarly learning alone as offered in schools in Kenya for example will not have any lasting effect on behaviour: it needs to be reinforced by skills and behaviour training and attention to attitudes (FAO, 2005a). UNICEF, 1998 suggests that in order to change nutrition and hygienic practices three factors have to be addressed: predisposing factors such as knowledge, attitude and belief; enabling factors such as availability of resources like latrine facilities and safe water supply, enabling students to transform newly acquired knowledge, attitudes and beliefs into desirable practices and reinforcing factors which affect the students' ability to sustain a certain behaviour, like support and cooperation received from parents, guardians and peer groups. Whereas appropriate hygiene education can bring about the intention to change hygiene behaviour, for most hygiene behaviours appropriate water and sanitation facilities are needed to allow people to transform intention to change into real change (UNICEF, 1998).

A nutrition education intervention study conducted by Shariff et al. (2008) in four primary schools in Malaysia revealed that at baseline, there were no significant differences in the mean KAP scores between the intervention and comparison groups. Post intervention mean scores of KAP items for the intervention group however show consistent and significant increments as indicated by the mean change in nutrition knowledge (Mean change=2.17, $p<0.001$), attitude (Mean change =1.40, $p<0.001$) and practice (Mean change=0.87, $p<0.001$) score between baseline and follow-up. However, no significant differences between pre and post intervention mean KAP scores were observed for the comparison group. Consistent with the findings, there was a significant difference in nutrition knowledge and practice between the intervention and comparison

groups. This implies that nutrition education programmes play an important role in improving pupils' nutrition knowledge.

A study conducted in four rural and urban primary schools by Mbithe, 2008 in Machakos District revealed that (35%) of the pupils scored "Very Poor" in the pre-tests, indicating that the pupils were not knowledgeable in nutrition. The results from the pre-tests indicated that all the intervention schools (experimental and control, rural and urban) were basically the same in terms of nutrition knowledge at the beginning of the intervention. Post intervention results indicated significant differences between the experimental and control schools with the experimental schools performing significantly better than the control schools. This study also revealed that nutrition practices in the area before the intervention were poor. Practices which had improved after intervention include: improved selection and packaging of food, hygienic practices and dietary patterns. This implies that school-based nutrition education should equip pupils with knowledge and skills as prerequisites for acquiring healthy nutrition-related practices. In other words, for children to adopt and maintain health-enhancing practices, they need to have adequate knowledge of the health and nutrition concern, attain the right attitudes to deal with the concern and possess the necessary skills and be self-efficacious to assume the health-enhancing behavior (Shariff et al., 2008). In addition, pupils need appropriate facilities which could play a key role in transforming the intention to change nutrition practices into real change.

2.7 Summary of the literature review

Good nutrition and health is important for the well being of school children. Ensuring that children are well nourished, healthy and able to learn is an essential component of effective nutrition knowledge. Nutrition education provides people with the knowledge,

skills and motivation to make wise dietary and lifestyle choices, building a strong basis for a healthy and active life. The school provides a critical setting to improve and sustain the health, nutrition, and education of children.

Whereas appropriate nutrition and health education can bring about the intention to change behaviour appropriate facilities and support is needed within the school environment to allow pupils to transform intention to change nutrition practices into real change. Increasing pupils' knowledge about nutrition and health should therefore not be pursued in isolation. When knowledge is supported by enabling and reinforcing factors, desirable changes may occur in the school setting and in the community. The school environment should therefore provide a conducive environment within which nutrition aspects can be practiced. In Kenya, there is scanty information on pupils' nutrition knowledge, nutrition-related attitudes and nutrition practices. In addition, there is limited information on how pupils' nutrition knowledge influences their practices in nutrition. This study therefore purposed to establish the status of nutrition knowledge, attitudes and practices of primary school pupils in Isinya and Nkoile Primary Schools in Kajiado district. This study also established the relationship between nutrition practice and nutrition knowledge and nutrition-related attitudes.

CHAPTER THREE: METHODOLOGY

3.1 Research design

This study adopted a cross-sectional analytical study design to establish the status of nutrition knowledge, attitudes and practices and to investigate the relationship between nutrition-related practices and nutrition knowledge and attitudes of pupils in Kajiado district. This design is appropriate for determining association between the independent and dependent variables of the study. It also allows for extensive data collection of both quantitative and qualitative data within a limited time frame (Katzenellenbogen, Joubert, and Abdool-Karim, 2002).

3.2 Study variables

The dependent variable for the study was nutrition-related practices which referred to consumption of a diverse diet, food preservation, and washing of hands before and after eating, washing of hands after visiting the toilet and washing fruits and vegetables before eating them. The independent variables were socio-demographic and socio-economic characteristics of the households from which the study children came from, education level of household members, age of pupils and parents, gender of pupils, occupation levels, ownership of household items and sources of; food, lighting and drinking water, attitudes of pupils towards nutrition and nutritional knowledge.

3.3 Location of the study

The study was carried out in Isinya and Namanga divisions, in Kajiado district. The study schools namely Isinya and Nkoile Primary Schools were purposively selected because they were among those participating in the ongoing Healthy Learning Programme (HLP). Furthermore, the schools were exploring different Healthy Learning projects with Isinya Primary School involved in hay harvesting while Nkoile Primary School reared poultry.

The Healthy Learning Programme is being implemented in 30 schools in 8 arid and semi arid districts in Kenya. The programme addresses each school as a holistic entity and look together for opportunities for “Healthy Learning” using existing systems, curriculum and mechanisms (<http://healthylearningprogramme.blogspot.com>, August 2011). At the school level, initiatives and small “projects” using available – and affordable – resources have been supported. It uses an integrated approach, correlating learning activities with food, nutrition, health and environmental issues in schools and their communities by facilitating the introduction of educational school projects like school gardens, school meals, hygiene and sanitation, water management and other school projects (VVOB/MOE, 2008a).

These two schools are located in semiarid regions and had ongoing School Feeding Programmes (SFP) at the time of the study. Both the HLP and SFP are appropriate avenues that could promote exploratory and practical approaches to learning nutrition while at the same time contribute to improved nutrition KAP among school children in Isinya and Nkoile Primary Schools. Isinya Primary School is in an urban setting while Nkoile Primary School is in a rural area.

3.4 Target population

The target population was primary school pupils in class 1- 6. Studies (Murphy et al., 1994; Winter et al., 1999 and Otiono, 2005) have shown that nutrition education and other interventions targeting small children are most successful in early school years since behavioural pattern become more resistant to change after class six.

3.4.1 Inclusion criteria

- Pupils in schools in the Healthy Learning Programme

- Schools with a School Feeding Programme
- Pupils' in class one to six
- Pupils willing to participate or where teachers were willing for them to participate in the study

3.4.2 Exclusion criteria

School children in class seven and eight

3.5 Sample size determination and sampling procedure

3.5.1 Sample size determination

The sample size was obtained using the formula by Cochran (1968) as cited by Fisher, Laing and Townsend, (1991).

$$n = \frac{Z^2 (up) / d^2}{q^2}$$

Where: n- Desired sample size

P- The estimated population of school enrollment (77%)

q- 1-p (1-77)

Z – Standard normal deviate set (1.96 at 95% confidence interval)

d- Degree of accuracy (0.05)

Thus $n = 1.96^2 (0.77 \times 0.23) / 0.05^2 = 272$. This was approximately 280 pupils

The Kenya National Net enrollment for primary school children was used to determine the proportion of school enrollment in the country which was 77% in 2003 (Vos et al., 2004). The estimated population in Nkoile Primary School was 391 while that of Isinya Primary School was 868 (VVOB/MOE, 2008). Thus the total population for the two schools was 1259. To determine the sample size for each school the calculated total sample (280) was divided by the total population for the two schools multiplied by the

population in each of the schools to get the sample size proportional to the total school population.

- a) Sample size for Nkoile Primary School

$$280/1259 \times 391 = 86.9 \text{ this was approximately } 90$$

- b) Sample size for Isinya Primary School

$$280/1259 \times 868 = 193 \text{ this was approximately } 200$$

The Sample size for Nkoile Primary School (90) was not obtained due to the small class sizes. Consequently, a comprehensive sample of 64 pupils was obtained in Nkoile Primary School. The Focus Group Discussions consisted of 6-12 persons per group purposively selected to provide information. Members of the focus group discussions were recruited with the help of Deputy Headteachers in the schools. The pupils who participated in the focus group discussion were not part of the 280 sample size.

3.5.2 Sampling technique and procedures

Two primary schools were purposively selected, because they form part of the schools where the Healthy Learning Programme is implemented. Nkoile Primary School represented rural day mixed schools while Isinya Primary School represented urban mixed schools with both day and boarding facilities. Proportionate stratified sampling by class and sex was used to select the pupils to participate in the study (Figure 3.1). This was to ensure equal representation of pupils of both sexes and pupils in classes 5 and 6. Pupils were further stratified proportionately by performance based on the end of term academic performance to ensure that the sample was not biased towards either low or high performance; pupils' nutrition knowledge could be skewed towards better or poor performance. This would introduce bias in the study as performance implies intelligence

which can affect nutrition knowledge. Pupils from each stratum were then selected by simple random method using Random Table Numbers. A 15% randomly selected subsample of the children was visited at home in order to observe nutrition-related practices to verify the self-reported information.

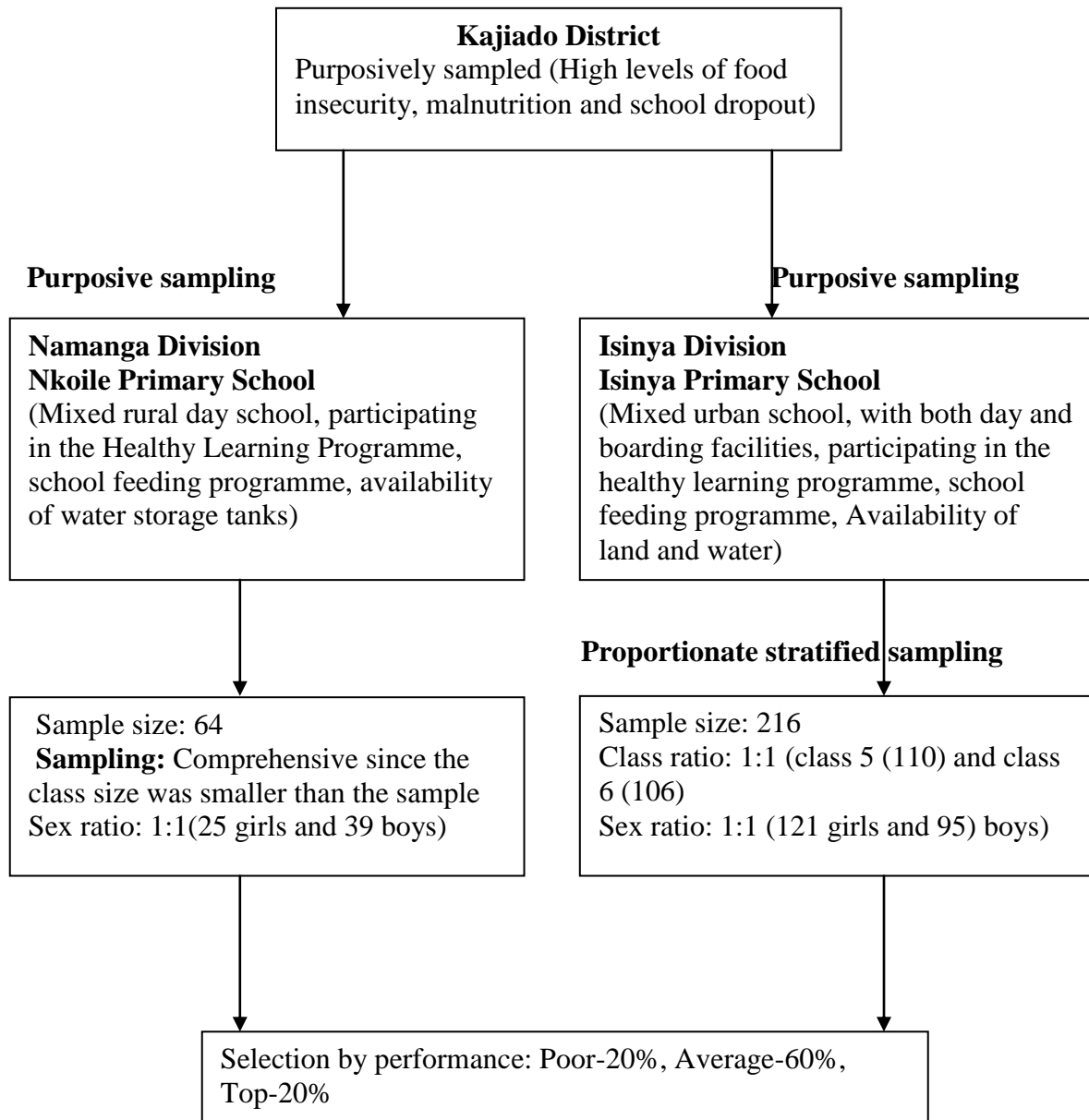


Figure 3.1: Schematic representation of the sampling techniques and procedures

3.6 Data Collection instruments

The questionnaire was divided into two sections, section one of the questionnaire was researcher-administered while section two was self-administered where respondents filled

in the responses themselves (Appendix 1). Section one covered socio-demographics and socio-economic characteristics, nutrition-related attitudes and dietary patterns of pupils while section two covered nutrition knowledge and nutrition practices.

Focus group discussion guides (Appendix 3, Appendix 4, Appendix 5 and Appendix 6) collected additional information on nutrition knowledge, attitudes and practices. Key informant interview schedule and observation checklists (Appendix 7) were used to obtain additional information on nutrition knowledge, attitudes and practices and were also used to verify the information collected from respondents.

3.7 Data collection procedures

Data collection was undertaken by the researcher and two research assistants. Permission to conduct the study was sought from the District Education Officer (DEO), Kajiado District and head teachers in the two study schools. The academic supervisors made two visits to the study site to monitor the progress of the research. Pupils were assisted to answer the section on socio-demographics and socio-economic characteristics, nutrition-related attitudes and dietary patterns of pupils as the section was detailed. The students however recorded their responses on nutrition knowledge and nutrition practices.

In Isinya Primary School the pupils responded to section one of the questionnaires for a period of four days, on the fifth day all the pupils responded to section two of the questionnaire which was self-administered. This was meant to avoid transfer of information from one target group to another which could introduce bias to the study. In Nkoile Primary School only two days were taken by the pupils to respond to section one of the questionnaires and on the third day all the pupils responded to section two of the questionnaire. Every day the researcher checked the questionnaires to ensure

completeness, consistency and logical responses. Any questionnaires that had problems were attended to the next day.

Focus Group Discussions held separately for class 1-4 pupils, parents and teachers generated qualitative data. The researcher facilitated all the Focus Group Discussions and one of the research assistants recorded and the other observed the deliberations. The discussions were useful in collecting in-depth information on nutritional knowledge, attitudes and practices in the schools. In every school a total of five focus group discussions were held as follows: 1 FGD with class 1 and 2 pupils; 1 FGD with class 3 and another with class 4 pupils. This was to ensure equal representation from all the classes so as to obtain representative views of all the pupils. One FGD was held with teachers and another one with parents. The FGDs were held either in the library, staffroom or in class rooms at a convenient time and place for the participants. Efforts were made to ensure the selected venues were comfortable and free from disturbance. On average, the FGDs lasted one hour. The findings of the FGDs were triangulated with the reported quantitative data.

Focus Group Discussion was conducted in a standardized manner: the facilitator introduced the research team and welcomed the participants who introduced themselves. The facilitator then explained the purpose of the meeting and set the discussion rules. The facilitator then started by asking the first question on the focus group discussion guideline. Although the guideline questions were followed as closely as possible during the discussion efforts were made to ensure a natural flow of conversation, without losing purpose of discussion. Efforts were made to ensure a balanced discussion by encouraging shy or quiet members of the group to participate. Domination of discussion by individual participants was discouraged. At the end of the discussion the facilitator would respond to

questions or pertinent issues raised during the discussion. Finally the facilitator thanked the members for participating in the discussion.

Key informant interviews were held with the head teachers and teachers in charge of the Healthy Learning and School Feeding Programmes in order to get in-depth information on how the programmes operated within the schools. The interviews were conducted by the researcher in the participants' office.

Observation of a sub-sample 15% of pupils was undertaken to verify information reported on nutrition practices. Some of the aspects observed included; washing hands after visiting the toilet, before handling food, before having meals and pupils participation in nutrition activities at home such as cooking. The researcher accompanied the pupils to their homes during the weekends to observe their nutrition practices.

3.7.1 Training research assistants

Two research assistants participated in data collection. The selection criteria for the research assistants were a minimum of Kenya Certificate of Secondary Education (KCSE) and a good command of English and Kiswahili. One of the research assistants had a good command of Kimaasai (the local language) and assisted in translation during Focus Group Discussion and home visits. Training of research assistants took two days. The purpose of the training was to explain; the objectives of the study, research methodology and the role and responsibility of the research assistants.

During training the objectives of the study were explained to the research assistants, without disclosing the research hypothesis. The training also involved going through the

questions one by one in order for the research assistants to understand the essence of each question. They were taught interviewing skills through demonstration and role play.

3.8 Pre-testing of research instruments

The study was pre-tested among school children in Kepiro Primary School in Kajiado district. This school was located in an area comparable to the study schools in terms of socio-economic and demographic characteristics as well as climatic conditions. The school had an ongoing School Feeding Programme. The pre-testing was conducted to establish accuracy of questions and clarity, and to determine the length of interviews. During pre-testing an effort was made to check for consistency in the interpretation of questions and to identify ambiguous items. After review of the instruments all suggested revisions were made before being administered in the actual study.

3.8.1 Validity

To ascertain the degree to which the data collection instruments measured what they purported to measure, the instruments were validated by a group of professionals from Kenyatta University and VVOB. The aspects tested on the questionnaire were also drawn from the available literature (books, magazines and past examination papers) in nutrition education for primary schools. The questionnaire was also pretested prior to data collection to ascertain content and face validity.

3.8.2 Reliability of questionnaires

This refers to quality control measures of the data collected. Before data collection the research assistants were intensively trained on objectives of the study and on data collection techniques. The process of data collection involved the principal researcher and the two research assistants. Questionnaires were checked daily for completeness,

consistency, and clarity as mentioned earlier. In addition, the academic supervisors visited the research site periodically to monitor the process of data collection.

3.9 Data analysis

Quantitative data was cleaned, coded and entered into SPSS version 16, SPSS Inc. for analysis. Descriptive statistics of frequencies, percentages, means and standard deviation were used to describe the characteristics of the parents and pupils; age, education level, marital status, ownership of items, sources of food, lighting and water, nutrition knowledge, nutrition practices and nutrition-related attitudes. Nutrition knowledge was determined based on nutrition knowledge scores. Scores were coded as 1 for a correct response and 0 for an incorrect response. The overall nutrition knowledge score for each pupil was determined by the number of correct responses; those with higher scores reflected higher nutrition knowledge. Attitude of pupils was measured by using a five point Likert Scale ranging from 5=Strongly Agree, 4=Agree, 3=Undecided, 2= Disagree, 1= Strongly Disagree.

Inferential statistics were used to determine statistical significances in selected variables between the pupils of Nkoile and Isinya. T-test and chi-square tests were used to establish relationships and associations between nutrition practice and knowledge and between nutrition practice and attitudes. Logistic regression analysis was used to determine predictors of nutrition practices. Significance of the results was determined at 95 % confidence interval. Qualitative data from Focus Group Discussions and Key Informant Interviews were first transcribed and then coded by assigning labels to variable categories. Common themes were then established and clustered in a patterned order to clarify variables. Inferences were made from particular data under each theme then conclusions were drawn from the findings. The findings were triangulated with the reported quantitative data.

3.10 Logistical and ethical consideration

Clearance to conduct the research was obtained from Graduate School Kenyatta University. A research permit was obtained from the Ministry of Education Science Technology. Clearance was also obtained from the district education officer of Kajiado North and Kajiado Central Districts. Informed consent was obtained from the primary school head teachers, teachers and pupils after the study objectives and methodologies had been explained to them. Study participants provided oral consent prior to participating in the study and participation was completely voluntary. Respondents were assured that the data collected was for purposes of the study and was to be treated with uttermost confidentiality.

CHAPTER FOUR: FINDINGS AND DISCUSSIONS

4.1 Socio-demographic and socio-economic characteristics of pupil's households

4.1.1 Socio-demographic characteristics of pupil's households

The socio-demographic information reported and discussed in this chapter include; household composition, education, marital status and occupation. These variables were purposely selected based on the information the pupils and teachers were able to provide accurately. Teachers verified the information provided by the pupils since they knew them and the households they came from.

The total number of household members drawn from both Isinya and Nkoile Primary Schools was 1723, of which the males formed 51.5 % and 48.5 % were females. This finding is in agreement with a study conducted in Machakos district, which showed that the males in the households were 51% while the females were 49% (Mbithe, 2008). However, the findings are slightly different from those by Kenya National Bureau of Statistics [KNBS] and ICF MACRO, (2010) which showed that the household population for females is 51% while that of males is 49 %. The mean age of the pupils from the two schools was 12.7 years ± 1.15 ; pupils in Nkoile Primary School were significantly older 13.1 years ± 1.77 than those from Isinya Primary School 12.4 years ± 1.19 ($p = 0.0001$).

The majority of the parents had secondary education and above with more fathers (34.7%) than mothers (28.1%) having attained college education. Slightly, more fathers (31.9%) and mothers (33.9%) from Nkoile Primary School had no formal education as compared to fathers (3.2%) and mothers (3.1%) from Isinya Primary School. This is probably because Isinya is in an urban centre. Majority of the pupils' parents were married (89.7%) while 8.8% were single only 0.8% were separated (Table 4.1).

Table 4.1: Socio-demographic characteristics of pupil's households

Characteristics of household members	Both schools N=280		Isinya N=216		Nkoile N=64	
	n	%	n	%	n	%
Total of household members	1723		1324		399	
Pupils' sex						
Male	134	47.9	95	44.0	39	60.9
Female	146	52.1	121	56.0	25	39.1
Sex of household members						
Males	887	51.5	678	51.2	209	52.4
Females	836	48.5	646	48.8	190	47.6
Educational level of fathers						
Pre-school	8	3.2	7	3.7	1	1.6
Not completed primary	10	4.0	7	3.7	3	4.9
Completed primary	42	16.9	31	16.6	11	18.0
Secondary	58	23.4	55	29.4	3	4.9
College	86	34.7	74	39.6	12	19.7
No formal education	25	10.1	6	3.2	19	31.1
Adult literacy	19	7.7	7	3.7	12	19.7
Educational level of mothers						
Pre-school	6	2.3	4	2.1	2	3.2
Not completed primary	17	6.6	14	7.2	3	4.8
Completed primary	51	16.0	44	17.5	7	11.3
Secondary	74	28.9	66	34.0	8	12.9
College	72	28.1	63	32.5	9	14.5
No formal education	27	10.5	6	3.1	21	33.9
Adult literacy	19	7.4	7	3.6	12	13.4
Marital status of parents						
Married	239	89.7	182	89.5	57	90.3
Single	23	8.8	18	9.0	5	8.1
Separated	2	0.8	1	1.5	1	1.6
Occupation of fathers						
Employed	137	63.3	101	50.5	36	57.4
Self-employed	58	17.4	44	22.0	14	21.3
Unemployed	69	19.3	55	27.5	14	21.3
Occupation of mothers						
Employed	114	42.7	102	65.6	12	19.4
Self-employed	83	31.3	56	18.3	27	43.5
Unemployed	69	26.0	46	16.1	23	37.1

A study by Parmenter, Waller and Wardle, (2000) on demographic variation in nutrition knowledge indicated a linear relationship between knowledge and education levels. With scores being lowest for people with no formal education while those with degrees scored

highest. Possible reasons given were that education incorporated the information included in that particular research and education exposes people to make better use of a variety of media (newspapers, brochures, magazines) which could provide nutrition information. Findings from the focus group discussion showed that most of the parents in Nkoile Primary School depended on their children for nutrition education and general reading since they had no formal education. This therefore implies that parents may not be relied upon to adequately transfer nutrition knowledge to the pupils. These findings concur with those of Ayieko and Midikila (2010) in Sabatia Division, Vihiga District in Western Province of Kenya, on food distribution and how it impacts on child nutrition that low levels of education constrained knowledge required to select nutritious foods.

It is also important to note that there were low cases of separation within the study population. This implies that most of the pupils are raised within a family set up. Studies have shown that the family is the basic unit where nutrition knowledge is learned and practiced (FAO, 2005a). This could possibly be a suitable avenue for nutrition education especially if parents are empowered with appropriate nutrition information.

Considerably, more fathers (63.3%) than mothers (42.7%) were employed. In Isinya Primary School more mothers (65.6%) than fathers (50.5%) were employed while in Nkoile Primary School more fathers (57.4%) than mothers (19.4%) were employed. About 43.5% of the mothers in Nkoile Primary School were self-employed. Findings from the focus group discussions point out that the self-employed parents were involved in: running small scale businesses and farming while some of those employed worked as casual labourers in the flower farms. Overall, about one-fifth of the mothers (25.6%) and fathers (19.0%) in both schools were unemployed; this could lower the purchasing power of food and education leading to lower levels of nutrition knowledge and dietary

diversity. It could possibly lead to overdependence on school meals or on food aid at household level.

4.1.2 Socio-economic characteristics of pupil's households

Socio-economic characteristics of pupils are important determinants of the health and nutrition status of household members, especially children. The characteristics can also be used as proxy indicators of the socio-economic status of households which may in turn influence the nutrition knowledge and practice of children. The following proxy indicators were used: ownership of consumer goods; types of materials used for housing; sources of fuel; sources of lighting; sources of food and drinking water and toilet facility available. Ownership of durable goods varied with residence, while most of the households in the urban center (Isinya) owned televisions, radios and video cassette players; most rural dwellers (Nkoile) owned land and farm animals.

Table 4.2 shows that radios, (92.1%) televisions (67.0%), agricultural land (66.4%), farm animals, and the land on which the dwelling is located stand out as the assets most commonly owned by households. Notably, a lower proportion of households owned bicycles (55.6 %), video cassette player (37.6%) and vehicles (34.8%). These findings agree with the (KNBS and ICF Macro, 2010) where 74% of Kenyan households owned radios, while about two-thirds own land, their dwelling, and agricultural animals and fewer (30.1%) households owned bicycles. Whereas more households in Isinya Primary School owned televisions (75.8%), bicycles (57.7 %), video cassette players (45.4%) and vehicles (37.7%) households in Nkoile Primary School recorded high ownership of land (87.5%), cows (87.5%), sheep (84.4%) and goat (92.2%).

Table 4.2: Socio-Economic Characteristics

Socio-economic characteristics	Both schools N=280		Isinya N =216		Nkoile N=64	
	n	%	n	%	n	%
Ownership of household item						
Radio	255	92.1	194	91.1	61	95.3
Television	187	67.0	163	75.8	24	37.5
Bicycle	155	55.6	124	57.7	31	48.4
Video cassette player	105	37.6	98	45.4	7	10.9
Land	195	66.4	139	65.0	56	87.5
Vehicle	97	34.8	81	37.7	16	20.0
Cows	177	63.4	121	56.3	56	87.5
Sheep	161	57.9	107	50.0	54	84.4
Goat	180	64.5	121	56.3	59	92.2
Type of roofing material						
Mud	44	15.8	20	9.3	24	37.5
Corrugated iron	219	78.1	183	84.7	36	56.3
Grass	17	6.1	13	6.0	4	6.2
Sources of fuel						
Firewood	161	57.5	103	47.7	58	90.6
Charcoal	217	77.5	179	82.9	38	59.4
Paraffin	105	37.5	83	38.4	22	34.4
Electricity	56	20.0	52	24.1	4	6.3
Gas	46	16.4	39	18.1	7	10.9
Sources of lighting						
Electricity	123	43.9	111	51.4	12	18.8
Kerosene hurricane	125	44.6	92	42.6	33	51.6
Firewood	35	12.5	16	7.4	19	29.7
Candle	67	23.9	57	26.4	10	15.6
Kerosene tin lamp	159	57.0	119	54.4	42	65.6
Sources of food						
Purchases	211	75.5	161	74.5	50	78.1
Own production	133	47.5	98	45.4	35	54.7
Food aid by WFP	34	12.1	14	6.5	20	31.3
Donations	41	14.6	35	16.2	6	9.4
Sources of drinking water						
Tap inside the compound	141	50.4	128	59.3	13	20.3
Tap inside the house	83	29.6	75	34.7	8	12.5
Spring	29	10.4	17	7.9	12	18.8
Rain tank	144	51.8	103	48.1	41	64.1
Bore hole	84	30.0	55	25.5	29	45.3
Type of toilet facilities						
Traditional pit latrine	192	68.6	155	71.8	37	57.8
Flush toilet	48	17.1	38	17.6	10	15.6
No latrine	35	12.5	19	8.8	16	25.0

Multiple responses allowed

The majority of the houses (77.4%) were made of corrugated iron roofs. In Isinya Primary School 84.7% of the pupils' houses were made of corrugated iron roofs while in Nkoile Primary School only 56.3% of the houses had corrugated iron roofs. Approximately 16% of the pupils' houses were made of mud roofs; this was especially common among those who lived in the rural areas. According to KNBS, (2008) one and a half of Kenyan's population does not have access to electricity and three quarters use firewood as the source of fuel for cooking. Table 4.2 shows a substantial proportion (77.5%) of households used charcoal as a source of cooking fuel. The second source of cooking fuel used was firewood (57.5%), followed by paraffin (37.5%), electricity (20%) and lastly 16% of the households used gas. Findings of the (Kenya Integrated Household Budget Survey [KIHBS] 2005; KNBS and ICF Macro, 2010) reveal that nationally, firewood remains a main source of fuel among households, with over 80% of rural household predominantly depending on firewood. The second most utilized source of fuel was charcoal and paraffin was ranked third. This was confirmed through observation of the households in the sub-sample that were visited by the research team.

The findings showed that the most common source of lighting is kerosene tin lamp (57.0%), followed by kerosene hurricane (44.6%) then by electricity (43.9%). Fewer households used candles and firewood as a source of lighting, (23.9%) and (12.5%) respectively. These findings agree with the report from KIHBS, 2005 which determined that in Kenya, paraffin-based lamps are the leading sources of lighting for households (77.7%). Electricity was second as a source of lighting (15.6%). However, there is variation in the source of lighting between rural areas and urban areas; the most common source of lighting in urban areas is electricity while in rural areas paraffin is a dominant source of lighting in rural areas (KIHBS, 2005). The study households were both from rural and urban settings this may account for the variations in sources of lighting among

households. Poor source of lighting could negatively affect private studies at home and this could consequently affect nutrition knowledge.

The most common method of food acquisition was through purchase for 75.5% of the households. The second common source of food was own production (47.5%). Fewer households got food from donations from churches, NGOs and the government, (14.6%) and food aid by WFP (12.1%); this was common especially during drought. The source of food in the households is a proxy indicator of food security which could influence diet diversity of the pupils.

The quantity and quality of water affects the welfare of school children. Water shortages could result in a number of waterborne diseases. The source of drinking water may be related to the incidence of water-borne infections. The safe sources of drinking water include: a piped source within the dwelling or plot, public tap, tube well or borehole, protected well or spring, and rainwater (KNBS and ICF Macro, 2010). The findings of this study showed that, the most common source of drinking water was rain water (51.8%) which was stored in tanks in most of the homes, tap in the compound (50.4%), borehole, (30.0%) tap inside the house (29.6%) and spring/river (10.4%).

These findings agree with those from the KNBS (2008) which showed rivers, unprotected wells, and rain water as the common sources of drinking water among the poor and middle class while among the rich, the sources included piped water in plots, public outdoor taps and borehole. However, this study did not find out the differences in water sources among the rich and poor as in the case of KNBS (2008). It should be noted that, lack of ready access to a water source may limit the quantity of suitable drinking water that is available to a household leading to waterborne diseases especially among children.

In addition, lack of ready access to water could constrain practices such as washing hands.

Toilet facilities are important determinants of the levels of hygiene and sanitation among households and schools. The most common way of waste disposal was through pit latrines 68.6 %. About 17.1% of households disposed waste in flush toilets while 12.5% of the households did not have toilets or latrines. This is an indicator of inadequate environmental sanitation and hygiene. Most of the pupils without pit latrines were from Nkoile Primary School 25% as compared to Isinya Primary School 8.8%. Nationally, the most common way of human waste disposal is through pit latrines (KNBS, 2008). For those without latrines at home, proper use of latrines at school could be challenging. These pupils could possibly use bushes or share toilet facilities leading to poor hygiene and sanitation.

Both Isinya and Nkoile Primary Schools had latrines; however, some of the latrines were dirty and dilapidated. This was attributed to lack of water, high number of students compared to the total number of latrines and carelessness where pupils do not use the latrines appropriately. These findings agree with those of VVOB/MOE (2008b) which showed that some schools had dirty and dilapidated latrines. Measures to address the few numbers of toilets in the schools had already been put in place at the time of the study as both schools had put in place funds to build new latrines and urinals for the pupils.

4.2 Nutrition knowledge among study pupils

4.2.1 Knowledge on hygiene and sanitation

A detailed analysis of the knowledge on hygiene and sanitation showed that a substantial proportion of the pupils knew storing water in dirty containers will make water unsafe for

drinking (66.4%), writing on the wall of school buildings should be avoided to keep school environment clean (51.8%) and fruits should be washed under clean running water before eating (80.4%). Similarly, a high (78.6%) percentage of the pupils were aware that drinking dirty untreated water could lead to sickness (Table 4.3). There was no significant difference $p>0.05$ between the two schools on the aspect of storing water in dirty containers. However pupils in Isinya Primary School demonstrated significantly higher knowledge $p<0.05$ on the following aspects: writing on the wall of school buildings should be avoided to keep the environment clean, fruits should be washed under running water before eating and drinking dirty water could lead to sickness.

Table 4.3: Knowledge on hygiene and sanitation

Concept	Both schools N=280		Isinya N=216		Nkoile N=64	
	n	%	n	%	n	%
Storing water in dirty containers will make water unsafe for consumption	186	66.4	144	66.7	42	65.6
Writing on the wall of school buildings should be avoided to keep school environment clean	145	51.8	122	56.5	23	35.9
Fruits should be washed under clean running water before eating them	225	80.4	181	83.8	44	68.8
Drinking dirty untreated water can lead to sickness	220	78.6	181	83.8	39	60.9

Whereas a majority (80.4%) of pupils in Isinya and Nkoile primary schools were aware that fruits should be washed before eating a study by Oldewage-Theron and Egal (2010) among school children in QwaQwa, South Africa showed that pupils had poor knowledge of hygiene practices. About 46.4% of the respondents did not think that they should wash their hands before eating, and only 51.1% of the respondents thought it was necessary to wash fruits before eating (Oldewage-Theron and Egal 2010). Lack of knowledge could deter nutrition-related practices.

4.2.2 Knowledge on nutrition deficiency diseases

About 68.8% of the pupils said that one would suffer from anemia in cases where the body lacks iron. This shows that a substantial proportion of the pupils were knowledgeable on the importance of iron in the body to prevent anaemia. A substantial proportion of the respondents 70.4% were able to identify kwashiorkor by its symptoms (Table 4.4).

Table 4.4: Knowledge on nutrition deficiency diseases

Concept	Both schools N=280		Isinya N=216		Nkoile N=64	
	n	%	n	%	n	%
When the body lacks iron one is likely to suffer from Anaemia	191	68.2	150	69.4	41	64.1
Symptoms of kwashiorkor	197	70.4	153	70.8	44	68.8
Scurvy is caused by lack of vitamin C	118	42.1	92	42.6	26	40.6
Night blindness is caused by lack of vitamin A	128	45.7	99	45.8	29	45.3

Over two-fifths of respondents 42.6% and 40.6% from Isinya and Nkoile Primary Schools respectively knew that lack of vitamin C could possibly lead to scurvy. Similarly 45.8% and 45.3% from Isinya and Nkoile Primary Schools respectively knew the lack of vitamin A could possibly lead to night blindness. There was no significant difference $p>0.05$ in knowledge on deficiency diseases between the two schools.

4.2.3 Knowledge on functions of food nutrients

Knowledge on the functions of food nutrients could play an important role in the individual's decisions towards food consumption patterns not just in childhood but also in adulthood. Overall, the pupils had fair knowledge on the functions of food nutrients. More than half of the respondents (58.9%) knew that proteins repair worn out body tissues. However, 25% of them said that the main function of proteins was to provide energy; this means that some of the respondents had an inaccurate understanding of the

functions of protein in the body. Similarly, some pupils (13.9%) stated that proteins protect the body against illnesses. When asked which category of food contained body building foods 74.6 % said that meat, milk and beans contain body building nutrients (Table 4.5).

Table 4.5: Knowledge on functions of food nutrients

Concept	Both schools N=280		Isinya N=216		Nkoile N=64	
	n	%	n	%	n	%
Proteins repair worn out body tissues	165	58.9	137	63.4	28	43.8
Vitamin D is important for formation of strong bones and teeth	167	59.6	129	59.7	38	59.4
Fruits and vegetables provide vitamins and minerals in the body	163	58.2	129	59.7	34	53.1
Ugali potatoes and rice are energy giving foods	150	53.6	119	55.1	31	48.4
Meat, milk and beans are body building foods	209	74.6	170	78.7	39	60.9

Similarly, more than half of the pupils (59.6%) knew that they should eat foods rich in Vitamin D for strong bones and teeth. A study by Oldewage-Theron and Egal (2010) found poor nutrition knowledge of the food groups and the role of the different food groups in the diet among school children. A South Carolina study on nutrition KAP found, overall, fair nutrition knowledge among nutrition educators (mean 19.6/31 \pm 3.12) with gaps in knowledge on absorption and functions of minerals and vitamins (Alexandra, 2005). The fair knowledge in the functions of food nutrients in this study could be attributed to the fact that nutrition education offered in schools incorporated the information included in this particular research. In addition, knowledge may also have been influenced by the variety of sources of nutrition information by the pupils.

The findings from the focus group discussions showed that most pupils who answered the question on proteins were from class four as compared to their junior colleagues (classes

1 to 3). Those in class one to three were able to mention the different types of foods but were not able to categorize them by their functions in the body because this topic is not covered in the lower classes. This may imply that lessons taught in class play a role in the transfer of nutrition knowledge. The findings from the focus group discussion also showed that most of the pupils knew the functions of food nutrients and were able to mention different nutrients as well as their functions in the body.

4.2.4 Knowledge on food choice, preparation and storage

Proper choice of food is important as it influences ones health and nutrition status. Findings suggest that the majority of the respondents (92.1%) were able to state that a balanced diet was one that contains carbohydrates, proteins and vitamins (*ugali*, meat, *sukumawiki* and orange) (Table 4.6).

Table 4.6: Knowledge on food choice preparation and storage

Concept	Both schools N=280		Isinya N=216		Nkoile N=64	
	n	%	n	%	n	%
Ugali, kales, meat Orange (balanced diet)	258	92.1	197	91.2	61	95.3
Vegetables should be washed before cutting to preserve vitamin C	219	78.2	176	81.5	43	67.2
Freezing is a modern method of food preservation	208	73.2	163	75.5	45	65.2
Milk cannot be preserved by salting	245	87.5	187	86.6	58	90.6
Stale food (<i>githeri</i>) should be thrown away	143	51.1	96	44.4	47	73.4
Eating of sugary food could lead to unhealthy teeth	225	80.4	173	80.1	52	81.2

When asked which of the practices should be done to preserve vitamin C when cooking vegetables, 78.2% reported that vegetables should be washed before cutting, 12.1% said

they should be washed after cutting showing that a higher percentage of respondents had the right knowledge. Most of the pupils were able to differentiate between a modern and traditional method of food preservation where 73.2% said that freezing is a modern method of food preservation (Table 4.6). The traditional methods of food preservation asked included: salting, drying and smoking.

Most pupils (87.5%) had the knowledge that milk could not be preserved by salting; only a few of them (12.5%) did not know that milk in its natural state cannot be preserved by salting. When asked what should be done with stale *githeri* (mixture of beans and maize), half of the pupils (51.1%) said that the food should be thrown away, 27.9% of them said that the food can be soaked and rinsed in clean water then warmed and eaten. Slightly more pupils in Isinya Primary School (30.6%) stated that stale *githeri* should be soaked, cleaned, warmed and eaten as compared to those in Nkoile Primary School (18.8%). Almost all the pupils (80.4%) knew that eating a lot of sugary foods could lead to unhealthy teeth. Only a few (19.6%) of the pupils did not have the correct knowledge on the dangers of eating sugary foods.

The findings from the focus group discussion revealed that most of the pupils in class four preferred nutritious food as compared to sweets, cakes and biscuits, the reason they gave was that this types of snacks could lead to tooth decay. The foods liked most by the pupils included: *ugly*; meat; milk, vegetables; fruits. The pupil's food choices were determined by: taste of food; amount served; cultural acceptability, availability and accessibility to food in the household. Food taboos affected dietary practices as some food though nutritious are not acceptable to the locals i.e. eggs, chicken, rabbits. Though most of the pupils knew that it is healthy to consume nutritious food over junk food some of them still preferred junk food because of its taste and peer influence. Some of the

pupils in class 1-3 preferred cakes, biscuits, potato chips, sweets, sweetened drinks over the nutritious foods. One of the pupils said, “*I love to eat cakes and biscuits because they are sweet*”. Another one said, “*I prefer eating chips because of my friends who enjoy the same*”.

4.2.5 Nutrition knowledge score

The maximum possible score for nutrition knowledge was 20. The pupils’ knowledge ranged from 5 to 20, with an overall mean (for both schools) of 13.8 ± 2.68 . On the whole, the pupils from Isinya Primary School had a significantly higher nutrition knowledge score (14.2 ± 2.69) compared to pupils in Nkoile Primary School (12.7 ± 2.33) at a p value <0.001 (Table 4.7).

Table 4.7: Nutrition Knowledge of the Pupils

	Both schools N=280		Isinya N=216		Nkoile N=64		T-test P-value *Sign
	Mean	SD	Mean	SD	Mean	SD	
Overall knowledge score (out of a total of 20)	13.8	± 2.68	14.2	± 2.69	12.7	± 2.33	$<0.001^*$
Score on hygiene and sanitation (out of a total of 4)	4.2	± 1.25	4.3	± 1.28	3.9	± 1.09	$<0.014^*$
Score on deficiency diseases (out of a total of 4)	1.6	± 1.03	1.6	± 1.04	1.5	± 0.98	0.358
Score on function of food nutrients(out of a total of 5)	3.8	± 1.28	4.0	± 1.29	3.4	± 1.15	$<0.003^*$
Score on food choice, preparation and preservation(out of a total of 7)	4.15	± 1.04	4.24	± 1.05	3.84	± 0.91	$<0.008^*$
The knowledge aspects comprise of a number of questions *Significant differences							

Disaggregated by various nutrition aspects, the findings revealed that most pupils from Isinya Primary School were more knowledgeable on the aspects of hygiene and sanitation (mean 4.3 ± 1.28 ; $p < 0.014$), food choice, preparation and preservation (mean 4.2 ± 1.05 ; $p < 0.008$) and functions of food nutrients (4.0 ± 1.29 ; $p < 0.003$) compared to pupils in Nkoile Primary School. There was however no significant difference in knowledge on deficiency diseases between the schools (Table 4.7). These findings agree with a study conducted among school children aged 9-11 in Cambridge Shire, United Kingdom nutrition knowledge scores were high at baseline in both intervention and control schools; with scores being higher in the intervention schools (28.3/36) compared to control schools (27.3/36) there was however a modest increase in post intervention scores (Lakshman, Sharp, Ong, and Forouhi, 2010).

In contrast, findings by Mbithe (2008) showed that the pupils had low levels of nutrition knowledge, before intervention; overall, 4.6% of pupils in both the experimental and control schools, rural and urban scored 3=average/some idea while 37.6% scored poor/no idea while the majority (57.8%) scored very poor/no idea at all on the pre-tests. However, results after intervention showed significant positive results; noting that a mean of more than 4.00 meant poor and 5.00 very poor (Mbithe, 2008). Studies by Oldewage-Theron and Egal (2009; 2010) found gaps in knowledge in the roles of the various food groups, the specific functions of the food nutrients in the body and hygiene practices. Some of the pupils (46.4%) were not aware that they should wash hands before eating similarly only a 51.1% deemed it necessary to wash fruits before eating (Oldewage-Theron and Egal, 2010).

4.3 Pupil's Sources of nutrition information

4.3.1 Source of nutrition information

Information from the school environment, classroom curriculum, media, peers, families and communities is necessary for promotion of nutrition and health knowledge and practice among school children (FAO, 2005; Traahms and Pipes, 2000). Pupils reported the following as the major sources of nutrition information; textbooks 70.5%, followed by radio 69.4%, lessons taught in class 69.2% and television 66.2% (Table 4.8). Other sources of information included: friends, family members, news papers/pamphlets and Isinya community knowledge centre among others. These findings agree with those of a study conducted among nutrition educators by Alexandra, (2005) in South Carolina who identified books, newspapers and television as their major sources of nutrition information.

Table 4.8: Sources of nutrition information

Source of nutrition information	Both schools N=280		Isinya N=216		Nkoile N=64		P-values
	n	%	n	%	n	%	
Text books	196	70.5	149	68.9	47	75.8	0.152
News papers	136	48.9	112	51.9	24	38.7	0.068
Family members	172	65.5	141	65.3	31	50.0	0.029
Friends	154	55.4	122	56.5	32	51.6	0.497
Television	184	66.2	166	70.5	18	28.1	0.006
Radio	193	69.4	153	70.8	40	64.5	0.341
Lessons taught in class	190	69.2	148	68.7	42	67.7	0.769
From healthy learning activities in school	159	57.2	145	67.1	14	22.6	0.001
From healthy learning activities in the community	68	24.7	58	26.9	10	16.1	0.085

Multiple responses allowed

However, the major sources of nutrition information differed between the schools. In Nkoile Primary School the findings showed that the major source of nutrition information was textbooks (75.7%) followed by lessons from class (67.7%) and the radio (64.5%). In Isinya Primary School, television provided nutrition information to 70.5% of the pupils, followed by radio 70.8% and textbooks 66.2% (Table 4.8) This could be possibly attributed to the ownership of items that provide nutrition information while most of the pupils from Isinya Primary School owned television 75.8% only 37.5% from Nkoile Primary School owned television.

A Study by (Jacobson et al., 2001) conducted in Ohio reported similar sources of nutrition information with addition of internet and physical education. Bedgrood and Tuck (1993) in Texas reported that journals played an important role as sources of nutrition information. Although the nutrition information from media may not necessarily be correct, current, consistently reliable and based on scientific research they are likely to discuss new recommendations on food and nutrition which can contribute to improving nutrition KAP of pupils (Whitney and Rolfes, 2002).

In Nkoile and Isinya Primary Schools, sources of nutrition information were limited to textbooks, lessons taught in class, television and radio. Access to magazines and internet is limited to a minority of the pupils. The findings from Focus Group Discussions with pupils revealed that they received nutrition information from radio, pamphlets/newspapers, textbooks, parents, and friends, lessons taught in class, television and Community Knowledge Center in Isinya. Findings from Focus Group Discussions with teachers showed that their sources of nutrition information were textbooks, news papers, and the Community Knowledge Center which is based in Isinya. The teachers also sourced information from pamphlets from VVOB. One teacher mentioned that

resource people from the hospitals were invited to provide information in the schools. Moreover, the media (radio and television) was mentioned as an important source of information.

The teachers also said that the sources of nutrition information were not adequate and they would wish to have more sources. However, the use of variety of sources of nutrition information was constrained by the pressure to finish the syllabus hence textbooks were the ones used majorly. One participant said *“as much as we would like to use the other sources of nutrition information regularly it is not possible to get information since we have to cover the syllabus so we opt to concentrate on information from textbooks as stipulated in the syllabus”*.

4.3.2 Ranking of sources of nutrition information

Sources of nutrition information were ranked according to sources which provided most nutrition information to the pupils. The findings showed that text books were ranked as the first source (24.5 %) they were followed closely by lessons taught in class (22.7%) and by television (21.6%). Radio and newspapers provided a substantial source of nutrition information to the respondents (18.7% and 17.3% respectively) (Table 4.9).

The least common sources of nutrition information were family members (11.5%); friends (8.3%) and lastly the Healthy Learning Programme in the community at 3.2%. This implies that the nutrition messages passed through textbooks, lessons taught in class and the media should be well packaged in order to provide adequate and reliable nutrition information (Table 4.9).

Table 4.9: Ranked common sources of nutrition information

Source of nutrition information	Combined N=280		Isinya N=216		Nkoile N=64	
	n	%	n	%	n	%
Textbooks	68	24.5	53	24.5	15	24.2
Lessons taught in class	61	22.7	52	24.1	9	14.5
Television	60	21.6	52	24.1	11	17.7
Radio	63	18.7	39	18.1	13	21.0
Newspaper/magazines	48	17.3	33	15.3	15	24.2
Family members	32	11.5	27	12.5	9	14.5
Friends	27	8.3	19	8.8	8	12.9
Healthy learning programme activities in school	35	12.6	32	14.8	3	4.8
Healthy learning programme activities in the community	10	3.2	8	3.7	2	3.2

Multiple responses allowed

The sources which provided most of the nutrition information seemed to differ between the two schools. In Nkoile Primary School, the sources which provided most of the nutrition information in order of ranking was: text books (24.2%), newspapers and magazine (24.2%) and radio (21.0%) while in Isinya Primary School text books (24.5%), lessons taught in class (24.1%) and television (24.1%) featured as the sources which provided most of the nutrition information. This could be attributed to the fact that more households in Isinya Primary School owned televisions (75.8%) and preferred it as a source of information compared to those in Nkoile Primary School (37.5%).

4.3.3 Preference of the sources of nutrition information

Source of nutrition information were ranked in order of preference. The reasons for liking the source of information were also solicited. Over a quarter (29.6%) of the respondents liked television with 44.6% stating that television was interesting and provided a lot of

information. About 20.5% said that it provided a variety of information which is simple and easily understood. Other reasons given for liking television was that the messages through television were a good reminder of important nutrition-related practices such as washing hands after visiting the toilet and before eating, washing fruits and vegetables before eating them, cooking and drinking clean water to avoid diseases.

Table 4.10 Preference of the sources of nutrition information

Sources of nutrition information	Percentage %	Reasons for liking the source of information
Television	29.6	Interesting to watch (44.6%)
		Information simple and easily understood (20.5%)
Text books	21.6	Easily available and accessible (45.2%)
		Provided new nutrition information (34.2%)
		Language simple and easily understood (20.9%)
Radios	21.6	Relatively cheap and available (30.2%)
		Interesting to listen (20.6%)
Lessons taught in class	11.2	Provide detailed information (48.0%)
		Provide reliable information (28.0%)

Multiple responses allowed

The findings from the Focus Group Discussion revealed that pupils learned of the importance of washing hands and the occasions when to wash hands through the “*sopo champion*” advertisement on television, radio, newspapers and magazines. Some of the pupils even sang the song “*wash your hands before you eat or drink, wash your hands after visiting the toilet or changing babies napkin, wash your hands before handling food, wash your hands be a sopo champion*” which was part of the advertisement. During

lunch, most of the pupils were observed by the research team to wash hands before having their meals; some of those who did not wash hands were using cutlery. Washing hands was however, common among pupils from senior classes as compared to those from the lower classes. This could possibly be attributed to the knowledge on the importance of washing hands before eating.

Text books and radios were the second most liked sources of nutrition information at 21.6% each. However the reasons for liking each one of them differed, (45.2%) of those who liked textbooks gave the reason that they were easily available and accessible in school, 34.2% said that they provided detailed, new nutrition information which was reliable and 20.9% said that textbooks were interesting, easy to read and understand since the language used was simple and some explanations were accompanied by pictures making it easy to understand. Those who liked the radio most were of the opinion that it was relatively cheap and available in most of the households (30.2%) making it accessible as a source of nutrition information to most of the pupils. Some of the pupils reported that they had their own radios. Other reasons given were that radio was interesting to listen to, gave detailed, varied and current information. It should be noted that though mass media contributes a lot to nutrition information it is important that the messages passed through media be authentic, correct and reliable.

Other forms of media which provided nutrition information to the students included magazines, newspapers and pamphlets. The Healthy Learning Programme played an important role in availing magazines and pamphlets which provided nutrition information to pupils. Lessons taught in class were ranked third by 11.2% of the respondents despite the fact that they provided a lot of nutrition information. About 48 % of them were of the opinion that teachers explained the concepts well and in details, 28 % of them said that

teachers gave true, reliable and consistent information which was important in improving nutrition knowledge and practice.

Despite their ability to provide nutrition information other sources of nutrition information such as the Healthy Learning Programme and the School Feeding Programme that allow for exploration and practical approaches to learning were not fully exploited. Only a few pupils were aware of the Healthy Learning Programme and its role in improving nutrition knowledge, attitudes and practices. The pupils were focused on reading books and homework with the aim of passing examination at the expense of practical activities which were considered as extra work, except for a few pupils who were mostly members of the 4-K club and health club.

4.4 Factor's associated with nutrition knowledge

The study investigated the socio-demographic characteristics of the households from which the study pupils came from, education level of parents, age of pupils and parents, sex of pupils, attitudes of pupils towards nutrition and sources of nutrition information and their association with nutrition knowledge. The findings reported in this section are based on factors that were associated with nutrition knowledge.

4.4.1 Nutrition knowledge and the demographic and socio-economic status of the pupils' households

The results indicated a weak negative correlation between the age of pupils and the nutrition knowledge score ($r = -1.166$, $p = 0.006$) this implies that younger pupils had significantly higher nutrition knowledge scores. This could partly explain the lower score in nutrition knowledge among pupils in Nkoile Primary School who were significantly older compared to those from Isinya Primary School. There was however no association between sex of pupils, age and educational level of parents, ownership of household

items and the nutrition knowledge score of the pupil's at a $p > 0.05$. Other studies have shown a relationship between nutrition knowledge and demographic factors. A study in Taiwan among the elderly, showed that elderly persons who were female, older, with lower educational levels, and living in remote areas (e.g. eastern Taiwan, mountain areas, and the PengHu islands) scored lower on the nutrition knowledge scale than males with higher educational levels and living in urban areas (Lin and Lee, 2005). This study was however conducted in a different population and age group.

4.4.2 The relationship between nutrition knowledge and source of nutrition information

Overall, the results showed that pupils whose sources of nutrition information were Healthy Learning Programme activities in both the school and in the community had significantly higher nutrition knowledge ($p < 0.001$ and $p < 0.034$) respectively, implying that the Healthy Learning Programme plays a role in improving nutrition knowledge. Disaggregation by nutrition aspects revealed that pupils who obtained nutrition information from the Healthy Learning Programme had significantly higher knowledge in deficiency diseases ($p < 0.046$) in food choice, preparation and storage ($p < 0.002$). While those who obtained information from Healthy Learning Programme activities in the community, family members and television had significantly higher knowledge in food choice, preparation and storage ($p < 0.003$, $p < 0.050$ and $p < 0.010$) respectively. These sources of nutrition information should therefore be fully explored to ensure improvement of the pupils' knowledge.

Analysis by schools, revealed that in Isinya Primary School, pupils who received nutrition information from the Healthy Learning Programme activities in school, the community and television had significantly higher nutrition knowledge ($p < 0.005$, $p < 0.021$ and $p < 0.030$ respectively) compared to those who received the information from

other sources. In contrast, there was no significant association between the sources of nutrition information and nutrition knowledge ($p>0.05$) in Nkoile Primary School. This reinforces the fact that participating in the Healthy Learning Programme activities plays a role in improving nutrition knowledge among school children. Implying that the school should fully exploit the different activities of the HLP and encourage pupils to participate in them as this could improve their knowledge in nutrition.

4.5 Pupils' attitudes towards nutrition

The assessment of all the pupils' attitudes towards nutrition included 19 items developed on a 5-point Likert scale. The pupils were asked to state their views on the statements, value points on the scale were represented from 5 as "strongly agree" to 1 as "strongly disagree". The minimum attitude score was 19 and the maximum was 95. The pupils had a positive attitude towards nutrition with an overall attitude mean score of 62.4 ± 11.73 . Pupils from Isinya Primary School had a significantly lower attitude mean score (60.3 ± 11.25) compared to Nkoile Primary School at 69.7 ± 10.46 ($p<0.001$). A study by Shariff (2008) found consistent and significant increments in the post intervention mean scores of nutrition-related attitudes between intervention group as indicated by the mean change in attitude (Mean change= 1.40 , $p<0.001$). Another study by Alexandra (2005) showed that teachers had positive attitudes toward nutrition, with an overall mean/standard deviation of 51.47 ± 4.43 out of 31 items.

4.5.1 Attitudes towards food choices, preparation and food consumption

The statement "cooking is an enjoyable task" was meant to determine the pupils attitude towards food preparation. Whereas slightly more than one fifth of the respondents (24%) strongly agreed with the statement 16.5% strongly disagreed. Despite the fact that about

one-quarter of the pupils had a positive attitude towards preparing meals, a relatively large proportion did not.

Table 4.11 shows that most of the pupils were not of the opinion that all unfamiliar foods are unhealthy for this reason as 39.1% and 19.4% strongly disagreed and disagreed with the statement respectively. Similarly, 41.1% and 16.8% respectively strongly disagreed and disagreed with the statement that the taste of food is more important than its nutrient content. A similar trend was observed regarding the statement that I do not have to worry about the kind of food I take because am still young as 37.6% strongly disagreed and 21.5% disagreed. In addition, 46.6% and 25.1 % strongly agreed and agreed respectively, that fruits are a healthy snack. The responses showed that the respondents had a positive attitude towards consuming a variety of nutritious food. Slightly more (41.4%) pupils from Isinya primary school strongly disagreed with this statement compared to their counterparts (25.0%) in Nkoile Primary School $p < 0.009$ (Table 4.11).

Table 4.11: Attitudes towards food choice, preparation and food consumption

Attitudes	Both schools N=280					Isinya N=216					Nkoile N = 64					Chi- square; P values
	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	
Cooking is an enjoyable task	16.5	17.2	13.6	28.7	24.0	14.4	20.4	13.4	28.7	23.1	23.8	6.3	14.3	28.6	27.0	0.074
All unfamiliar or new foods are unhealthy	39.1	19.4	11.1	12.5	17.9	40.5	19.5	11.2	12.6	16.3	34.4	18.8	10.9	12.5	23.4	0.755
I do not have to worry about the kind of foods I eat because I am still young ⁺	37.6	21.5	11.1	15.1	14.7	41.4	23.3	10.7	13.0	11.6	25.0	15.6	12.5	21.9	25.0	0.009*
I prefer meat to vegetables ⁺	21.9	15.8	11.5	22.6	28.3	22.3	19.5	11.6	23.7	22.8	20.3	3.1	10.9	18.8	46.9	0.001*
The taste of food is more important than its nutrient content ⁺	41.1	16.8	16.1	11.8	13.6	43.3	17.7	16.7	10.2	12.1	35.9	14.1	14.1	17.2	18.8	0.302
Breakfast is important to me ⁺	13.3	7.2	8.2	27.2	44.1	14.9	7.9	9.3	30.7	37.2	7.8	4.7	4.7	15.6	67.2	0.001*
All nutritious foods are expensive	38.4	21.9	11.1	13.9	14.7	40.9	26.0	11.6	9.8	11.6	29.7	7.8	9.4	28.1	25.0	0.001*
Eating of healthy food is only important during illness ⁺	41.2	13.3	8.6	13.6	23.3	45.1	15.8	9.8	12.1	17.2	28.1	4.7	4.7	18.8	43.8	0.001*

SD- Strongly disagree; D- Disagree; N- Neutral; A-Agree; SA-Strongly agree

* Significant difference p<0.05

⁺Source: Siti Sabariah et al., in Sharriff et al., 2008

Findings from the focus group discussion showed that both pupils and parents were receptive to new fruits and vegetables such as water melon, cow peas and carrots introduced through school garden. Several pupils brought fruits to school on some days of the week to complement the school meal, in order to provide minerals and vitamins

The statement that all nutritious foods are expensive was to determine the opinion of respondents towards the cost of nutritious meal 38.4% strongly disagreed with the statement, 21.9% disagreed, 11.1 % neither agreed nor disagreed with the statement while fewer respondents 13.9% and 14.7% respectively agreed and strongly agreed with the statement. About 44.1% strongly agreed with the statement that breakfast is an important meal. Similarly, 41.2% strongly disagreed with the statement that eating of healthy food is only important during illness. Overall, the pupils' attitude towards food selection and food consumption was positive and in line with appropriate nutrition practices. This may be attributed to nutrition knowledge learned in the school from avenues such as the Kiwi Project which was involved in facilitating the planting of school gardens and the Healthy Learning Programme which were reported by teachers during the focus group discussions to have improved attitude of pupils towards diversity in the school meals.

4.5.2 Attitudes towards learning nutrition

In the Kenyan Primary School curriculum, nutrition is not taught separately as a subject, instead it is integrated in the science curriculum. The statements in this section were meant to determine the attitudes of pupils towards learning nutrition as this is an important determinant of nutrition knowledge and practice as well. When asked if learning about food and nutrition is enjoyable, more than half of the respondents were in agreement with this statement. About two-fifths (39.3%) and (27.1 %) strongly agreed and agreed respectively with this statement. Only a few of the respondents (10.7%) strongly disagreed

with the statement as shown in Table 4.12. More pupils (62.5%) from Nkoile primary school strongly agreed with the statement that learning about food and nutrition is enjoyable compared to the pupils (32.4%) from Isinya Primary School $p < 0.001$.

The respondents (31.2%) strongly disagreed with the statement that “It is hard to practice good nutrition at home, so I will study just to pass the examination”. The findings from the focus group discussion with teachers, pupils and parents revealed that most of the pupils liked learning about nutrition and they showed a lot of interest in whatever they learnt in school. In particular, they showed a lot of interest in learning about new food crops. When new crops were introduced in the school garden some pupils participated in planting, watering and harvesting, some even borrowed seeds and planted the fruits and vegetables at their their homes. This implies that pupils transfer the knowledge learned in schools to their homes.

It is however important to note that about one-fifth of respondents (20.4%) strongly agreed that it is hard to practice nutrition even though they may have appropriate nutrition knowledge and perform well in their examinations. This is an indication that nutrition knowledge alone may not lead to change in practice. There is therefore, need to address the attitudes of pupils in order to improve nutrition-related practices

Table 4.12: Attitudes towards learning nutrition

Attitudes	Both schools N=280					Isinya N=216					Nkoile N=64					Chi-square; P values
	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	
Learning about food and nutrition issues is enjoyable	10.7	12.5	10.4	27.1	39.3	13.9	12.5	10.2	31.0	32.4	0.00	12.5	10.9	14.1	62.5	0.001*
It is hard to practice good nutrition at home, so I will study just to pass the examination	31.2	20.1	14.3	14.0	20.4	32.6	22.8	16.3	13.5	14.9	26.6	10.9	7.8	15.6	39.1	0.001*

***Significant difference $p < 0.05$.**

SD- Strongly disagree

D- Disagree

N- Neutral

A- Agree

SA- Strongly agree

4.5.3 Contribution of the Healthy Learning and School Feeding Programmes to nutrition knowledge attitudes and practices

The statement “I like the Healthy Learning Programme because it has contributed to my knowledge in nutrition” was meant to establish the attitudes of the pupils towards the contribution of the Healthy Learning Programme to nutrition KAP. More than half of the respondents (52.3%) strongly agreed with the statement, (25.4%) of them agreed and only a few of them (8.2%) strongly disagreed with the statement. Findings from the focus group discussion revealed that the pupils were aware of the Healthy Learning Programme activities within the school and enjoyed participating in them. This implies that the Healthy Learning Programme is an appropriate avenue in contributing to pupils’ nutrition knowledge, attitudes and practices since the pupils were able and willing to participate in the activities such as planting food crop and cash crops, cleaning the school compound and rearing poultry.

In Isinya Primary School pupils ate well cooked food due to the purchase of an energy saving jiko which reduced the food wastage rates. In Nkoile Primary School pupils enjoyed eating eggs from the poultry project with part of the money being used to supplement the school meals in order to improve its quality. Findings from Key Informant Interviews with the Head teacher of Isinya Primary School revealed that the before the purchase of the energy saving jiko there was a problem in ensuring effective cooking of *githeri*; in most cases the food didn’t cook properly resulting in food wastage. Most pupils were accustomed to throwing away the food. Parents were equally happy as their children had grown to like schooling and seemed to enjoy the learning experience. Apart from this pupils have learned various skills in school such as poultry keeping, environmental conservation, planting some farm vegetables and hygiene and sanitation. Interviews with parents during home visits revealed that the knowledge acquired from school had been transferred to homes by pupils for example some homes were now

keeping poultry; a practice which was not common in that locality. These findings further confirm that the school is an important avenue for learning nutrition information, not only for the pupils but the community at large (Mbithe, 2008; FAO, 2005a).

When pupils were asked if the lunch provided by the School Feeding Programme was sufficient for them, 33% strongly agreed with this statement, while 29.7% agreed that the lunch was sufficient. Notably, 14.3% and 11.5% strongly disagreed and disagreed with this statement respectively. Key informant interviews with the school administration revealed that the programme was beneficial to many pupils who went to school without having taken breakfast and thus dealt with short-term hunger and enabled the students to concentrate on their studies. In addition, there was increased school attendance by the children as reported by the school administration.

The findings from the focus group discussion revealed that parents liked the School Feeding Programme and felt it was necessary for their children because it had led to increased school enrollment, improved school attendance and attention in class. In fact parents said that some of their children come to school just because they were assured a meal. These findings agree with findings from the World Food Programme (2010) that suggested that schools with meals attracted pupils, improved the health of children, reduced the incidence of illness, increased attentiveness and interest of students in the classroom.

Table 4.13: Attitudes of pupils toward the Healthy Learning Programme and School Feeding Programmes

Attitudes	Both schools N=280					Isinya N=216					Nkoile N=64					Chi-square; P values
	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	
I like the healthy learning programme because it has contributed to my knowledge in nutrition	8.2	6.8	7.2	25.4	52.3	8.8	7.9	7.0	27.4	48.8	6.3	3.1	7.8	18.8	64.1	0.218
The lunch provided by the school feeding programme is sufficient for me	14.3	11.5	11.5	29.7	33.0	14.4	11.6	13.5	32.6	27.9	14.1	10.9	4.7	20.3	50.0	0.011*

*Significant difference $p < 0.05$ **SD- Strongly disagree****D- Disagree****N- Neutral****A- Agree****SA- Strongly agree**

4.5.4 Hygiene and sanitation

Respondents were presented with two statements in order to determine their attitudes towards hygiene and sanitation. The statement “We can dispose of rubbish anywhere as long as the teachers are not seeing us” was meant to determine the attitudes of respondents towards hygiene. More than half of the respondents (53.8%) and (14.7%) of the respondents strongly disagreed and disagreed with this statement respectively. The pupils had a positive attitude towards disposing rubbish in the right place, which is important if sanitary environment is to be maintained.

Consistent with the findings more than half of the respondents (55.4%) strongly disagreed with the statement “I do not like cleaning the school compound because it makes me tired”. The findings from the focus group discussion showed that most of the pupils participated in cleaning the school compound and latrine as well as in planting trees and flowers in order to keep their environment clean. Some pupils also cleaned their plates and spoons before and after meals. In addition to this, those who did not have spoons washed their hands. However, this practice was common among upper primary pupils compared to their juniors in class one to three.

When asked whether one can become sick if they do not wash their hands often, 39.6% strongly agreed with the statement whilst 27.9% agreed with this statement, fewer respondents (15.0%) strongly disagreed with this statement. Though not significant $P>0.05$, most of the respondents who reported to washing hands in all occasions agreed that one can become sick if they do not wash their hands often.

Table 4.14: Pupils attitudes on hygiene and sanitation

Attitudes	Combined N=280					Isinya N=216					Nkoile N=64					Chi-square p-value
	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	SD (%)	D (%)	N (%)	A (%)	SA (%)	
We can dispose off rubbish anywhere in the compound as long as the teachers are not seeing us	53.8	14.7	12.5	7.9	11.1	51.6	14.0	14.4	9.3	10.7	60.9	17.2	6.3	3.1	12.5	0.178
One can become sick if they do not wash their hands often	15.0	5.7	11.8	27.9	39.6	13.4	6.0	13.9	30.1	36.6	20.4	4.7	4.7	20.3	50.0	0.056
I do not believe that frequent brushing of teeth leads to healthy teeth	28.1	11.9	8.6	19.1	32.4	27.6	12.1	9.8	21.0	29.4	29.7	10.9	4.7	12.5	42.2	0.200
I do not like cleaning the school compound because it makes me tired	55.4	17.9	8.2	10.0	8.6	56.0	18.5	7.4	9.3	8.8	53.1	15.6	10.9	12.5	7.8	0.803
I feel good when I drink boiled water	10.8	8.6	9.7	20.4	50.4	12.6	9.8	10.2	23.7	43.7	4.7	4.7	7.8	9.4	73.4	0.001*

SD- Strongly disagree; D- Disagree; N- Neutral; A-Agree; SA-Strongly agree

*Significant difference $p < 0.05$

Similarly, more than half of the respondents (50.4%) strongly agreed with the statement “I feel good when I drink boiled water”. Pupils in Isinya Primary School had significantly lower attitudes towards the aspect I feel good when I drink boiled water compared to pupils in Nkoile Primary School ($p=0.001$) (Table 4.15). The findings from the focus group discussion show that pupils were aware of methods of purifying water other than boiling they mentioned the addition of chemicals and filtering. However the practice of boiling is not so common among pupils because they feel that boiled water has a flat taste.

Most of the pupils had a positive attitude towards various hygiene aspects except on oral hygiene where most of the pupils (32.4%) strongly agreed with the statement that “I do not believe that frequent brushing of teeth leads to healthy teeth”. While 28.1% of the respondents strongly disagreed, this could possibly be explained by lack of knowledge of the importance of brushing regularly. This study only established the attitudes of the pupils but did not establish the reasons behind the attitudes whether positive or negative. These findings suggest that school children cannot benefit from nutrition programmes in isolation, without positive attitudes towards improving hygiene; otherwise interventions to improve nutrition may be in vain.

4.6 Nutrition-related practices among the pupils

4.6.1 Consumption of boiled drinking water

Almost all the pupils (98.2%) consumed water every day, and 83.6% of all the pupils reported that they boiled drinking water at home while in Isinya and Nkoile Primary Schools (84.7% and 79.7% respectively) boiled drinking water. There was no significant difference ($p>0.05$) in percentage of pupils who boiled and those who did not boil drinking water in Isinya and Nkoile Primary Schools. A study among primary school

children in Angolela, Ethiopia established that only 14% of the respondents boiled water on the day prior to the interview (Vivas, et al., 2010). Approximately, 61%, 94% and 73% of the pupils reported that boiling water kills germs, a water container needs cleaning and covering, and human faeces contain germs, respectively (Vivas, et al., 2010).

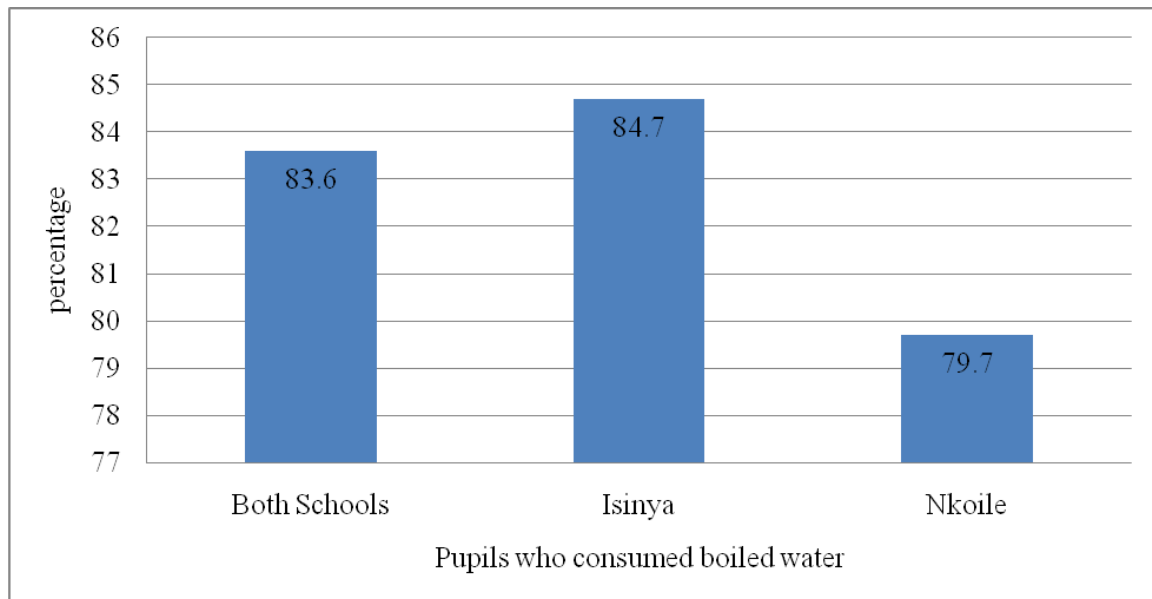


Figure 4.1: Proportion of pupils who drank boiled water

Though boiling is a way in which water can be treated, chemical treatment of water is known to be more effective than boiling method since boiling in many households may not be thoroughly done. The findings from the focus group discussions with pupils from Nkoile Primary School however, revealed that the practice of boiling water is not common among the local people. This was attributed to lack of knowledge on the importance of boiling water, some preferred taking water directly from the borehole since it had a nice taste compared to boiled water which was deemed to be tasteless. Other ways in which drinking water was purified among the households included adding water guard and filtering.

4.6.2 Occasions when hands are washed

Availability of resources like latrine facilities, hand washing facilities, soap and safe water supply are considered as enabling factors in transforming newly acquired knowledge, attitudes and beliefs into desirable practices such as washing hands before and after meals, after visiting the toilet and before handling food (UNICEF, 1998; Vivas, et al., 2010).

Almost all the pupils washed hands before eating (93.9%), after visiting the toilet (92.9%) and before handling food (93.9) with 82% of the pupils reported to wash hands in all the three occasions. It should be noted however, that this practice was not consistently adhered to both in school and home environments. Observations by the research team revealed that most of the pupils only washed hands when water was available at the washing points implying that inconsistency in hand washing could be attributed to water shortages.

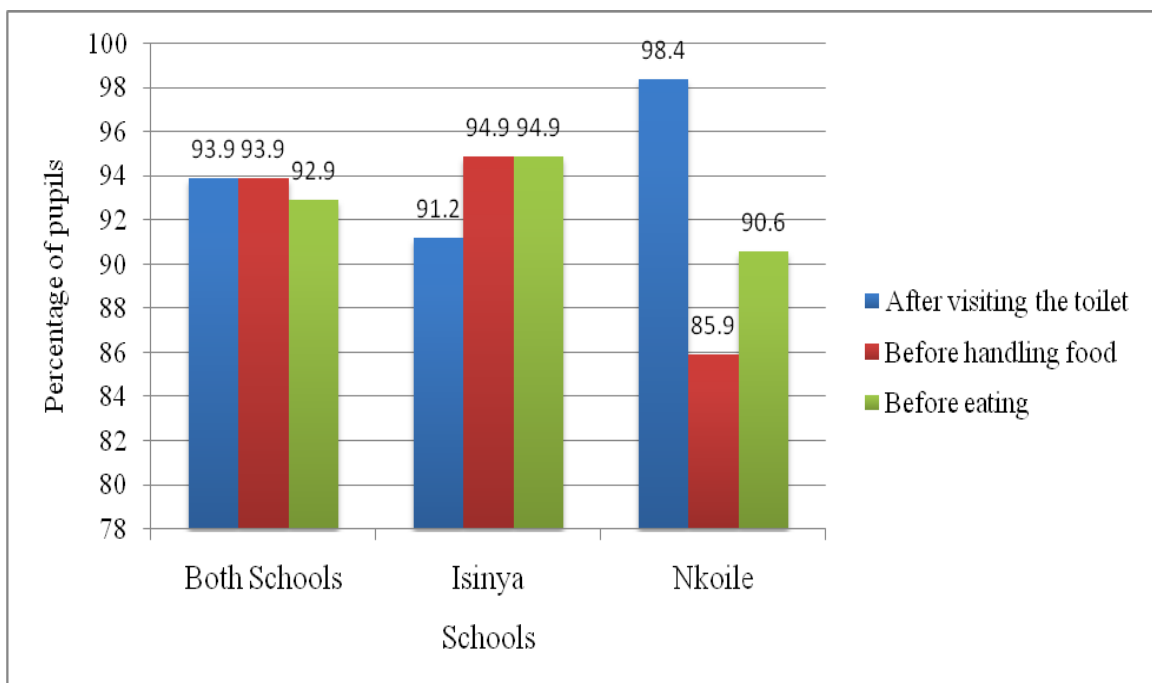


Figure 4.2: Occasions when hands are washed

This finding agrees with a study on hygiene practices among children in Angolela Primary School in Ethiopia which showed that most (99.0%) of the respondents washed hands before eating while 46% washed hands after eating. In contrast, only 14.8% of the respondents washed hands after visiting the toilet (Vivas, et al., 2010).

Reasons given for not washing hands included: lack of knowledge, lack of adequate water in appropriate places within the schools, forgetfulness, lack of time between classes, lack of adequate hand washing facilities, stubbornness and lack of water in the hand washing facilities near the eating areas and the latrines. In some cases pupils had to save water for drinking at the expense of hand washing due to inadequate water sources in the schools. Some pupils however, did not wash hands because they used cutlery for eating. The findings on reasons for not washing hands are consistent with a study among primary school children conducted in Senegal which revealed that stubbornness, laziness, the rush to go to breaks and the time it takes from their playtime. They explained that stubbornness arose from not wanting to do what they were told by adults (Water Sanitation Programme, 2007; Vivas et al, 2010).

Isinya Primary School had a hand washing facility near the teacher's latrine but this facility was lacking for pupils' latrines. The reasons given for this were lack of adequate water within the school, carelessness and irresponsibility among the pupils' who in most cases would break or steal the leaky tins and soap put near the toilet for purposes of hand washing. Efforts by teachers to address this were futile and at the time of the study only two hand washing facilities were functional. As a matter of fact, the tap near the toilet had running water occasionally due to water rationing within the area. In Nkoile Primary School, the hand washing facilities were available for both teachers and pupils' but then the school lacked adequate water at the time of the study. The reason given for this was

that the water pump near the school had broken down. The little water available was reserved for cooking, drinking and washing dishes. Some pupils however saved the water that was meant for drinking and they would use it to wash hands.

4.6.3 Pupils' participation in activities at home

There were significant differences ($p < 0.05$) in the number of girls washing up dishes, cleaning the compound, cooking family meals, fetching firewood, fetching water, taking care of younger siblings and gardening as compared to boys (Table 4.15).

Table 4.15: Pupils participation in activities at home

Activity	Both Schools N =280		Boys N=134		Girls N=146		p value
	n	%	n	%	n	%	
Washing dishes	236	84.3	101	74.5	135	92.5	0.001*
Cleaning house and compound	252	90.0	112	83.6	140	95.5	0.001*
Washing clothes	247	88.2	115	85.3	132	90.4	0.234
Buying food from the market	176	62.5	90	67.2	86	58.2	0.213
Harvesting food from farm	153	54.6	80	59.7	73	50.0	0.184
Cooking family meals	210	75.0	89	66.4	121	82.9	0.001*
Herding	118	42.1	74	55.2	44	30.1	0.001*
Fetching firewood	157	55.9	64	47.8	93	63.4	0.016*
Fetching water	202	72.4	86	64.2	116	80.0	0.003*
Taking care of younger siblings	151	53.6	64	47.8	87	59.0	0.051
Gardening	134	47.3	77	57.5	57	37.9	0.003*
Helping in family business	157	55.9	77	57.5	80	54.5	0.572

Multiple responses allowed

Although not significant ($p > 0.05$) slightly more girls (90.4%) than boys (85.3%) reported to be responsible for washing clothes. More boys (67.2%) than girls (58.2%) were responsible for going to the market to purchase food than its preparation. This difference was also not significant ($p > 0.05$). These findings agree with those of a study conducted in

Machakos District by Mbithe, (2008) who found out that more boys participated in purchasing food from the market compared to girls, while more girls participated in food preparation and clean up at home.

The results also indicated that pupils who participated in tasks such as washing dishes, clothes and helping in family business had significantly higher nutrition knowledge; p values at 0.029, 0.011 and 0.003 respectively. This implies that pupils' knowledge was associated with afore mentioned practices meaning that nutrition knowledge influenced pupils' participation in activities such as washing up dishes, clothes and helping in family business.

Overall, the findings showed that girls were responsible for most household tasks while the boys performed outdoor tasks such as gardening, herding and helping in family business. Consistent with the findings of a nutrition education study on children's perception of their role in everyday life among primary school children in Madagascar revealed that from a very early age the gender difference between women's and men's roles is internalized. Typically, young boys are expected to be responsible for herding and to assist their fathers with agricultural tasks. Young girls however, have to fetch water, assist in cooking, washing up, sweeping the house and taking care of younger siblings (Mahr, Wuestefeld, Haaf and Krawinkel, 2005). Those taking care of younger siblings play the role of surrogate mothers and are responsible for the children's hygiene behaviour: washing their clothes, bathing them and teaching them to fetch water and clean the house. Older boys teach younger siblings how to accomplish their daily tasks like herding cattle (Mahr et al., 2005).

Since children are responsible for different tasks at home it is important that they have appropriate nutrition knowledge and be encouraged to practice nutrition for the wellness of the family. In addition, children act as change agents and may influence decisions regarding household hygienic standards, food choice preparation and consumption. For children to be effective as nutrition and health change agents the nutrition messages passed across should be simple, adapted to their abilities and interests as well as cultural and social environments (Mahr et al., 2005). When knowledge is supported by enabling and reinforcing factors, desirable changes may occur in the home, school setting and in the community.

4.6.4 Methods of refuse disposal

Refuse disposal greatly influences the level of hygiene. Rudimentary methods of refuse disposal can result in a high prevalence of water and sanitation related diseases, causing many people, children in particular, to fall ill or even die. Respondents were asked to state how refuse was disposed in their homes. Most of the pupils (86.4%) had composite pits for refuse disposal, 21.9% of them disposed refuse in a cowshed while 18.3% and 11.1 % disposed refuse in the *shamba* and open field respectively. Observation during home visits revealed that most households had composite pits and only a few households disposed refuse in an open field.

4.6.5 Food consumption patterns of pupils

Several studies have linked consumption of a diverse diet to improved nutrition status and health, stating that dietary diversity is significantly associated with anthropometric indicators (Onyango, 2003; Arimond and Ruel, 2004). Food consumption patterns involved determining food consumed by the pupils using a 24-hour food frequency. The overall dietary diversity score mean of the pupils was 8.4 ± 2.81 out of a total of 14 food

groups. Pupils in Nkoile Primary School had a significantly higher dietary diversity score 9.9 ± 1.96 as compared to those in Isinya Primary School 7.9 ± 2.87 (t-test; $p < 0.001$).

Table 4.16: Food consumption patterns of pupils

Types of food	Combined N=280		Isinya N= 216		Nkoile N=64		P-values
	n	%	n	%	n	%	
Cereals and cereal products	255	91.7	193	90.2	62	96.9	0.384
Vitamin A rich fruits	184	66.7	133	62.7	51	79.7	0.037
White tubers and roots	152	55.5	107	50.7	45	71.4	0.063
Dark green leafy vegetables	172	62.3	127	59.9	45	71.4	0.266
Other vegetables e.g. cabbage	239	86.3	180	84.5	59	92.2	0.279
Vitamin A rich fruit	141	51.1	102	7.9	39	61.9	0.342
Organ meats	134	42.2	88	41.3	46	73.0	0.478
Flesh meats and offals	117	48.6	93	43.7	24	37.5	0.001*
Eggs	90	32.6	65	30.7	25	39.1	0.401
Fish	78	28.1	61	28.5	17	26.6	0.640
Pulses legumes and nuts	169	61.1	124	58.2	49	76.6	0.064
Milk and milk products	195	70.1	146	68.2	49	76.6	0.020*
Oils and fats	201	72.6	150	70.4	51	79.7	0.145
Sweets	198	71.5	142	66.7	56	87.5	0.014*
Dietary Diversity							
Mean	8.4		7.9		9.9		
SD		± 2.81		± 2.87		± 1.96	0.001*

Multiple responses allowed

Table 4.16 indicates that the most common consumed foods were cereals and cereal products (91.7%) which included: maize, *ugali* and bread followed by other vegetables such as cabbages, tomatoes and onions (86.3%). Other foods consumed by most of the pupils were oils and fats, milk and milk products and sweets such as sugar, glucose, sweet juice and sweets. The least consumed of the foods included fish (28.1%) and eggs (32.6%). This could possibly be explained by the fact that the foods were expensive, not locally available and were culturally unacceptable by some of the households. A study

conducted by Ajani (2010) in Nigeria revealed that the predominant food groups in the diet were: cereal/grains (92%), root/tubers (59%), legumes/nuts (63.5%), fish (57.1%), vegetables (48%), meat (33%), while a large majority (99%) consumed oils/fat in soups/stews.

Other studies have shown stiff porridge (ugali) as the most consumed food among school children (Mbithe, 2008; Oldewage-Theron and Egal, 2010). The focus group discussion with teachers, pupils and parents revealed that factors such as availability and accessibility of food affected food consumption at the household. Some pupils stated that they consumed meat, milk and blood because it was locally available, culturally accepted and affordable to the family.

Foods which were least consumed included fish and eggs. The low consumption these foods was attributed to the fact that they were locally unavailable and these foods expensive. Other factors such as food preferences taboos and beliefs have important consequences for what foods are eaten or not eaten. Parents' preferences, constant communication, beliefs, and attitudes toward food shaped their children's food-related beliefs, attitudes, knowledge, preferences, and consumption, which in turn influenced eating behaviours. FGDs with pupils revealed that some pupils did not consume some foods just because their parents did not consume them. *"I do not eat meat just because my mum does not eat it"* Implying that parents should be good role models as their food choices influence those of their children.

Focus group discussion with the pupils and parents revealed that consumption of chicken and its products among females was a taboo. This is changing over time; in Nkoile Primary School there was an initiative to rear poultry for the purpose of consumption and

also income generation. The project was meant to sustain the School Feeding Programme and was funded by the Healthy Learning Programme. The findings from the focus group discussions showed that most of the parents were developing positive attitudes about poultry farming. Other than the school curriculum, the findings from FGDs showed that projects within the school had contributed to a positive change in nutrition-related practices. Consequently, there was increased production and consumption of foods such as cow peas, chicken and its products, kales, spinach among other crops which could lead to improved nutrition status of the household members. This study however, did not establish the nutrition status of the pupils and the level of production of “new food crops” within the schools and households

4.7 Relationship between nutrition practice, nutrition knowledge and nutrition related attitudes

4.7.1 Relationship between nutrition practices and pupils attitudes

The attitude score of pupils who participated in tasks such as helping in family business, gardening, taking care of siblings, fetching water, cooking family meals, buying food from the market and washing clothes was higher than for those who did not participate $p < 0.05$. This implies that positive attitude is a necessary factor in influencing nutrition practice among school children in these schools. Given that the decisions to participate in activities at home and school did not entirely rely on pupils but on parents and teachers who assigned tasks to them, parents and teachers should motivate and encourage children to work at home and in school by telling them the importance of tasks they conduct but not using tasks such as gardening, cleaning the compound, washing dishes and cleaning the toilet as a punishment which will make the children to work by order but not to enjoy whatever they do. There was no significant difference (T-test) $p > 0.05$, in the attitude

score of pupils who participated in harvesting food from the farm, herding, washing dishes, fetching firewood and cleaning the compound.

There was no correlation between the dietary diversity score and the attitudes of the pupils towards nutrition $r= 0.025$, $p=0.0.68$ (Table 4.17). Therefore, the hypothesis that there is no significant relationship between the pupils' diet diversity and their nutrition-related attitudes is accepted. This could be attributed to the fact that decisions on dietary intake were not entirely dependent on children. In most cases parents made decisions on what was to be consumed in the household while teachers made decisions at school.

Table 4.17: Relationship between nutrition practices and nutrition-related attitudes

	Both schools N=280	Isinya N=216	Nkoile N=64
Nutrition practices and nutrition-related attitudes			
Pearson correlation or t-test (p-value)			
Washing of hands	t=1.271 (0.21)	t= 1.350 (0.18)	t= 0.348 (0.73)
Boiling of drinking water	t= 0.005 (1.00)	t= 0.289 (0.77)	t= 0.140 (0.89)
Dietary diversity score	r= 0.025 (p=0.68)	r= -0.130 (0.06)	r= -0.174 (0.17)

4.7.2 Relationship between nutrition practices and pupils nutrition knowledge

According to the findings, there was a significant weak negative correlation between dietary diversity and nutrition knowledge $r= -0.133$, $p= 0.03$. Therefore, the null hypothesis that there is no significant relationship between dietary diversity and nutrition knowledge is rejected. These findings could be attributed to the fact that diet consumed in both school and at home was not entirely dependent on the decision of pupils but rather on teachers and parents. Findings from the focus group discussion with pupils revealed that factors which influenced choices of food among the pupils included: taste of food;

amount served; cultural acceptability, availability and accessibility of food in the household.

Table 4.18: Relationship between Nutrition Practice and Nutrition Knowledge

	Both schools N=280	Isinya N=216	Nkoile N=64
Nutrition practices and nutrition knowledge			
Pearson correlation or t-test (p-value)			
Washing of hands	r=-0.015(0.81)	r=-0.052(0.45)	r= -0.206 (0.10)
Boiling of drinking water	r= -0.062(0.301)	r=-0.091(0.19)	r= 0.088 (0.49)
Dietary diversity score	r= -0.133 (0.03)*	r= -0.080 (0.24)	r= -0.014(0.91)

***Significant difference $p < 0.05$**

Overall, there was no association between the practice of washing hands at critical times and nutrition knowledge $r = -0.015$, $p = 0.81$. Similarly, there was no association between the practice of boiling water before drinking and nutrition knowledge of the pupils in both schools $r = -0.062$, $p = 0.301$. Therefore, the null hypothesis that there is no significant relationship between the pupils' nutrition practices and nutrition knowledge is not rejected. Studies have shown that despite adequate nutrition awareness and knowledge and positive attitude towards healthy nutrition, cultural acceptability, lack of food availability and accessibility experienced by the children or individuals in low socioeconomic households may remain as an important deterrent in the achievement of a healthy and varied diet (Sherman, and Muehlhoff, 2007; Mbithe, 2008).

4.7.3 Predictors of appropriate nutrition practices

Logistic regression analysis was used to identify the predictors of nutrition practices. Pupils with positive attitudes towards nutrition were 3 times more likely to wash hands before handling food (Odds Ratio [OR] =3.25; Confidence Interval [CI] =1.19-8.84;

p=0.02). In Isinya Primary School however, pupils who had positive attitude towards nutrition were about 7 times more likely to wash hands before handling food (OR= 6.75; P=0.02; CI=1.29-3.35) There was no significant (p>0.05) relationship between washing hands before handling food and having positive attitudes towards nutrition in Nkoile Primary School (Table 4:19).

Table 4.19: Relationship between nutrition practice, nutrition knowledge and nutrition related attitudes.

	Both schools N=280	Isinya N=216	Nkoile N=64
Relationship between nutrition practices and nutrition-related attitudes			
<u>Washing hands</u>	OR; CI; (P value)	OR; CI; (P value)	OR; CI; (P value)
Before leaving the toilet	1.13; 0.43-2.93(0.80)	1.16; 0.45-3.15 (0.73)	1.24; 0.11-1.33(0.10)
Before handling food	3.25; 1.19-.84(0.02)*	6.56; 1.29-3.35 (0.02)*	2.13; 0.50-9.02(0.30)
Before eating	0.86; 0.29-2.51(0.78)	0.74; 0.19-2.87 (0.66)	1.21; 0.20-7.22(0.84)
In various occasions	1.52; 0.80-2.89(0.21)	1.69; 0.79-3.63 (0.18)	1.25; 0.36-4.32(0.72)
Drinking boiled water	1.22; 0.62-2.42(0.56)	1.22; 0.56-2.65 (0.61)	1.61; 0.36-2.19(0.53)
Relationship between nutrition practices and nutrition knowledge			
<u>Washing hands</u>	OR; CI; (P value)	OR; CI; (P value)	OR; CI; (P value)
Before leaving the toilet	1.37; 0.55-3.42 (0.50)	1.99; 0.77-5.18 (0.16)	0.71; 0.05-1.22 (0.24)
Before handling food	0.75; 0.28-2.03 (0.57)	0.44; 0.09-2.22 (0.32)	0.61; 0.15-2.54 (0.50)
Before eating	0.97; 0.37-2.60 (0.96)	1.68; 0.50-5.69 (0.40)	0.23; 0.04-1.34 (0.10)
In various occasions	1.06; 0.57-1.99 (0.85)	1.44; 0.68-3.08 (0.34)	0.35; 0.11-1.15 (0.08)
Drinking of boiled water	1.53; 0.81-2.70 (0.19)	1.79; 0.85-3.78 (0.23)	0.80; 0.23-2.82 (0.73)

***Significant difference p<0.05**

This implies that a positive attitude towards nutrition plays an important role in improving some nutrition practices among school children. This is therefore the only predictor of the washing of hands before handling of food. Attitude rather than knowledge influenced some aspects (not all) of nutrition practices.

Nutrition knowledge did not significantly predict appropriate nutrition practices. Studies have shown that gains in knowledge and attitudes do not always result in positive changes in practice and that nutrition knowledge is a necessary but not sufficient factor for changes in nutrition-related practices (Worsely, 2002; Sherman and Muehlhoff, 2007). Shariff et al. (2008) argues that whereas appropriate nutrition and health education can bring about the intention to change nutrition-related practices, positive attitudes towards nutrition, appropriate facilities and support is needed within the school environment and home to allow pupils to transform intention to change nutrition practices into actual practice (Shariff et al, 2008). For example, the school needs to provide adequate clean toilets, hand washing facilities with soap and water in appropriate places in order to fully encourage hand washing.

Other studies have shown that hygienic and dietary practices are contingent upon availability of resources such as toilets, soap, clean water, hand wash facilities and accessibility and availability of various foods (Water Sanitation Programme, 2007; Sherman and Muehlhoff, 2007; Vivas, et al., 2010). Increasing pupils' knowledge about nutrition and health should therefore not be pursued in isolation. When knowledge is supported by enabling and reinforcing factors, desirable changes may occur in the school setting and in the community. Pupils should however be made to understand the need to acquire appropriate nutrition and health practices as these may influence them to develop appropriate nutrition attitudes and practices.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Presented in this chapter are; the summary of the study, conclusions, implications of the findings, recommendations and suggestions for further research.

5.1.1 Summary

This study was carried out in Isinya and Namanga divisions in Kajiado district, Kenya from June, 2010 to July 2010. The aim of the study was to establish the status of nutrition knowledge, attitudes and nutrition practices among class 1-6 school pupils from rural and urban set-ups, that is, Nkoile and Isinya Primary Schools respectively. The study also investigated the relationship between nutrition practices, and nutrition knowledge and nutrition-related attitudes.

5.1.2 Conclusions

The pupils' level of nutrition knowledge in both schools was average; however pupils from Isinya Primary School had significantly higher nutrition knowledge compared to those from Nkoile Primary School. The main sources of nutrition information were textbooks, followed by the information received during the lessons taught in school indicating that the curriculum is an important source of nutrition information. The nutrition knowledge acquired by the pupils was further dissipated among their parents and the community at large.

Despite the fact that the television was the fourth major source of information for the pupils, it was the most preferred medium because it was interesting and provided information using a variety of stimulus material. The only factors associated with nutrition knowledge were age, with younger pupils significantly demonstrating higher levels of knowledge than their older counterparts. The source of information was another

factor, influencing nutrition knowledge. Those who received information from the Healthy Learning Programme were more likely to have higher scores in nutrition knowledge. The pupils, parents and teachers, liked the Healthy Learning and School Feeding Programmes as well as their activities because of their contribution in addressing hunger and malnutrition among the school children.

Positive attitudes towards nutrition are considered a prerequisite for the promotion of appropriate nutrition-related practices. Overall the pupils had positive attitudes towards nutrition, with those from Nkoile Primary School having significantly higher positive attitudes as compared to those from Isinya Primary School. The present study demonstrated that positive attitudes influenced appropriate nutrition practices.

As a whole, nutrition-related practices including hand washing, drinking of boiled water, food preparation and other activities such as washing up after meals, purchasing food from the market, taking care of siblings and taking care of livestock were positive. Nonetheless, as expected, these practices were gender-defined, with girls being more involved in food preparation and child-care and the boys in purchasing of food and herding livestock.

The predictors of appropriate nutrition practices in the study population were positive attitudes towards nutrition. The results of logistic regression analysis revealed that pupils who had high attitude scores were more likely to practice washing hands at appropriate occasions. This implies that nutrition knowledge and attitudes played an important role in improving nutrition-related practices in the study population.

Findings from the focus group discussions revealed that the pupils, parents and teachers liked the Healthy Learning Programme for its contribution to improved quality of school meals, diet diversity, and knowledge transfer from school to the community and improved nutrition knowledge, attitudes and practices among school children in both schools.

5.1.3 Implications of the findings

This study has important implications for nutrition education, nutrition-related practice at schools and research. First of all, nutrition knowledge and attitudes among school children are important factors influencing appropriate nutrition practices which are necessary to address malnutrition in school children and the community at large. The findings of this study have further reinforced the fact that school is an important learning environment for passing on nutrition knowledge to the pupils. Pupils are important change agents transferring knowledge and ideas learnt from school to the community. The school curriculum is important in improving nutrition knowledge of the school pupils. The media as a source of nutrition knowledge is becoming important based on the proportion of pupils who liked this source of information.

Nutrition knowledge and positive attitudes are important prerequisites to appropriate nutrition practices. Nonetheless, knowledge and positive attitudes do not always translate into practice. In this study population, appropriate nutrition practices were constrained by availability of resources and facilities such as latrines, hand washing facilities, soap, water, fuel and some types of foods. In addition, culture also influenced practice, for example, some foods were not eaten because traditionally they were not eaten by the community or because they were not known to the community.

Co-curricular activities as those of the Healthy Learning Programme provided additional forum for pupils to improve their knowledge and attitudes on nutrition. Furthermore, the programme improved the dietary diversity of the children by providing additional foods such as vegetables and eggs.

5.1.4 Recommendations for policy

1. Nutrition messages passed through textbooks and lessons taught in class should be well packaged in order to provide adequate and reliable information. Text books should be available in schools and be optimally utilized by each pupil. Professionals (nutritionists and educationalists) should explore the use of media as source of nutrition information. The media offers a lot of potential and appealed to many pupils. Nevertheless, the media should be closely monitored by nutritionists and educationalists to ensure that correct and reliable information is passed through this channel.
2. The study has reinforced the fact that school is an important learning environment for nutrition among school children. Avenues of nutrition education within the school such as the health and nutrition clubs, Healthy Learning Programme, School Feeding Programme and KIWI projects among others should be exploited fully by the school by ensuring infusion and integration of knowledge learnt from class with those from these programmes. These programmes should be up scaled and sustained to ensure that pupils continue enjoying both nutritional and educational benefits of the programmes. In addition, schools should explore ways of ensuring that all pupils participate in these programmes and projects initiated within the school and not just for a few as in 4-K club and health and nutrition clubs. Parents should also be targeted in programmes such as Healthy Learning

and School Feeding Programmes in order for them to reinforce what is being taught in schools at home. Interventions such as the Healthy Learning Programme with demonstrated benefits to the nutrition knowledge, attitudes and practices to the pupils and the community at large should be up scaled by the schools in collaboration with the Ministry of Education and Flemish Association for Development Cooperation and Technical Assistance.

5.1.5 Recommendations for practice

1. Science teachers should equip themselves with appropriate nutrition information as they were rated to be the most common source of nutrition information so that they can be creative and innovate appropriate teaching and learning materials tailored to the needs of the pupils. To improve nutrition-related practices, the teachers should target specific nutrition practices such as appropriate dietary intake, washing of hands and participation in activities at school.
2. It is recommended that schools invest in a variety of teaching and learning materials for both teachers and pupils. This can be done by encouraging the use of a variety of locally available resources in order to make teaching and learning of nutrition interesting and productive. A variety of sources of information should be provided and utilized within the school as they have potential to improve nutrition knowledge, attitudes and practices.
3. The school should strive to inculcate positive attitudes towards nutrition among the pupils in order to encourage the practice of appropriate nutrition-related activities by motivating the pupils to participate in nutrition activities for the vast health and nutrition benefits.

4. The schools should provide clean, well-designed and well-located latrines and hand washing facilities that have adequate amounts of soap and water these were found to constrain hygienic practices.

5.1.6 Suggestions for further research

1. Replication of a similar study on school children in other districts in Kenya especially those in arid and semi-arid regions (ASAL) such as Eastern and North Eastern Provinces which are as dry as this study district in order to strengthen/validate or show variability of these research findings.
2. Other similar researches to be conducted in areas not having the same characteristics as the study area to investigate factors that influence nutrition knowledge, attitudes and practices. Such areas are likely to be having different nutrition challenges.

REFERENCES

- Ajani, S.R. (2010). An assessment of dietary diversity in six Nigerian states. *African Journal of Biomedicine. Res.* 13; 161 -167.
- Alexandra, E. (2005). Nutrition knowledge attitudes and practices among nutrition educators in the South. *American Journal of Health Studies.*
- Anderson-Butcher, D., Lawson, H., Bean, J., Boone, B., & Kwiatkowski, A. (2004). Implementation guide: The Ohio Community Collaboration Model (OCCM) for school improvement
- Ayieko, M.A. & Midikila, K.F. (2010). Seasonality of food supply, coping strategies and child nutritional outcome in Sabatia-Kenya. *Advance Journal of Food Science and Technology* 2(5): 279-285, ISSN: 2042-4876. *Maxwell Scientific Organization*
- Arimond, M., & Ruel M.T. (2004). Dietary diversity is associated with child nutritional status: Evidence from 11 Demographic and Health surveys. *The Journal of Nutrition. vol. 134 no. 10* 2579-258.
- Bedgrod, B.L., & Tuck, M.B. (1993). Nutrition Knowledge of Teachers in Texas. *Journal of the American Dietetic Association;* 83: 78-89.
- Contento IR. The effectiveness of nutrition education and implications for nutrition Education policy, programs and research: A review of research. *Journal of Nutrition Education.* 127(5): 284-286.
- Contento, I.R. (2007). *Nutrition Education: Linking, Research, Theory and Practice.* Columbia: Jones and Barret Publishers.
- Eboh, L.O. & Boye, T.E. (2006). Nutrition Knowledge and Food Choices in Primary School Pupils in Niger – Delta Region Nigeria. *Pakistan Journal of Nutrition;* 5:308-311.
- FAO (1997). Agriculture, food and nutrition for Africa: a resource book for teachers of agriculture. Rome, Italy.
- FAO (2003). Food Nutrition and Agriculture; from nutritional needs to classroom lessons: Can we make a difference? *FAO.* 33: 45-51.
- FAO (2005a). Nutrition Education in Primary Schools: A Planning Guide for Curriculum Development. Vol.1. Rome, Italy. 7-8, 17, 67-69, 92.
- FAO (2005b). Setting Up and Running a School Garden: A Manual for Teachers, Parents and Communities. Rome, Italy. 182-190.
- Fisher, A. A., Laing, J. E., & Tounssend, J. W. (1991). Handbook for family planning operations research and design. USA: Operations Research Population Council

- Graves, K.L., Farthing, M.C., & Turchi, J.M. (1991). Nutrition training, attitudes, knowledge, recommendations, responsibility and resources utilization of kindergarten teachers. *Journal of the American Dietetic Association*; 9: 103-112.
- Hendrie, G. Cox, D. & Coveney, J. (2008). Nutrition knowledge as a predictor of nutrient intake and diet quality. *Journal of Nutrition Education and Behaviour* 2008; 40(4):S50–1.
- Jacobson, B.H., Sonoma, C., & Ransone, G. (2001). Nutrition practices and knowledge of kindergarten teachers: A follow up study. *Journal of Strength & Conditioning Research*; 15: 67-79.
- Katzenellenbogen, J.M., Joubert G. & Abdool-Karim S, S. (2002). *Epidemiology. A Manual for South Africa*. Cape Town: Oxford University Press.
- Kenya Integrated Household Budget Survey (2006). Volume 1 Basic Report January 2007. Central Bureau of Statistics. Ministry of Planning and National Development. www.cbs.go.ke. ISBN:9966-767-07X.
- Kenya National Bureau of Statistics (2008). *Well-being in Kenya: A Socio-economic Profile*. Nairobi, Kenya. English Press and limited. ISBN 9966-767-13-4.
- Kenya National Bureau of Statistics (KNBS) and ICF macro. (2010). *Kenya Demographic and Health Survey 2008-09*. Calverton, Maryland: KNBS and ICF Macro.
- KIE (2002). Republic of Kenya, Ministry of Education, Science and Technology Primary Education syllabus Vol. 1 and 2 KIE Nairobi, Kenya.
- Lakshman, R.R., Sharp, S.J., Ong, K.K., Forouhi, N.G. (2010). A Novel School-Based Intervention to Improve nutrition knowledge in children: cluster randomised controlled trial. *BMC Public Health* 2010, 10:123 <http://www.biomedcentral.com/1471-2458/10/123>
- Lin, W. and Lee, Y., W. (2005). Nutrition knowledge, attitudes and dietary restriction behaviour of Taiwanese elderly. *Asia Pacific Journal of Clinical Nutrition*. 14(3):221-9
- Lytle, L.A., Stone, E.J., & Knichaman, M.Z. (1996). Changes in nutrition intakes of elementary school children following a school based intervention: results from the CATCH study. *Journal of Preventive Medicine*. 25: 465-477.
- Mahr, J., Wuestefeld, M. Haaf, J., T. and Krawinkel, M., B. (2005). Nutrition education for illiterate children in southern Madagascar-addressing their needs, perceptions and capabilities. *Public Health Nutrition*. 8 (4):366-72
- Margaret, R., & Mamdouh G. (1994). *Nutrition in the nineties*. Policy issues. Bombay: Oxford University Press.
- Mbithe, D. (2008). Promoting nutrition education intervention in rural and urban Primary Schools in Machakos District, Kenya: Focus on school gardens. Unpublished Doctoral Dissertation, Kenyatta University, Nairobi, Kenya.

- Murphy, A.S., Youatt, J.P., Hoerr, S.L., Sawyer, C. A. & Andrew, S.L. (1994). Nutrition Education Needs and Learning Preferences of Michigan Student in Grades 5, 8 and 11. *Journal of School Health*. 64: 273-278.
- Nicklas, T A., Baranowski, L.N.T., Baranowski, J. C., Cullen, K., Rittenberry, L., Olvera, N. (2001). Family and Child-care Provider Influences on Preschool Children's Fruit, Juice, and Vegetable Consumption. *Nutrition Reviews*, Vol. 59, No. 7.
- Oldewage-Theron W. H. & Egal A. A. (2009). Evaluation of a nutrition education programme on the nutrition knowledge of children aged six and seven years. *Journal of Family Ecology and Consumer Sciences*; 37:45–51.
- Oldewage-Theron, W. H. & Egal, A. A. (2010). Nutrition knowledge and nutritional status of primary school children in QwaQwa. *South African Journal of Clinical Nutrition* 2010; 23(3):149-154
- Okorodudu, G.N. & Okobiah, O.S. (2004). Child abuse effectiveness of a food preparation and nutrition and parental neglect: A COG in the wheel of Education Programme for Children. Topics in Clinical Development in Nigeria. *Delsu. Journal of Nutrition Education. Res. Dev.: Nutr*, 14: 48-59.125-138.
- Otiono, A. (2005). An investigation into the socio –cultural health practices and beliefs among women in Delta State. Unpublished Doctoral Dissertation. Delta State University, Abraka.
- Onyango, A.W. (2003). Dietary Diversity, Child Nutrition and Health in Contemporary African Communities. *Comparative Biochemistry and Physiology - A Molecular and Integrative Physiology*, 136 (1), pp. 61-69. Abstract retrieved from <http://www.sciencedirect.com/science/article/pii/S1095643303000710>.
- Parmenter, K., Waller, J. and Wardle, J. (2000). Demographic variation in nutrition knowledge in England. *Health Education and Research: Theory and Practice*. 15:2:163-174
- Shariff, Z.M., Bukhari, S.S., Othman, N., Hashim, H.M., Ismail, M., Jamil, Z., (...) & Hussein, M.Z.A., (2008). Nutrition Education Intervention Improves Nutrition Knowledge, Attitude and Practices of Primary School Children: A Pilot Study. *International Electronic Journal of Health Education*, 2008; 11:119-132.
- Shah, P., Misra, A., Gupta, N., Hazra D.K., Gupta, R., Seth, P., (...) & Goel, K. (2010). Improvement in Nutrition-Related Knowledge and Behaviour of Urban Asian Indian School Children: Findings from the 'Medical Education for Children/Adolescents for Realistic Prevention of Obesity and Diabetes and for Healthy Ageing' (MARG) intervention study. *British Journal of Nutrition*. 2010; 104, 427–436.
- Sherman, J. & Muehlhoff, E. (2007). Developing a Nutrition and Health Education Program for Primary Schools in Zambia. *Journal of Nutrition Education and Behavior*. 2007; 39:335-34.

- Shoaf, L. R. & McClellan, P.D. (1996). Nutrition knowledge, Interests and Information Sources of Teachers. *Journal of Nutrition Education*; 18: 67-98.
- Traahms, C. M. & Pipes, P. (2000). Nutrition in childhood. In: Worthington-Roberts BS, Williams SR, eds. *Nutrition throughout the Life Cycle*. 4th ed. Boston, Mass: McGraw Hill; 2000:26-40, 226-261.
- United Nations Children's funds, (1998). *Towards programming: A Manual on School Sanitation and Hygiene*. New York.
- Vandenbosch, T. (2009). Promoting food security, agriculture and rural development through relevant education at all levels: Workshop on "Food crisis: education and training of rural people at stake" FAO headquarters, Rome, Italy – 4 and 5 June 2009.
- Valleau, L., Almeida, S., Deane, M. E., Froats-Emond, C., Henderson, D., Prange, M. E. & Wai. (2004). Ontario Society of Nutrition Professionals in Public Health School Nutrition Workgroup. Call to Action: Creating Action: creating a healthy school nutrition environment www.osnpph.on.ca.
- Vivas, A., Gelaye, B., Aboset, N., Kumie, A., Berhane, Y & William, M. A. (2010). Knowledge, attitudes, and practices (KAP) of hygiene among school children in Angolela, Ethiopia. *Journal of Preventive Medicine and Hygiene*. 51(2):73–79.
- Vos, R., Bedi, A., Kimalu, P., Manda, D.K., Nafula, N. & Kimenyi, M. (2004). Achieving universal primary school education in Kenya. KIPPRA Discussion Paper No. 46. Kenya Institute for Public Policy Research and Analysis.
- VVOB/MoE (2008a). Concept Document: Collaborative Programme 2008 – 2013_“ICT Integration and Healthy Learning for quality education through support of KESSP” between The Ministry of Education and The Flemish Association for Development Cooperation and Technical Assistance.
- VVOB/MoE (2008b). Baseline survey healthy learning: A summary report (Volume II) submitted to Ministry of Education in partnership with the Flemish Association for Development Cooperation and Technical Assistance (VVOB) and the World Agro forestry Centre.
- Water and Sanitation Programme, (2007). Can hygiene be cool and fun? Insights from school children in Senegal. *London School of Hygiene and Tropical medicine*.
- Winter, M. M., Stanton, L. and Bousley, C. (1999). The effectiveness of a food preparation and nutrition education programme for children. *Journal of clinical nutrition* 14: 48-59.
- WHO/FAO. (1998). Healthy nutrition: an essential element of a health-promoting school. Geneva. WHO information series on school health, document 4. Geneva <http://www.who.int/hpr>

World Food Programme (2010). Impact Evaluation of WFP School Feeding Programmes in Kenya (1999-2008): A Mixed-Methods Approach Vol 1. Full Evaluation Report. <http://www.wfp.org>

Worsely, A. (2002). Nutrition knowledge and food consumption: Can Nutrition Knowledge Change Food Behaviour? *Asia Pacific Journal of Clinical Nutrition* 11: S579–S585.

Whitney, E. N., & Rolfes, S. R. (2002). Understanding nutrition (9th Ed.). Belmont, CA: Wadsworth.

<http://wsd.waupaca.k12.wi.us/staff>, Accessed on 20th July 2009

<http://www.paofdurango.com.htm> , Accessed on 15th June 2009

<http://healthylearningprogramme.blogspot.com>, Accessed on 30th August 2011

APPENDICES

Appendix 1 Questionnaire

Knowledge, Attitudes and Practices of Children from Isinya and Nkoile Primary Schools in Kajiado District, Kenya

I am Velma Nyapera, a post graduate student at Kenyatta University, School of applied human Science, Department of Food Nutrition and Dietetics. I am undertaking a research entitled Knowledge, Attitudes and Practices of Children from Nkoile and Isinya Primary Schools in Kajiado District, Kenya. The aim of the study is to establish the relationship between children's nutritional practice, nutrition knowledge, and nutritional related attitudes in Kajiado district. This questionnaire is intended for data collection. Respondents are kindly requested to answer the questions to the best of their knowledge; information obtained will be accorded utmost confidentiality. Your participation and co-operation in the excise is highly appreciated.

Thank you for your cooperation

TO BE ADMINISTERED TO CLASS FIVE AND SIX PUPILS IN ISINYA AND NKOILE PRIMARY SCHOOL.

SECTION A: Administrative details

Questionnaire ID no.....Name of interviewer.....
 School name..... Zone.....
 Respondents name.....Class.....
 Date of interview.....Questionnaire checked.....
 Date Checked.....

SECTION B. Demographic Information

B. Record the demographic information of all the household members of the household the index pupil comes from.

B1. Names of Household members	B2. Relationship	B3. Sex	B4. Age	B5. Education levels	B6. Marital status	B7. Occupation
1. (Index pupil)						
2.						
3.						
4.						
5.						
6.						
7.						

Codes:

Relationship: 1=father 2=mother 3=grandmother 4=grandfather 5=sister 6=brother
 7=worker 8=aunt 9=uncle

Occupation: 1= unpaid family worker 2= unskilled private worker 3= unskilled public worker 4= skilled private worker 5= skilled public worker
 6=business

Education: 1=preschool 2=not finished primary 3=primary 4=in secondary 5=post Secondary 6=not gone to school

Sex: 1=male 2=female

Marital status: 1= married 2=single 3= separated 4= divorced

SECTION C: Socio-economic factors

C1. Out of which material is the roof of your house made? (Tick the appropriate Box as [x])

- a). Mud []
- b). Corrugated iron []
- c). Tiles []
- d). Grass
- e). Other (specify).....

C2. Which of the following items does your family own? (1=Owned 2= Not owned)

- a) Radio []
- b) Television []
- c) Bicycle []
- d) Video cassette player []
- e) Land []
- f) Vehicle []
- g) Cows []
- h) Goats []
- i) Sheep []
- j) Others (specify).....

C3. Which one of the following is the main source of fuel for cooking in your family?

(Tick the appropriate Box as [x])

- a) Firewood []
- b) Charcoal []
- c) Paraffin []

- d) Electricity
- e) Gas

C4. Which of the following is the main source of lighting used in your family? (TICK the appropriate Box as [x])

- a) Electricity
- b) Kerosene hurricane
- c) Kerosene tin lamp (koroboi)
- d) Candle
- e) Firewood
- f) Other (specify).....

C5. What is the main source of food for your family? (Tick the appropriate response as[x])

- a) Own production
- b) Purchased from market
- c) Food Aid by WFP
- d) Donations and gifts by churches, NGOs and government
- e) Other (specify)

C6. Which is your main source of drinking water in your family? (Tick the appropriate response as [x])

- a) Rain/tank
- b) Spring
- c) Tap inside the house
- d) Tap in the compound
- e) Borehole

- f) River/springs []
- g) Other (specify)

C7. What type of toilet do you have at home? (Tick the appropriate response as [x])

- a) Traditional pit latrine []
- b) Flush toilet []
- c) No toilet/latrine []
- d) Other (specify)

SECTION D: Sources of Nutrition Information

D.1 From where do you receive information about nutrition issues? (PROBE AND TICK

ALL RESPONSES MENTIONED as [x]).

- 1= I do not receive any nutrition information []
- 2= Text books []
- 3= Newspapers /pamphlets []
- 4= Family members []
- 5= Friends []
- 6= Television []
- 7= Radio []
- 8= From lessons taught in class []
- 9= Healthy Learning programme activities in the school []
- 10= Healthy Learning Programme activities in the community []
- 11= Any other (specify).....

D2. Which of the sources mentioned above provide you with the most information? Rank in order of their importance)

.....

.....

 D3. Which of these three sources of nutrition information do you like most? Give reason for liking each one of them (List in order of their liking)

Source of nutrition information	Reason for liking it

SECTION E. ATTITUDES ON NUTRITION

SD -refers to strongly disagree with the statement

D -refers to disagree with the statement

N -means neither agree nor disagree with the statement

A - Refers to agree with the statement

SA -refers to strongly agree with the statement

Please indicate your opinions of the following statements by putting an “X” against “SD”

(1), “D” (2), “N” (3), “A” (4) or “SA” (5) on the spaces provided after each question.

		SD	D	N	A	SA
Examp le	Its healthy to drink boiled water					x
1.	We should eat as many different kinds of foods as possible					
2.	One can become sick if they do not wash their hands often					
3.	Learning about food and nutrition issues is enjoyable					
4.	I do not like cleaning the school compound because it makes me tired					
5.	Cooking is an enjoyable task					
6.	All unfamiliar or new foods are unhealthy					
7.	I feel good when I drink boiled water					
8.	I do not have to worry about the kind of foods I eat because I am still young					
9.	Fruits are a healthy snack					
10.	I like the healthy learning programme because it has contributed to my knowledge					

	in nutrition					
11.	I prefer meat to vegetables					
12.	I do not believe that frequent brushing of teeth leads to healthy teeth					
13.	Breakfast is important to me					
14.	The taste of food is more important than its nutrient content					
15.	All nutritious foods are expensive					
16.	We can dispose off rubbish anywhere in the compound as long as the teachers are not seeing us					
17.	It is hard to practice the nutrition aspects at home, so I will just study nutrition to pass the examinations					
18.	The lunch provided by the school feeding programme is sufficient for me					
19.	Eating of healthy food is only important during illness					

SECTION F: FOOD CONSUMPTION PATTERNS

F1. Food group consumed	F2. Did you consume food from any of these groups in the last 24 hours (from this time yesterday to now)? Include any snacks consumed 1= Yes 0= No	F3. What is the main source of the dominant food item consumed (Please insert the appropriate code) 1=Own production 2= purchases 3=gifts from friends/ family 4= food aid 5= traded or bartered 6=borrowed 7=Gathering /wild 8= Others specify
Type of food		
Cereals and cereal products (e.g. sorghum, maize, spaghetti, pasta, <i>anjera</i> , rice, bulga wheat, bread)		
Vitamin A rich vegetables and tubers: Pumpkin, carrots, yellow fleshed sweet potatoes		
White tubers and roots: Potatoes, white yams, cassava or foods from roots, white sweet potatoes,		
Dark green leafy vegetables: Dark green leafy vegetables including wild ones + locally available vitamin A rich leaves such as, pumpkin leaves, kunde leaves, sukuma wiki, spinach,		

Other vegetables (e.g. tomatoes, biringanya, onions, cabbages)		
Vitamin A rich fruits: Ripe mangoes , papayas + others locally available like watermelon		
Other fruits like oranges, wild fruits		
Organ meat (Iron rich): Liver, kidney, heart or other organ meats or blood based foods , spleen		
Flesh meat and offal's (matumbo): Meat, poultry, (goat, camel)		
Eggs		
Fish: Fresh or dried fish or shell fish or smoked , salted, fried		
Pulses legumes or nuts (e.g. beans , lentils, green grams, cowpeas, dried peas,)		
Milk and milk products (e.g. goat , camel, fermented milk , cow's milk, donkey's meat, powdered milk)		
Oils/ fats (e.g. cooking fat or oil, butter , ghee, margarine, goat's fat, sheep's fat)		
Sweets: Sugar, honey, sweetened juice, soda/sugary foods such as sweets, glucose		

SECTION G. NUTRITION PRACTICES

F1. Do you drink water every day?

1= Yes []

2= No []

F2.If yes how many cups/glasses do you drink per day? -----

F3. Do you boil the water you drink in your home?

1= Yes []

2= No []

F4. During which of the following occasions do you wash your hands?

Occasions	1= Yes 2=No	If no give a reason
After visiting the toilet		
Before handling food		
Before eating		
None of these occasions		

F5. Which of the following activities do you participate in at home?

- =Washing dishes []
- =Cleaning the house and compound []
- =Washing clothes []
- =Buying food from the market []
- =Harvesting food from the farm []
- =Cooking []
- =Herding []
- =Fetching firewood []
- =Fetching water []
- =Taking care of younger siblings []
- =Gardening []
- =Helping at family business []
- =Cooking family meals []

F6. Where do you throw garbage at home?

- 1=Composite pit []
- 2=Cow's shed []

3=Shamba

4=Open field

5=Other (specify) _____

F7. Where do you take the food that remains at home after a meal?

1=Throw away

2=Use the following day

3=Nothing remains

4=Store the food and consume for the next meal

5=Other (specify) _____

F8. Are there clubs which support nutrition in your school? Name them.

F9. Are you a member of these clubs?

F10. Do you enjoy being a member of these clubs? 1=Yes 2=No

F.11. What activities are undertaken by the club?

F11. Of these activities/what do you enjoy most?

SECTION H: NUTRITION KNOWLEDGE

(Please tick only one option in this section)

H1. What is the function of proteins in the body?

- 1= For protection against illnesses
- 2= For repair of worn out body tissues
- 3= To provide energy
- 4= To aid in digestion

H2. In order for bones and teeth to be strong we should eat foods rich in.....

- 1= Vitamin D
- 2= Vitamin A
- 3= Vitamin B
- 4= Vitamin C

H3. When the body lacks iron a person is likely to suffer from which one of the following conditions?

- 1= Kwashiorkor
- 2= Aneamia
- 3= Marasmus

4= Rickets []

H4. Four pupils of Isinya and Nkoile primary carried the following packed lunches:

David: Rice and Irish potatoes

Jane: *Ugali*, *sukuma wiki*, meat and orange

Mike: *Nduma*/arrow roots and tea

Mary: Chips, soda, and cake

Who one of the pupils took a balanced diet for lunch?

1= Mary []

2= Mike []

3= Jane []

4= David []

H5. Which one of the following practices should be done to preserve vitamin C when cooking vegetables such as *sukuma wiki*?

1= Washing the vegetables before cutting []

2= Cooking vegetables under low heat []

3= Washing the vegetables after cutting []

4= Covering the vegetables in covered in water []

H6. Which one of the following practices will make drinking water unsafe?

1= Boiling the water before drinking []

2= Covering the water []

3=Filtering []

4= Storing the water in dirty containers []

H7. Which of these groups contain energy- giving foods ONLY?

1= Rice, meat, maize, carrots []

2 = *Ugali*, potatoes, Rice []

3=Meat, milk, *ugali* []

4= Chips, cabbage []

H8. Which of the following snacks is unhealthy to eat on a regular basis?

1= Fried chips []

2=Bananas []

3=Mangoes []

4=Ground nuts []

H9. Fruits and vegetables provide which one of the following nutrients ?

1= Carbohydrates []

2= Vitamins and minerals []

3=Proteins []

4=Fats []

H10. Which one of the following is a modern method of preserving food?

1=Freezing []

2= Smoking []

3= Drying []

4= Salting []

H11. Which of the following practices is NOT good for the development of healthy teeth?

- 1= Eating a diet rich in calcium and Vitamin D
- 2= Brushing teeth daily
- 3=Eating sugary food
- 4= Having regular dental check up

H12. Which one of the following practices should be avoided to keep the school environment clean and neat?

- 1= Disposing rubbish in the compost pit
- 2= Sweeping the classrooms everyday
- 3= Picking litter from all over the compound
- 4=Writing on the walls of school buildings

H13.Which of these groups of food contains nutrients used for body building ONLY?

- 1= Rice, maize, carrots
- 2= Ugali, potatoes, rice
- 3=Meat, milk, beans
- 4=Chips, cabbage, millet

H14. The following are symptoms of a deficiency disease:

- a) Loose and falling of hair
- b) Protruding stomach (big stomach)
- c) Sores on the mouth and legs
- d) Dry skin, swollen feet and arms
- e) Oedema on the lower limbs

Identify the deficiency disease with these symptoms

- 1=Marasmus

2=Kwashiorkor

3=Rickets

4=Anaemia

H15. Scurvy is caused by a deficiency of

1= Vitamin C

2= Fats and oils

3= Protein

4=Carbohydrates

H16.What deficiency disease is caused by lack of vitamin A in the body?

1= Rickets

2= Night blindness

3=Aneamia

4=Marasmus

H17. Mama Mark bought oranges, mangoes, pawpaws and apples. What should her children do before they eat the fruits?

1=Peel the fruit

2=Wipe the fruit

3= Wash the fruits under clean running water

4= Eat the fruits without washing

H18.Which of the following foods is NOT preserved by salting?

1 =Vegetables

2 = Milk

3 = Meat

4 = Fish

H19. James' mother cooked a mixture of beans and maize (githeri). After staying for three days the food had a foul/bad smell. What should she do with the food?

1= Warm and eat it

2= Throw it away

3= Soak and clean in clean water, heat the food and eat it

4=Put in a fridge

H20. Which of the following practices can lead to sickness?

1=Washing hands before handling or eating food

2=Washing fruits and vegetables before eating them

3=Drinking dirty untreated water

4=Boiling boiling water before drinking

Appendix 2 Marking scheme for the test questions on nutrition knowledge

1. =1

2. =1

3. =2

4. =3

5. =1

6. =3

7. =2

8. =1

9. =2

10. =1

11. =3

12. =3

13. =2

14. =2

15. =1

16. =2

17. =1

18. =2

19. =2

20. =3

Appendix 3 Focus group discussion with parents

1. What is nutrition? What is its value to you, the family and the community as a whole?
2. What are the sources of nutrition knowledge in this community? (PROBE for; relatives/friends; community; from the Healthy Living project; from school; from their children)
3. Have you acquired any new information on health and nutrition from your child?
4. If so, what information have you acquired? How useful is this information?
5. Do you think that the children are being equipped with adequate information on health and nutrition at the school?
6. Have you learnt any storage and preservation techniques through the transfer of knowledge by your child from school to home?
7. Are you aware of the school feeding programme in the school?-Probe who funds the programme, their attitude towards the programme, whether parents contribute to the programme.
8. Do you think children are getting sufficient food and nutrients through the school lunch provided by the SFP? Do you like food served to your children in school.
9. What is your view about the healthy learning programme- is it a good programme, has it helped your children and made a contribution to the community.
10. In what ways has the programme contributed/helped your children?
11. Are you participating in the Healthy Learning Programme?
12. What are your views on the Healthy learning project activities being undertaken by the school where your child goes? PROBE- Do you like the project the school ventured into-under the healthy learning programme?
13. In your view, what else could be done to improve on the activities?

Appendix 4 Focus group discussion with teachers

1. During this school year (2010), have you taught lessons on nutrition to your pupils?
2. What are your sources of information on nutrition issues? Are they adequate?
3. What are your views about?
 - a). Students' value of nutrition?
 - b). Do they practice what is taught?
3. Which instructional materials do you use for teaching nutrition in the school? Are they adequate?
4. What practical skills do you offer that contribute to nutrition practice?
5. What challenges do you face in the teaching of nutrition? PROBE for teaching resources: books, teaching aids and materials; time allocated in the time-table; interest among the pupils etc
6. Do you feel the present curriculum adequately covers nutrition? If NOT, what aspects are not included and you feel are important?
7. Do the pupils in this school participate actively in projects initiated in the school (healthy learning programme, school feeding programme) among others available
8. Do you think the participation in school projects and clubs has led to improved food, nutrition and environmental knowledge among the pupils? If yes how?
9. Which projects in particular have been very instrumental in the above?
10. Please comment on the pupils' interest and commitment to these project activities.
11. In what ways have parents contributed to the nutrition knowledge and practices of the pupils? In what other ways can parents be involved in nutrition education in order to improve the nutrition knowledge and practices of the pupils?
12. What is the parents' level of interest and commitment to these project activities?
13. In what ways have parents and community perceptions, in your view influenced the nutrition attitudes of the pupils?

14. What is your perception of the Healthy Learning Programme, do you think it has achieved its objectives.
15. Are you involved in the activities of the healthy learning programme?
16. Are you involved in the administration of the school meals? What lessons can be learnt for food and nutrition including hygiene and health from the SFP and Healthy learning programmes?

Appendix 5 Focus group discussion with class one – three pupils

TASK A: For the Researcher- PLACE THE FOLLOWING FOOD ITEMS IN FRONT OF THE CHILD.

- i. Mango
- ii. Oranges
- iii. Maize
- iv. Milk
- v. Carrots
- vi. Bread

1. Point to each food item. Let the children randomly name the foods
2. Which one of this is a fruit?
3. Why is the food good for us?

TASK B: For the Researcher- SHOW THE FOLLOWING CATEGORY OF FOODS TO THE CHILD.

- | A | B |
|---------------|----------|
| i. Oranges | Soda |
| ii. Bread | Sweets |
| iii. Cabbages | |
| iv. Kales | |
| v. Spinach | |
| vi. Milk | Biscuits |

4. Call the children's attention. Ask.
5. Which foods should you eat more often?
6. Which foods should you eat in small quantities?

7. Why should you eat these foods (POINT TO ALLOWED FOODS) more *often than these foods* (POINT TO RESTRICTED FOODS)?
8. Which foods do you like eating?
9. Why do you like such foods?
10. When and how often should you wash your hands?
11. What should be done to fruits before eating them?
12. Where do the food that you eat and the water that you drink come from?
13. Do you know of the healthy learning programme? Do you participate in this programme? If so, how?
14. Do you like participating in these activities?
15. What have you learnt from these activities?

Appendix 6 Focus group discussions with class four pupils

1. What is nutrition?

2. From where do you receive information about nutrition issues? (PROBE AND TICK ALL RESPONSES MENTIONED).

1= I do not receive any nutrition information []

2= Text books []

3= Newspapers /pamphlets []

4= Family members []

5= Friends (parents) []

6= Television []

7= Radio []

8= From lessons taught in class []

9= Healthy Learning programme activities in the school []

10= Healthy Learning Programme activities in the community

11= Any other (specify).....

3. Which of the sources mentioned above provide you with the most information? Rank in order of their importance)

1.

2.

3.

4. Which of these three sources of nutrition information do you like most? (List in order of their liking)

1.

2.

3.

5. The clubs within the school-

- Health club
- Environment club

6. When and how often should you wash your hands?

7. What should be done to fruits before eating them?

8. Where do the food that you eat and the water that you drink come from?

9. Do you know of the healthy learning programme? Do you participate in this programme? If so, how?

10. Do you like participating in these activities?

11. What have you learnt from these activities?

Appendix 7 Observation checklist for use at the school and at home

1. Are there hand washing facilities near the toilet and meal serving facilities?
 - a).Yes []
 - b). No []
2. Do pupils wash hands after visiting the latrines?
 - a).Yes []
 - b). No []
3. Do pupils wash hands before eating?
 - a).Yes []
 - b). No []
4. Is treated water available in the school for drinking and cooking?
 - a).Yes []
 - b). No []
5. Do pupils drink treated water?
 - a).Yes []
 - b). No []
6. Is the kitchen and meal serving area clean?
 - a).Yes []
 - b). No []
7. Are the kitchen staff clean
 - a).Yes []
 - b). No []
8. Are the kitchen staffs appropriately dressed?
 - a).Yes []
 - b). No []
9. Is the food store clean and well maintained?

- a).Yes []
- b). No []
10. Are there any signs of rodents and pest infestation in the food store?
- a).Yes []
- b). No []
11. Is the garbage appropriately disposed?
- a).Yes []
- b). No []
12. Is the compound maintained clean?
- a).Yes []
- b). No []
13. Are the classes maintained clean?
- a).Yes []
- b). No []
14. Are the toilets maintained clean?
- a).Yes []
- b). No []
15. Do the pupils use plates, cups or containers when having their meals?
- a).Yes []
- b). No []
16. Do the pupils use spoons and forks while eating?
- a).Yes []
- b). No []
17. Are the utensils washed with soap and clean water before and after meals?
- a).Yes []
- b). No []

Appendix 8 Clearance letter from Kenyatta University



KENYATTA UNIVERSITY GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
 Website: www.ku.ac.ke

P.O. Box 43844, 00100
 NAIROBI, KENYA
 Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School **DATE:** 15th June, 2010

TO: Ms. Velma Nyapera **REF:** H60/10301/08
 C/o Foods, Nutrition & Dietetics
 Department

REF: APPROVAL OF RESEARCH PROPOSAL

=====

This is to inform you that the Graduate School Board at its meeting of 24th May, 2010 approved your research proposal for the M.Sc degree.

Thank you.

JOHN M. ODONGI
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Foods, Nutrition & Dietetics Department

Supervisors:

1. Dr. Dorcus Mbithe
C/o Foods, Nutrition & Dietetics Department
2. Dr. Sophie Ochola
C/o Foods, Nutrition & Dietetics Department

JMO/bkk

Appendix 9 Clearance letter from National Council of Science and Technology

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi
 Telephone: 254-020-241349, 2213102
 254-020-310571, 2213123.
 Fax: 254-020-2213215, 318245, 318249
 When replying please quote

P.O. Box 30623-00100
 NAIROBI-KENYA
 Website: www.ncst.go.ke

Our Ref: **NCST/RR1/12/1/MAS/135**

Date: **23rd June 2010**

Ms. Velma Nyapera
Kenyatta University
P. O. Box 43844
NAIROBI

Noted

Dear Madam,

13/7/10
 DISTRICT EDUCATION OFFICER
 KAJIADO CENTRAL

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Nutrition knowledge, attitudes and practices of children from Nkoile and Isinya primary schools in Kajiado District, Kenya*" I am pleased to inform you that you have been authorized to undertake research in **Kajiado District** for a period ending **31st May 2011**.

You are advised to report to the **District Commissioner and the District Education Officer, Kajiado District** before embarking on the research project.

On completion of the research, you are expected to submit two copies of the research report/thesis to our office.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:
 The District Commissioner
 Kajiado District
 The District Education Officer
 Kajiado District

Appendix 10 Kajiado North research authorisation**OFFICE OF THE PRESIDENT**

Telegrams: "DISTRICTER" Kajiado North
Telephone: 020 – 8040911
Fax: 020 - 8040918
Email: dc.kajiadonorth@go.ke
When replying please quote

DISTRICT COMMISSIONER,
KAJIADO NORTH DISTRICT,
P.O. Box 78 – 00208,
NGONG HILLS.

COR.3/1/VOL.II/71

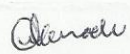
30th June, 2010

To Ms. Velna Ngapera

RE: RESEARCH AUTHORIZATION

Refer to your letter dated 23/06/2010 ref. No.NCST/RRI/12/1/MAS/135.

This office has no objection to you undertaking research on "Nutrition Knowledge, attitudes and practices of Children from Nkoile and Isinya Primary Schools in Kajiado District, Kenya" for the period ending 31st May 2011.

 **DISTRICT COMMISSIONER
KAJIADO NORTH DISTRICT.**
WANJIKU KAMOCHU
FOR: DISTRICT COMMISSIONER
KAJIADO NORTH DISTRICT