

**RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE
AND PRACTICES OF PRE-SCHOOL TEACHERS FROM
MUMBUNI ZONE, MACHAKOS DISTRICT, KENYA**

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

27-04-06 BY _____ Date

Muting'au
Muting'au, Nduku Jane
15/04/2006

MUTING'AU, NDUKU JANE

This thesis has been submitted for examination with our approval as university supervisor.

PPG PPG/182C

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF MASTERS
OF EDUCATION (EARLY CHILDHOOD STUDIES) OF
KENYATTA UNIVERSITY, NAIROBI.**

27-04-06 Date 15/4/06

Dr. *Mwamburi N. Kuria*
Department of Foods, Nutrition and Dietetics

APRIL 2006

Muting'au , Nduku
*Relationship between
nutrition knowledge*



2007/299729

KENYATTA UNIVERSITY LIBRARY

DECLARATION FORM

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

27-04-06 Date

Muting'au.

Muting'au, Nduku Jane

E55/7147/2001

This thesis has been submitted for examination with our approval as university supervisors.

1. Barbara G Koech Date 28/04/06

Dr. Barbara G. Koech
Department of Early Childhood Studies

2. Elizabeth N. Kuria Date 15/5/06

Dr. Elizabeth N. Kuria
Department of Foods, Nutrition and Dietetics

ACD DEDICATION

This thesis is dedicated to my dear husband, Mr. J. Muting'au and also our four children, M. Ngali, D. Mbithe, E. Muema and B. Mulinge without whose support, I would not have had the drive and motivation to complete it.

To my late father Munyambala Nuku and my mother Agnes who made me go to school and taught me the value of hard work.

I am grateful to my employer the Teachers Service Commission (TSC) for the leave granted during the period of my study. I also thank the Ministry of Education, Science and Technology (MEST) for the grant of leave to carry out the research. I also thank the District Commissioner (DC) for the leave granted during the period of my study.

The school teachers in the study are appreciated for their willingness to provide information. Appreciation also goes to the head teachers of the schools for allowing me use their institutions as research sites.

Special thanks go to my daughter, M. Ngali, who has been my very best friend and support throughout the period of my study. Last, but not least, thank you to the Almighty God for the strength and support during the challenging period of my study. AMEN

ACKNOWLEDGEMENT

I wish to give my sincere appreciation to all those who in one way or another contributed to the success of this study. My sincere and heartfelt gratitude goes to my supervisors, Dr. B. G. Koech and Dr. E. Kuria who guided and corrected my work. The prompt reading of my drafts, their support and encouragement made me work harder. I further thank my family members who gave me both moral and material support.

I am grateful to my employer the Teachers Service Commission (TSC) and the District Education Officer (DEO) Machakos District for granting me study leave. The Ministry of Education, Science and Technology (MOE/ST) and the District Commissioner (DC) of Machakos District are also recognized for granting the permit to carry out the research.

Pre-school teachers in the study are appreciated for their willingness to give information. Appreciation also goes to the headteachers of the schools for allowing me use their institutions without much interruption.

Special thanks to our daughter, Maggy, who has been inspiring me by giving holistic support throughout the period of my study. Lastly, to my dear husband, Joseph, for the understanding, care and loving support during the challenging period. May God bless each one of them in a mighty way. **AMEN**

ABSTRACT

Nutrition is fundamental for growth and development from conception to adulthood. It is essential for health and quality of life at every stage. Earlier researchers noted poor children's nutrition status. Mumbuni Zone is the most densely populated in the district and pre-school teachers were given nutrition education. These innovative approaches to nutrition education have never been assessed. Thus, it is not known whether or not they have influenced practices. The purpose of this study was to provide information on the relationship between these pre-school teachers' knowledge and practices. In order to understand the relationship the study investigated the following aspects of knowledge: balanced diet, sources of nutrients, food hygiene, food storage and preservation. Jerome Bruner's theories on knowledge representation guided the study. In addition the study investigated the following aspects of nutrition practices: daily plan of meals, frequency of feeding, food hygiene, sanitation, food storage and preservation. Finally the study explored the relationship among these aspects of knowledge and practices.

The population was comprised of eighty (80) pre-schools, ninety-nine (99) pre-school teachers and 1589 children in Mumbuni zone of Machakos District. A sample of 20 pre-schools was purposively selected and 30 pre-school teachers together with 779 children in their classes were randomly selected from those pre-schools. This was over 30.3% of the pre-school teachers in the zone which formed a requisite to perform meaningful statistics. This study employed a descriptive design. It involved both qualitative and quantitative data collection. Self-administered interviews were used as a method of collecting information about knowledge. Both interview and observation schedules were used to collect information about practices. A content analysis of the qualitative data on pre-school teachers' levels of each type of knowledge was also carried out. The quantitative data collected were prepared for analysis using the statistical Package for Social Sciences (SPSS). The hypotheses were tested using ANOVA and Pearson Product Moment Correlation Coefficient (PPMCC).

The knowledge of pre-school teachers exposed to nutrition education through professional training and those not exposed was similar though not statistically significant. The trained teachers and the trainees had slightly more knowledge than the untrained. Pre-school teachers are not only exposed to nutrition education through professional training, courses and seminars, but also through the process of socialization, the media and at school in primary and secondary levels. This may be why the nutrition knowledge of pre-school teachers who attended courses and seminars and those who had not did not vary greatly. The practices of pre-school teachers exposed to nutrition education through professional training and those not exposed were similar though not statistically significant. Pre-school teachers who attended courses and seminars and those who had not attended had similar nutrition practices though not statistically significant. The nutrition education initiatives, cluster and panel meetings assisted pre-school teachers in sharing their experiences. Nutrition

knowledge and practices of pre-school teachers in Mumbuni zone were related. Pre-school teachers who scored high in knowledge questions also scored high in practice questions.

FAO	Food and Agriculture Organization
ICE	Inter-country Education
MOEST	Ministry of Education Science and Technology
PEM	Project Energy Mobilization
UNICEF	United Nations Children's Fund
WHO	World Health Organization
ICN	International Conference on Nutrition
ACC	Active Learning Capacity
MOH	Ministry of Health
MOA	Ministry of Agriculture
NGO	Non Governmental Organization
UN	United Nations
KIB	Karvy Institute of Education
NACE	National Centre for Early Childhood Education
DPECE	District Primary Education Office
CCR	Community Life Skills and
UNESCO	United Nations Educational Scientific and Cultural Organization
WFP	World Food Programme
WSC	World Summit for Children
ECE	Early Childhood Education
WFP	World Food Programme

ABBREVIATIONS

CBS	Central Bureau of Statistics
FAO	Food and Agriculture Organization
GOK	Government of Kenya
MOE/ST	Ministry of Education Science and Technology
PEM	Protein Energy Malnutrition
UNICEF	United Nations Children Education Fund
WHO	World Health ORGANIZATION
ICN	International Conference on Nutrition
ALC	Active Learning Capacity
MOH	Ministry of Health
MOA	Ministry of Agriculture
NGO	Non Governmental Organizations
UN	United Nations
KIE	Kenya Institute of Education
NACECE	National Centre for Early Childhood Education
DICECE	District Centre for Early Childhood Education
CCF	Christian Children's Fund
UNESCO	United Nations Education Scientific and Cultural Organization
PHC	Primary Health Care
WSC	World Summit for Children
ECD	Early Childhood Education
WFP	World Food Programme
CBO	Community Based Organization

FBO	Faith Based Organizations
OP	Office of the President
ORT	Oral Rehydration Therapy
USDA	United States Department of Agriculture
ARI	Acute Respiratory Infection
NPAN	National Plan of Action for Nutrition

Acknowledgment

Abstract

Abbreviations

List of Contents

List of Figures

CHAPTER ONE: INTRODUCTION

1.1. Background

1.2. Statement of the Problem

1.3. Purpose of the Study

1.4. Study Objectives

1.5. Research Hypothesis

1.6. Significance of the Study

1.7. Definition of the Study

1.8. Study Area

1.9. Research Limitations

TABLE OF CONTENTS

	PAGE
Declaration.....	ii
Dedication.....	iii
Acknowledgement.....	iv
Abstract.....	v
Abbreviations.....	vii
Table of Contents.....	ix
List of Tables.....	xv
List of Figures.....	xvi

CHAPTER ONE- INTRODUCTION

1.1: Background.....	1
1.2: Statement of the Problem.....	4
1.3: Purpose of the Study.....	5
1.4: Study Objectives.....	6
1.5: Research Hypothesis.....	6
1.6: Significance of the Study.....	7
1.7: Delimitations of the Study.....	8
1.8: Assumptions.....	9
1.9: Theoretical Framework.....	9

1.9.1 The Representation of Nutrition Knowledge according to Bruner.....	9
1.9.2 Modes of Knowledge Representation.....	10
1.9.3 Social and Cultural Context (Environment).....	12
1.9.4 Conceptual Framework.....	16
1.10: Operational Definition of terms	19

CHAPTER TWO - LITERATURE REVIEW

2.0: Introduction.....	21
2.1: Nutrition and Its Relation to Health.....	21
2.1.1: Knowledge Content.....	23
2.1.2: Nutrition for Pre-school Children.....	26
2.1.3: Nutrition Education and sources of Nutrition knowledge.....	34
2.2: Studies on Nutrition Knowledge, Its Relation to Practices and the Need for Transition.....	42
2.2.1: Consumption Patterns and Nutrition Knowledge.....	42
2.2.2: Nutrition Knowledge and Practices.....	43
2.2.3: Need for Transition of Child's Feeding from Home to School.....	44

CHAPTER THREE: METHODOLOGY

3.0: Introduction.....	46
3.1: Research Design.....	46
3.2: Study Variables.....	47
3.3: Location of the study.....	48
3.4: Target Population.....	48
3.5: Sampling Techniques and Sample Size.....	49

3.5.1 Sampling Techniques.....	49
3.5.2 Sample Size.....	49
3.6: Research Instruments.....	50
3.7: Pilot Study.....	51
3.7.1: Validity.....	52
3.7.2: Reliability.....	52
3.8: Data Collection Techniques.....	52
3.8.1: Logistical and Ethical Considerations.....	53

CHAPTER FOUR: RESEARCH FINDINGS

4.0: Introduction.....	54
4.1: Methods of Data Analysis.....	54
4.1.1: Qualitative Data.....	55
4.1.2: Quantitative Data.....	55
4.1.3: Statistical Testing of Hypothesis.....	56
4.2: Findings of the Study.....	57
4.2.1: Gender.....	57
4.2.2: Age.....	58
4.2.3: Professional Qualifications.....	58
4.2.4: Teaching Experience.....	59
4.2.5: Type of Training.....	60
4.2.6: Duration of Training.....	60
4.2.7: Formal Schooling Level.....	61
4.2.8: Nutrition Education, Course Organizers/Attendance.....	62

4.3: Pre-school Teachers' Nutrition Knowledge.....	63
4.3.2: Knowledge of balanced diet.....	64
4.3.3: Sources of Nutrients.....	65
4.3.4: Knowledge of Food Hygiene.....	66
4.3.5: Food Storage and Preservation.....	66
4.3.6: Knowledge of the Trained, Trainees and the Untrained Teachers.....	67
4.3.7: Knowledge Impacted by Training Seminars and Courses.....	68
4.4: Pre-school Teachers' Practices.....	70
4.4.1: Frequency of Children's Feeding Within Preschool.....	71
4.4.2: Hygiene Practices.....	72
4.4.3: Sanitation Practices (Cleanliness of Latrines/Toilets).....	73
4.4.4: Daily Plan of Meals.....	74
4.4.5: Food Storage and Preservation.....	75
4.5: Knowledge of Pre-school Teachers between Who Attended Nutrition Education Courses and Those Who Had Not Attended.....	76
4.6: Exposure to Nutrition Education and Pre-school Teachers' Practices.....	77
4.6.1: Reported and Observed Practices of the Trained Pre-school Teachers.....	78
4.6.2: Reported and Observed Practices of the Trainees.....	78
4.6.3: Reported and Observed Practices of the Untrained Pre-school Teachers.....	79
4.6.4: Reported and Observed Practices of Pre-school Teachers Who Had Attended Education Courses and Seminars.....	80
4.6.5: Reported and Observed Practices of Pre-school Teachers Who Had	

Not Attended nutrition education courses/seminars.....	81
4.6.6: Relationship between Pre-school Teachers' Knowledge and Practices.....	82
4.7: Hypotheses Testing	83
4.7.1: Pre-school Teachers' Knowledge and the Extent of Exposure to Nutrition Education.....	84
4.7.2: Knowledge of Pre-school Teachers with Different Levels of Professional Training.....	84
4.7.3: Knowledge of Pre-school Teachers Who Had Attended Courses And Those Who Had Not.....	85
4.7.4: Practices of Pre-school Teachers' With Different Levels of Professional Training.....	86
4.7.5: Practices of Pre-school Teachers Who Attended Courses and Seminars And Those Who Did Not.....	87
4.7.6: Relationship between Pre-school Teachers' Knowledge and Practices	88
4.8: Discussion of Research Findings.....	89
4.8.1: Knowledge and Professional Training.....	89
4.8.2: Knowledge and Attendance at Courses and Seminars	90
4.8.3: Teachers' Practices and Professional Training	91
4.8.4: Teachers' Practices and Attendance At Courses and Seminars	91
4.8.5: Relationship Between Teachers' Knowledge and Practices	92

CHAPTER FIVE: SUMMARY, RECOMMENDATIONS AND CONCLUSIONS.

5.0 Introduction.....	93
5.1: Summary of Research Findings.....	93

5.3: Recommendations.....	96
5.3.1: For Moe/st, Inspectorate, NACECE, DICECE.....	96
5.3.2: For Pre-school Teachers.....	98
5.3.3: For Community.....	99
5.3.4: For Universities.....	99
5.4: Suggestion for Further Research.....	100
5.5: Conclusion	101
REFERENCES.....	102
APPENDICES	109
Appendix I: Interview Guide for Teachers	109
Appendix II: Observation Schedule.....	116
Appendix III: Budget	118
Appendix IV: Research Time Table	119
Appendix V: Research Permit from the Ministry of Education Science and Technology.....	120

LIST OF TABLES

Table 2.1: The Size of an Individual Ration for Pre-primary School Child.....	29
Table 2.2: Suitable Breakfast Foods for Pre-school Children.....	33
Table 2.3: Suitable Snack Foods for pre-school children.....	34
Table 2.4: Suitable Lunch for Pre-school Children.....	34
Table 3.1: Sampling Frame for Study	50
Table 4.1: Age of the Pre-school Teachers.....	58
Table 4.2: Professional Qualifications.....	58
Table 4.3: Experience of Pre-school Teachers in Present Pre-school.....	59
Table 4.4: Type of Training.....	60
Table 4.5: Pre-school Teachers by Duration of Training.....	61
Table 4.6: Pre-school Teachers by Level of Education.....	62
Table 4.7: Course Organizers/Attendance.....	62
Table 4.8: Understanding of a Balanced Diet.....	64
Table 4.9: Knowledge on Sources of Nutrients.....	65
Table 4.10: Knowledge of Food Hygiene.....	66
Table 4.11: Food Storage and Preservation.....	67
Table 4.12: Areas of Knowledge Impacted by Training and Seminars/Courses.....	68
Table 4.13: Frequency of Children's Feeding Within Pre-school.....	71
Table 4.14: Hygiene Practices.....	72
Table 4.15: Sanitation Practices.....	73
Table 4.16: Daily Plan of Meals.....	74
Table 4.17: Food Storage and Preservation.....	75
Table 4.18: Relationship between Pre-school Teachers' Knowledge and Practices.....	83

Table 4.19: Results of ANOVA on Professional Training and Knowledge(HO ₁ A).....	84
Table 4.20: Results of ANOVA on Course Attendance and Knowledge(HO ₁ B).....	85
Table 4.21: Relationship between Pre-school Teachers' Knowledge and Practices.....	86
Table 4.22: Results of ANOVA on Course Attendance and Practices.	87
Table 4.23: Relationship between Pre-school Teachers' Knowledge and Practices	88

LIST OF FIGURES

Figure 1.1: Nutrition Knowledge and Practices.....	18
Figure 2.1: Food Guide Rectangle (Three Food Groups).....	24
Figure 2.2: Food Guide Rectangle (Four Food Groups).....	25
Figure 2.3: The Six Food Guide Pyramid.....	26
Figure 2.4: The Simplest Local Recipe for Young Children.....	30
Figure 2.5: A Variety of Local Foods for Multi-mix meal.....	31
Figure 2.6: An Example of a Multi-mix meal	32
Figure 4.1: Pre-School Teachers' Nutrition Knowledge.....	63
Figure 4.2: Knowledge of Trained, Trainees and Un-trained Teachers.....	64
Figure 4.3: Knowledge of Pre-school Teachers who Had Attended Nutrition Education Courses and Those Who Had not Attended.....	76

Teachers.....78

Figure 4.5: Reported and Observed Practices of Trainees.....79

Figure 4.6: Reported and Observed Practices of the Un-trained

Pre-school Teachers.....80

Figure 4.7: Reported and Observed Practices of Pre-school Teachers

Who Had Attended Nutrition Education Courses.....81

Figure 4.8: Reported and Observed Practices of Pre-school Teachers

Who Had Not Attended Courses and Seminars.....82

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Nutrition is fundamental for growth and development from conception to adulthood. It is essential for the health and the quality of life at every stage in a living organism. A normal healthy child grows at a genetically predetermined rate that can be compromised or accelerated by under nutrition, imbalance intake and over nutrition (Pipes, 1989).

Globally, a lot of attention is given to child nutritional status and malnutrition is widespread in sub-Saharan Africa. Poor maternal health and malnutrition tend to lead to poor growth in infancy and childhood (UNICEF, 1995). Throughout the world, about two hundred and twenty-six million children are stunted while sixty-seven million are wasted (UNICEF, 1998). Consequently, malnutrition among the children is a worldwide problem that needs to be addressed seriously.

High levels of malnutrition remain contributory causes of poor health and mortality, especially among children. In the tropics the common childhood diseases during pre-school period are: Protein Energy Malnutrition (PEM) especially kwashiorkor, diarrhoea, pneumonia, malaria, diseases due to intestinal worms and whooping cough. Micro-nutrient deficiency is also a major problem. Up to 76% of children under-five years are anaemic or are deficient in vitamin A

and Zinc (WHO, 2002-2005). Frequently pre-school children suffer from several of these conditions simultaneously since their immune systems have been weakened by their nutritional status. The death rate in this group is at least twenty times as great in the tropics as it is in Europe and North America.

In Kenya the nutrition status of children under five years has deteriorated. About a third of Kenyan children are chronically malnourished. 30% of children under five years are stunted, 6% are wasted and 20% are underweight (KDHS, 2003). A major underlying factor of malnutrition is poverty in general and food poverty, specifically. In Kenya food poverty was found highest in the following provinces Eastern (60%), North Eastern (57%) and Western (52%) in the year 1994. Districts within Eastern Province with high prevalence of food poverty were Makueni (67%), Machakos (66%) and Kitui (65%). Lack of awareness as to which food is nutritious and appropriate food handling, preparation and storage also contribute to malnourished status of many children

In Eastern Province, childhood morbidity rates for under-fives who had acute respiratory infection (ARI) and/or fever were 53% and those with diarrhea were 49%. The under five mortality between birth and fifth birthday was 84 deaths per 1000 births (KDHS, 2003). Stunted children under five years were 33%, 4% were wasted and 21% were underweight. Malnutrition status for the under fives in Machakos District was 40% stunting, 5% wasting and 26% underweight (Annual

Work Plan for Machakos District, 2004).

To mitigate the child malnutrition in Machakos District, intervention programmes for nutrition education were developed by the District Centre for Early Childhood Education (DICECE), Mwana Mwende Trust (Treasured Child), Compassion International, Christian Children's Fund (CCF) and Primary Health Care (PHC) from Machakos General Hospital. Their targets were the pre-school teachers. Various innovative programmes on health and nutrition were also developed on all nutrition issues, nutritive foods and the importance of vitamin A and other foods by Machakos District Hospital Nutrition Department. Pre-school feeding programmes were initiated, and pre-school teacher training programmes were intensified so that the teachers would be trained in nutrition among other areas of concern. Inspection of pre-schools was put in place, and growth monitoring programs were initiated in the pre-schools. The purposes of these programmes were to give nutrition education to pre-school teachers, ensure better centre based nutrition by providing the teachers with knowledge to change their practices within the schools and to prepare teachers to appropriately inform parents and other caregivers about nutrition requirements of young children.

The recent research done in Machakos has focused on family nutrition status but not on changes of pre-school teachers' knowledge and practices. A number of research studies carried out in Machakos District, including Mumbuni Zone, noted

children's poor nutritional status and recommended further investigations on the poor nutritional status of young children (Bali & Kabiru, 1996, Gakuru & Koech, 1995, Swadener, 1995). Other studies pointed to the increase of teenage pregnancies and early motherhood and their impact on children's development and nutritional status (Kabiru & Njenga, 1997).

An impact assessment of these nutrition interventions in Machakos has not been made. Consequently, it is not known if the specific nutrition education given in the two- years training, short courses, seminars and other meetings were effective, as they have not been accessed to determine their impact. Many questions have been left unanswered: Did these programmes increase teachers' knowledge and change their practices? Was the basic knowledge that the teacher learned through their families when they were growing up, through the media, the primary and secondary schools enhanced or changed by these deliberate interventions?

1.2 Statement of the Study

1.2 Statement of the Problem

Malnutrition is widespread in sub-Saharan Africa and within this region the highest level of stunting is found in Eastern Africa. In Kenya malnutrition is common among under-fives. Furthermore 23,000 deaths among the under fives were associated with malnutrition in the year 2000.

Nutrition knowledge is complex, encompassing diverse areas such as foods and

nutrient values, equivalences and quantities and appropriate food preparation and storage. Also, nutrition knowledge has different kinds of sources including formal schooling, informal, and training. Cultural and traditional nutrition knowledge is passed from generation to generation. A lot of resources including money had been spent on research and provision of nutrition education to Mumbuni zone. However, it is not known if the pre-school teachers with nutrition education differed in nutrition knowledge from those pre-school teachers without nutrition education. Again, it is not known whether or not pre-school teacher's nutritional knowledge in this community was directly related to their nutrition practices. Since the initiatives implemented were to reduce childhood malnutrition and its accompanying illness, there was need to know if they were effective because if they were not children might still not be getting proper nutrition. Other research in Mumbuni has not focused on these questions so this research was required.

1.3 Purpose of the Study

The purposes of this study were to find out a) if there is a relationship between pre-school teachers' knowledge of nutrition and their practices, and b) to investigate whether Pre-school teachers with varied exposures to nutrition education, including different levels of professional training, differed in their nutrition knowledge.

1.4 Study Objectives

The following were the study objectives:

1. To determine the differences in the nutrition knowledge of pre-school teachers who had been exposed to nutrition education and those who had not been exposed.
2. To determine the differences in nutrition practices of pre-school teachers' exposed to nutrition education and those not exposed.
3. To determine the relationship between the pre-school teachers' nutrition knowledge and practices.

1.5 Research Hypotheses

Based on the theoretical framework and studies reviewed the following research hypotheses were drawn.

1. The knowledge of pre-school teachers exposed to nutrition education through professional training is different from those not exposed.
2. The knowledge of pre-school teachers exposed to nutrition education through attendance of courses and seminars is different from those not exposed.
3. The practices of pre-school teachers exposed to nutrition education through professional training is different from those not exposed.
4. The practices of pre-school teachers attending courses and seminars is different from those not exposed.

5. Pre-school teachers' knowledge and practices are related.

1.6 Significance of the Study

Pre-school education is the foundation of the Kenyan education system, however, pre-schoolers do not feature in the countries plan for the school feeding programmes yet they are at a critical stage of their growth and development, thus more vulnerable to malnutrition. Pre-school teachers need to work closely with parents to foster pro-nutrition practices for children, both at school and at home. The information from this research study will be of use and interest to Non-Governmental Organizations (NGOs), such as United Nations Children Education Fund (UNICEF), Mwana Mwende, Christian Children's Fund (CCF), Food Agricultural Organization (FAO), World Health Organization (WHO), World Food Programme (WFP), Community Based Organizations (CBOs), United Nations Education Scientific and Cultural Organization (UNESCO), Faith Based Organizations (FBOs), and Ministries such as Ministry of Education Science and Technology (MOE/ST), Ministry of Health (MOH), Ministry of Agriculture (MOA), Ministry of Social Services, Office of the President (OP) and all the ministries that deal with the nutrition of young children. These NGOs and Ministries are involved in feeding programmes and nutrition in many parts of the country. Therefore, they will also be able to plan for more appropriate and more targeted nutrition interventions for children.

The study results will also be significant to all those doing pre-school training. From this knowledge they will learn about the areas of knowledge that were impacted from previous nutrition education programmes. This will assist them also in planning their curricula and training methods.

The MOE/ST and NACECE will benefit since the results will in some small way suggest the effectiveness of their two year training programmes and short courses. They will have some data to support the changes or extensions of specific contents of training.

1.7 Delimitations and Limitations

Since the study was done in peri-urban Mumbuni Zone (Machakos), generalization of the findings to pre-school teachers of other areas outside this zone should be done with care. Also, it should be noted that some of the pre-school teachers' practices were observed and others were reported. For example, pre-school teachers were observed practically feeding their pre-school children while at other instances written daily plan of meals were relied upon and conclusions were made.

One limitation for this study was financing. It was expensive to travel to the schools and the limited finances meant that the researcher did not visit the schools as often as she wanted. She went to each school only once and spent the whole day rather than going several times.

1.8 Assumptions

The study was conducted with the following assumptions. Pre-school teachers have different types of nutrition knowledge as well as different levels of nutrition knowledge of food groups. Some of them have attended courses, others had learned at home, others had attended secondary school and others had not attended, some went for professional training up to diploma level. Consequently, it was assumed that these different exposures resulted in different types and levels of knowledge.

Other research done in the West has suggested that acquisition of nutrition knowledge of pre-school teachers is positively related to their nutrition practices, such as, frequency of feeding, food hygiene, sanitation, plan of daily meals, food storage and preservation. From these other studies it has been seen that nutrition knowledge will influence practices, which will in turn impact on nutrition status and thus it is assumed to be true in other countries, but it is not known to be true in Kenya.

1.9 Theoretical Framework

1.9.1 The Representation of Nutritional Knowledge According to Jerome Bruner

Jerome Bruner, (1941) was a cognitive psychologist who was highly interested in the learning process. Bruner has been acknowledged providing a major supplement

to Piaget's theory of cognitive development (Bruner, 1966 pg. 1). He tried to extend the scope of the existing theory of cognitive development by creating his "Three modes of Representation" and pointing out the close relationship between cognitive development and theories of instruction.

1.9.2 Modes of Knowledge Representation

According to Bruner (1966) there are three modes of knowledge representation.

They are as follows:

- Enactive: Learners acquire knowledge by action, past events and patterned motor response.
- Iconic: Learners perceive outside with internal images by using visual and other sensory organizations.
- Symbolic: Learners can understand knowledge by language and reason, moreover they start trying to solve problems by thinking creatively.

In reference to nutrition knowledge, the first mode, enactive, deals with actions with food, nutrition and malnutrition. It can be represented through initiation of pre-school feeding-programmes, growth-monitoring sessions for preventive care and provision of health facilities for malnourished children. Pre-school teachers can also organize for cooking demonstrations by use of locally available foods. They can have children sing songs about food, nutrition and malnutrition. Pre-school children may recite poems on the mentioned topics, dramatize and role-play

mother or family members cooking.

In the second mode, iconic, nutrition knowledge can be represented by stories about food, nutrition and malnutrition. Specifically, stories or ideas about how different kinds of food smell, taste, feel (texture) and look are represented in this mode. Discussions about foods that are eaten raw and those that are cooked to make them tender and tasty are represented in iconic mode.

The third mode, the symbolic, refers in this case to the language which is used to describe the knowledge. Specifically, in reference to nutrition knowledge, language is used to depict the knowledge of food, nutrition and malnutrition. The language to be used is expected to be that of the catchment area in line with the cultural context for better knowledge creation. The pre-school teacher's nutrition education should be linked to what was learned in primary and secondary education.

According to Bruner, the order of these modes is not fixed, rather it can be flexible according to the specific individual. In the variant sequence of stages, the significant factor which affects the process of intellectual development is social and cultural context (environment) that is discussed below.

1.9.3 Social and Cultural Context (Environment)

According Bruner, nutrition information should be given by the use of the local language as well as visual and sensory materials and actions such as talking, looking, touching, smelling, feeling and tasting, and specific actions with the food so as to encourage good nutritional practices. Use of locally available foods is encouraged in support of social and cultural context. Before using other foreign foods, nutrition information and education should use local foods so that sequential intellectual development is from known to unknown.

Pre-school teachers become agents of culture by transmitting nutrition information from indigenous, primary, secondary school education to the rest of the community members. Bruner's cognitive approach to instruction has influence in various aspects. Firstly, Bruner emphasized the proposition to learn. Instruction is expected to be set up in relation to the pre-school teacher's experience and contexts because these things tend to make learners willing and able to learn.

Secondly, Bruner emphasized the sequence of instruction and the structure of knowledge. Instruction must specify the ways in which a body of knowledge should be structured so that learners can understand easily. Bruner (1966) stated that, "A body of knowledge can be presented in a form simple enough so that any particular learner can understand it in a recognizable form", and then learning should move from known to unknown and build on previous learning. For

example, what a child learns at home when they are young children should be enhanced with what is learnt in primary school on nutrition. The content of the primary school nutrition is build from what was learnt at home. Then further, what is learnt in secondary school about nutrition should be built on what was learnt in primary school years and the chain continues. Training colleges, such as those training pre-school teachers, should also build on the nutrition that was learned earlier, explaining it deeper and with more applications at various levels.

Thirdly, reinforcement was emphasized. Instruction should include good materials to stimulate pre-school teachers' motivation and recall of prior knowledge. Wanting to learn for its own sake is the best type of reinforcement. For example, if a pre-school teacher has a healthy, active, strong, alert and confident child in class and she knows that this good health has resulted from proper nutrition that she is training the parents on, this awareness of her use of knowledge is rewarding to the teacher, and could encourage her to search for more knowledge to assist other children. Use of language from the catchment area is also encouraged because it motivates the learners to learn more than if the content was in a foreign language.

Knowledge, according to Bruner, is to be put into practice. Thus, nutrition knowledge which is obtained by pre-school teachers during training courses and seminars is complete when it is applied to children's feeding programmes. The nutrition information received would guide the pre-school teachers to make

choices freely on the foods to be eaten by the pre-school children. Public health and community development programs have a part to play in the choice of foods eaten by facilitating conditions like access to food or means of food production; time and energy resources for food preparation. The foods eaten will depend on the environmental and biological factors which will in turn influence the nutritional well-being of pre-school children.

According to Bruner (1966), the pre-school teacher is viewed as an autonomous individual. The model is concerned with the inner experience. The key factors are the pre-school teacher and the environmental interactions. There is enhancement of development through experiential problem solving situations. The underlying assumptions are that people make nutrition decisions in the light of their developmental level. The relevance of Bruner's theory to instruction of pre-school teachers is that the nutrition knowledge obtained during training, courses and seminars will be interpreted and put into practice during pre-school feeding programmes.

The relevance of these modes to the study was to guide the development of the instruments, including interview and observation schedules by assisting the researcher to assess different forms of knowledge within each of these modes. The instruments as a result captured the experiences and knowledge and real situation practices at the study area as far as activities on food, nutrition and malnutrition

were concerned. For example, Bruner emphasises the uses of stories about locally available foods, and these were included and discussed along with their importance to our pre-school children.

Bruner's symbolic mode emphasizes use of language as an essential means to the creation of knowledge. Language is social in that it includes the way we acquire food, preserve, prepare, cook, serve and eat it. In the study language was used to give information about food, nutrition and malnutrition.

Bruner's Theory of Instruction was particularly relevant to this study, as it identified the breadth of learning opportunities of the pre-school teachers. They learned nutrition knowledge from home, in primary school, from the media, from secondary schools and for some from their professional training. This knowledge was found to be circular and become increasingly more complex and technical at higher level. This is consistent with Bruner's sequence of knowledge.

Also, his emphasis on local and socio-cultural contexts of knowledge encouraged the research to focus on local knowledge of nutrition in its diversity. His view of reinforcement emphasized the role of applying knowledge in practice and this perspective guided the investigation of whether or not these teachers in this study used their knowledge in their feeding programmes and other methods of food handling, preparation and storage.

1.9.4 Conceptual Framework

Pre-school teachers obtain nutrition knowledge from many sources, including indigenous sources, primary school education in home science, secondary school education, home science and teacher education health and nutrition courses. Acquisition of this knowledge may result in planning of balanced meals, use of locally available foods, involvement in income-generating activities and improved food habits. An objective of the study was to determine the differences in the nutrition knowledge of pre-school teachers' exposed or not exposed to nutrition education. Generally the outcome of nutrition education may determine nutrition practices in pre-schools. These programmatic practices include initiation of full feeding programmes, including the provision of nutritious meals and quality snacks. The specific practices during feeding programmes and snack giving that were considered in the study were frequency of feeding, hygiene, sanitation, plan of daily meals, food storage and preservation.

Both government, international organizations and the non-government sector have put in place many food related interventions with the intention that malnutrition may be stemmed among the young children. For example improving household food security through income generating activities targeting caregivers. Provisions of food to school children through school feeding programmes have been initiated. Advocacy of food production, storage, consumption and preservation of micronutrients have been put in place. The outcome of these could impact

children's health and the learning process as a whole. Of course, it is recognised that if the training in nutrition is effective and the teachers become knowledgeable, their practices are likely to reflect this higher level of knowledge. These changed practices would then translate to a higher nutrition status of the children in the pre-school as better feeding programmes are implemented and parents and caregivers are educated on nutrition for young children. Figure 1.1 depicts these relationships and the variable studied within this study.

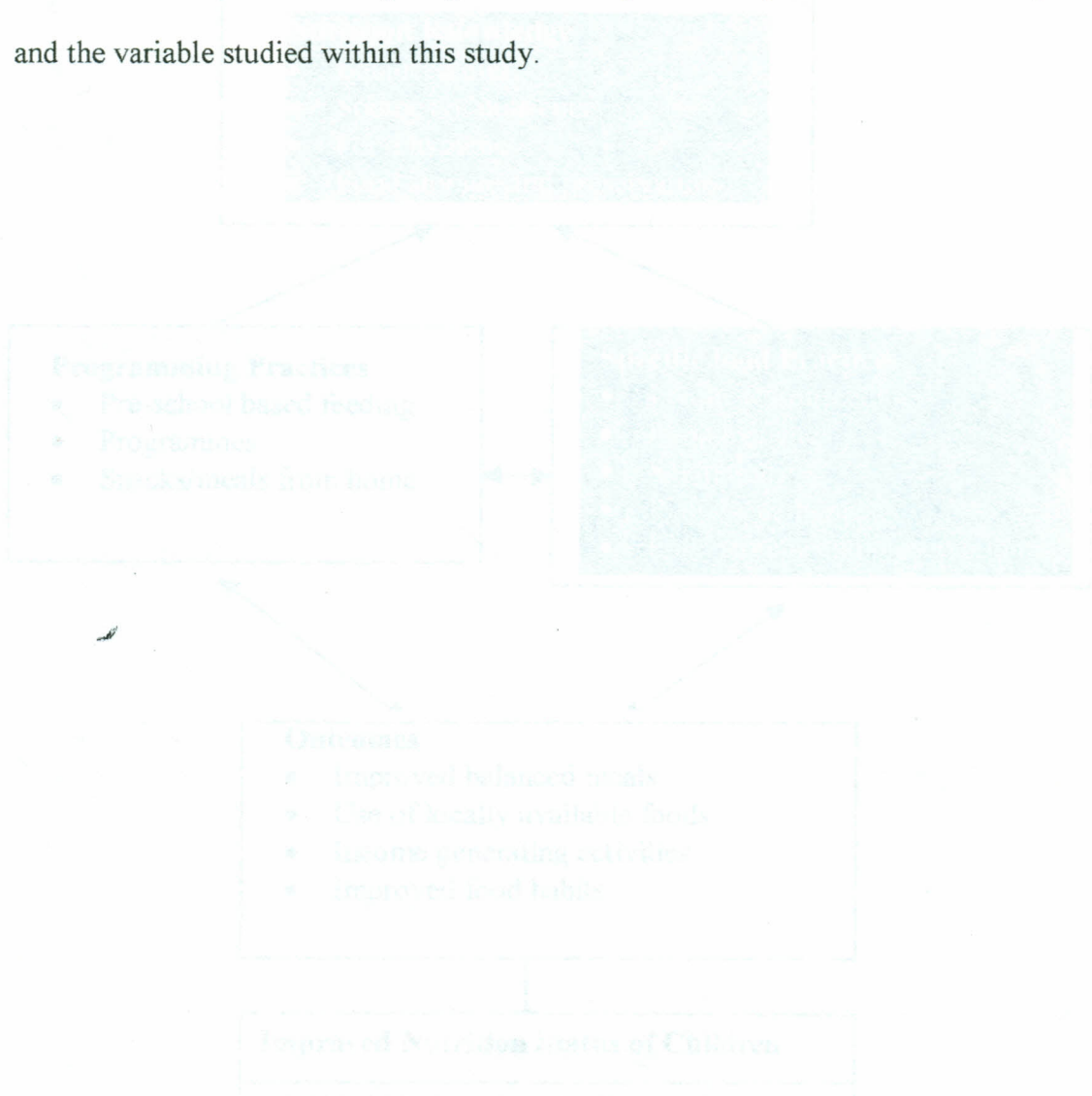
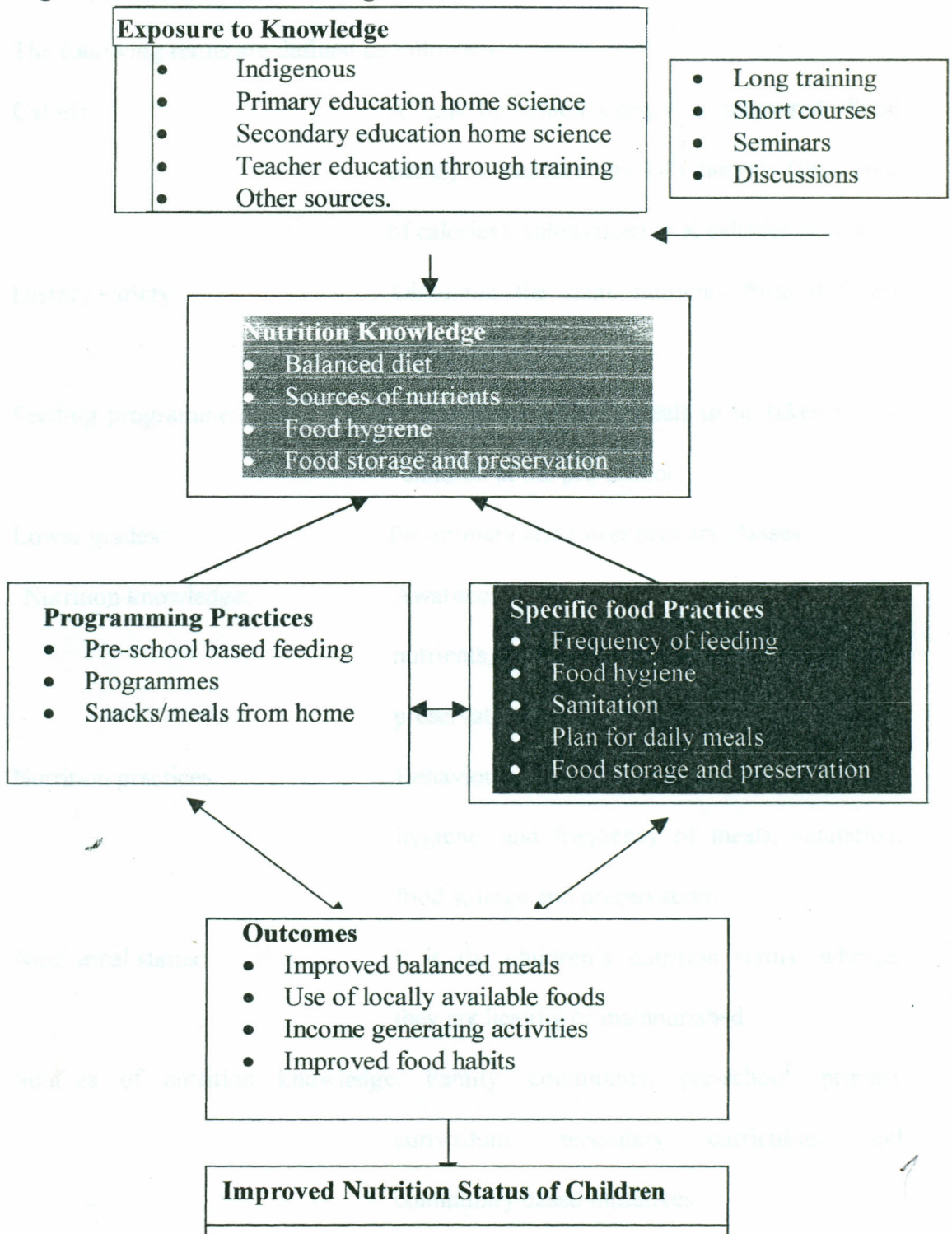


Figure 1.1: Nutrition Knowledge and Practices



1.10 Operational Definition of Terms

The following terms are defined as follows: -

Calorie:	A unit by which energy is measured. Food energy is measured by kilo calories (thousands of calories), abbreviated as K calories or Kcal.
Dietary variety:	Obtaining the same nutrients from different foods.
Feeding programme:	Plan for a meal or meals to be taken by the children at the pre-school.
Lower grades:	Pre-primary and lower primary classes.
Nutrition knowledge:	Awareness of balanced diet, sources of nutrients, food hygiene, food storage and preservation.
Nutrition practices:	Behaviours related to daily plan of meals, food hygiene, and frequency of meals, sanitation, food storage and preservation.
Nutritional status:	It is the children's nutrition status, whether they are healthy or malnourished.
Sources of nutrition knowledge:	Family, community, pre-school, primary curriculum, secondary curriculum and community based initiatives.
Defined feeding programme:	A written feeding time table which is used

on a daily basis.

Undefined feeding programme: * A feeding programme which is off head and has different kinds of food packed from home.

Exposure to Training: * Those who have attended two year in service course, diploma training, seminars and short courses.

Lack of Training: * Those who have neither attended two year in service courses nor diploma training.

2.1 Nutrition and its Relation to Health

The growth pattern of healthy and well fed children are reflected in pattern changes in their height and weight. Inadequate food intake, owing either to insufficient intake of nutrients, resulting in serious consequences to the physical and mental growth and development of the children. One of the key development indicators of the Kenyan Government is to reduce by half the proportion of malnourished children by 2015. The standard indices of physical growth and development the nutritional status of children are:

- * Height-for-age (stunting)
- * Weight-for-height (wasting)
- * Weight-for-age (underweight)

The most often cited indicator was estimated to be 17% deaths per 1000 live births by year 2015. This means that one of every nine children born in Kenya will die before the age of five.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews relevant literature on which the study was based. It begins by discussing what nutrition is and knowledge content of nutrition. There was limited literature on nutrition education in pre-schools in Kenya. The literature that was available was in form of field reports and seminar reports.

2.1 Nutrition and Its Relation to Health

The growth patterns of healthy and well-fed children are reflected in positive changes in their height and weight. Inadequate food supply, among other factors, often leads to malnutrition, resulting in serious consequences on the physical and mental growth and development of the children. One of the 48 development indicators of the Kenyan Government is to reduce by half the proportion of malnourished children by 2015. The standard indices of physical growth that describe the nutritional status of children are:

- Height-for-age (stunting)
- Weight-for-height (wasting)
- Weight-for-age (underweight)

The under-five child mortality was estimated to be 115 deaths per 1000 live births by year 2003. This means that one in every nine children born in Kenya dies

before attaining his/her fifth birthday. The pattern shows that 29% of deaths under age five occur during the neonatal period, and 38% occur during the post-neonatal period (KDHS, 2003).

Malnutrition weakens children and reduces their resistance to diseases. In the areas of children's health and nutrition, the use of oral rehydration therapy (ORT), immunization, and breast feeding has improved child survival. There has been great success in campaigns to eradicate polio and eliminate deficiencies in micro-nutrients such as iodine and vitamin A (GOK and UNICEF, 2004-2008). A diet should provide enough of each of the five types of food that provide all the essential nutrients (carbohydrates, proteins, fats, vitamins, minerals, fibre and water) (FAO, 2001).

The mixture of nutrients in the daily food intake is used by the body to supply energy for maintenance, work, growth, protection, reproduction and lactation (FAO, 1999). Safe levels of nutrient intake are the levels that maintain health and nutrient stores in almost all the healthy individuals within a group (FAO, 1990b).

Nutrition is a critical factor in the promotion of health and prevention of disease and in the recovery and rehabilitation from illness or injury (Reva, 1986). Growth retardation which is one form of malnutrition is associated with a substantial reduction in mental capacity and adverse school performance in children which

leads to reduced work productivity. The intellectual power of children is the greatest national resource that determines the national power of a country (U.N. Geneva: ACC/SCN 2002).

2.1.1 Knowledge Content

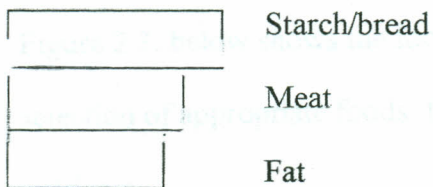
Traditionally African countries have a wealth of indigenous foods of high nutritional value. There are many customs associated with food. The choice of food substances, the manner of preparation and eating is social, having been learnt in the family, home or community (KIE, 1996). For example, Kambas grow up accepting and appreciating “isyo” (mixture of cooked maize and beans). “Muthokoi” (maize without husks) was prepared with a mixture of beans, peas or cowpeas for young children. They believed that too much fibre was not good for digestion in young children.

A diet should be balanced and there should be no over emphasis of any food type or nutrients at the expense of others. A diet also is required to have calorie control, supply the amount of energy that one needs to achieve and maintain his or her desirable weight. There should be moderation in a pre-school child’s diet. There should be little fat, salt and cholesterol because their nutrient content is not significant in the nutrient characteristic of a food group. A good diet is expected to have as many different food varieties as possible and minimal amounts of processed foods (FAO, 2001).

It is necessary to use different foods for the same nutrients. It is also necessary to consider standards of good nutrition, which has varied over time. Initially, it began with the idea of three food groups, then four food groups, the six food groups (FAO, 2001) and the current food guide pyramid (Cowley, 2003).

Figure 2.1 shows a food guide rectangle for the three food groups. The first group of fats includes: butter, margarine, oil, salad dressing and ghee. The second group of meat includes: chicken, milk, meat and legumes. The third food group includes: cereal, tubers and roots.

Figure 2.1 Food Guide Rectangle (Three Food Groups)

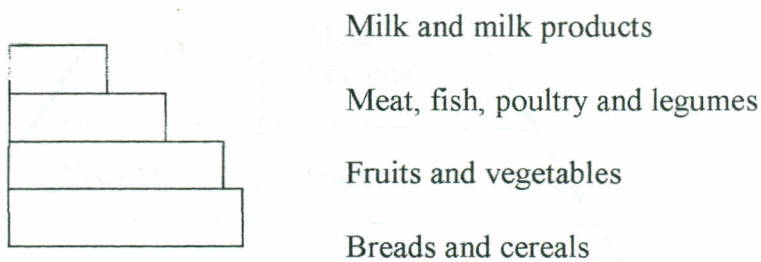


Source: Whitney, Cataldo and Rolfes (1991)

The three-food group was improved to a four-food group. Figure 2.2 shows a food guide rectangle for the four food groups. The first group is milk and milk products. The second group is meat, which includes fish, poultry and legumes. The third group includes fruit and vegetables. The fourth group is breads and cereals.

Legumes have long been scorned by some people as the “poor man’s meat” but they are an inexpensive, health promoting, land sparing, nutritious food. Legume seeds are high in protein and iron but lower in fat than meat. They are the preferred protein foods as many of them are complete proteins.

Figure 2.2 Food Guide Rectangle (Four Food Groups)

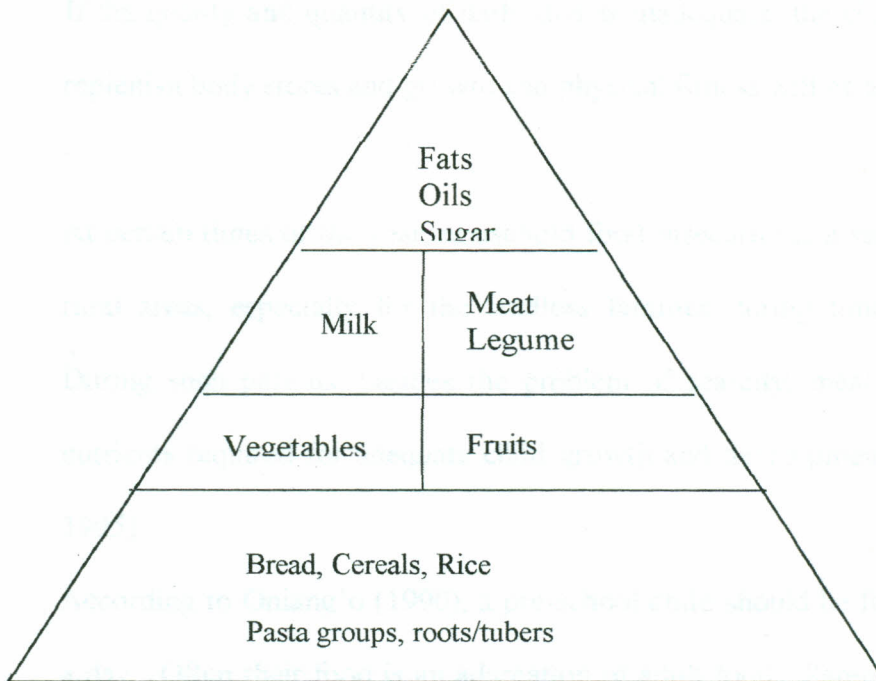


Source: Whitney, Cataldo and Rolfes (1991)

Figure 2.3, below shows the food guide pyramid, which can be used for the selection of appropriate foods. It is required to provide all the essential nutrients.

This food guide has been improved by USDA over time to six food groups. The first one had omitted the food group of fruits and vegetables. This newer food guide pyramid has separated fruits and vegetables each to form its own food group. Therefore pre-school teachers should be guided by the food pyramid in meal preparation for pre-schoolers.

Figure 2.3 The Six Food Guide Pyramid



Source: FAO (2001).

However the food guide pyramid has been simplified into four parts food square multi-mix. It can be used by mothers and other care-givers at the local community.

2.1.2 Nutrition for Pre-school Children

In Kenya, pre-primary school children are given meals or snacks. Sometimes these feeding programmes are linked to those of a nearby primary school. It is recommended that the pre-school children receive a meal providing about 55 percent of their daily energy requirements at school (FAO, 1993). The foods used

should make a meal that is not bulky but rich in energy, protein and essential micronutrients, especially those known to be low in the local diets. (FAO, 1993). If the quality and quantity of daily diet is inadequate, the child will be unable to replenish body stores and growth and physical fitness will be affected.

At certain times of the year, household food insecurity is a serious problem in the rural areas, especially for the landless families during times of food scarcity. During such periods, besides the problem of scarcity, meals also lack essential nutrients required for adequate child growth and development (Nkinyangi, et. al. 1995).

According to Oniang'o (1990), a pre-school child should be fed at least five times a day. Often their food is an adaptation of adult food. Parents play a key role in pre-school feeding. Where they can, parents support a scheme that provides a snack and a hot meal for their children.

Using the Food Guide Pyramid in planning meals for preschool children will help ensure that they are getting a variety of foods and the right amounts from each food group. It also will help ensure that foods high in fat and added sugars are kept in moderation.

It is important that young children receive a proper diet. When a child gets proper nutrition, healthcare and stimulation during the pre-school years, the quality of the

child sitting in the classroom, which is Active Learning Capacity (ALC), improves. This means that the efficiency of learning also improves (Levinger, 1995). Thus, nutrition has significant impact on children's development as well as growth.

A care-giver needs to plan regular meal and snack times and eat together. Because of their small stomachs and short attention spans, preschool children like to snack. Most preschoolers eat four to five snacks or meals each day. The teachers need to plan snacks as they do meals, as snacks can be an excellent way to get needed nutrients into a child's diet. (Kendall and Puck).

The individual ration for pre-primary school is considered because the pre-school teachers are required to know the nutritional needs of their children, how to fulfill them and how they differ from those of adults. Pre-school teachers should understand that children are growing very fast, they are active and they are more prone to infections and accidents, unlike adults (FAO, 1993)

Normally, children need a balanced diet. Young children's food choice is limited and their capacity for quantities is also limited, their requirements are very high. Pre-school children are completely dependent on their care-givers for their food. Their eating patterns are variable. An effort should be made to ensure that proper eating habits are established quite early in life since these have implications for

future eating patterns.

Table 2.1 below shows an accepted example of the size of an individual ration for pre-primary school child worldwide (FAO, 1993).

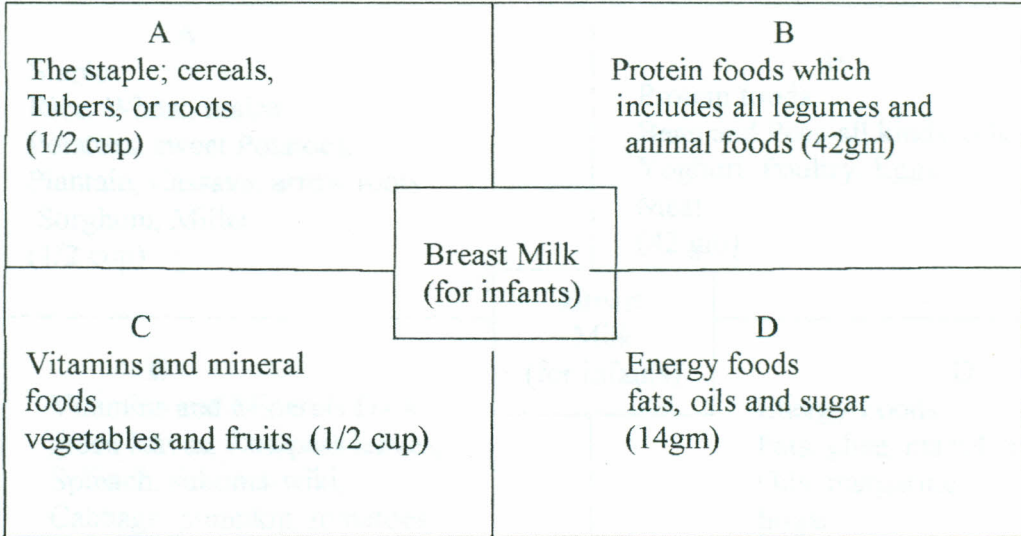
Table 2.1: The size of an Individual Ration for Pre-primary School Child

Maize flour	160g
Beans	20g
Oil	20g
Sugar	20g

Source: FAO, 1993

Figure 2.4 below shows the simplest local recipe for young children according to the four parts of a food square.

Figure 2.4 The Simplest Local Recipe for Young Children

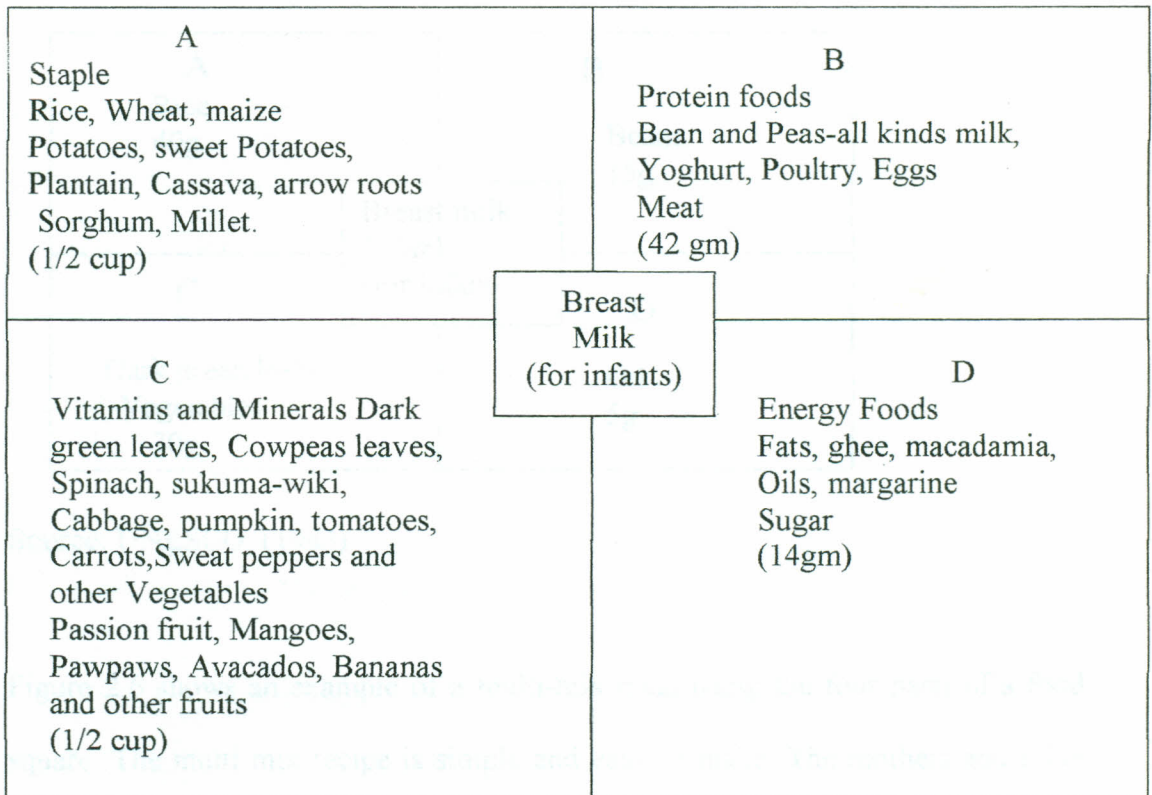


Source: UNESCO, (1983).

A family meal made from the local foods can make a suitable multi-mix for the young child.

Figure 2.5 shows a variety of local foods for multi-mixes or family pot recipes which are fitted into the four parts of the food square.

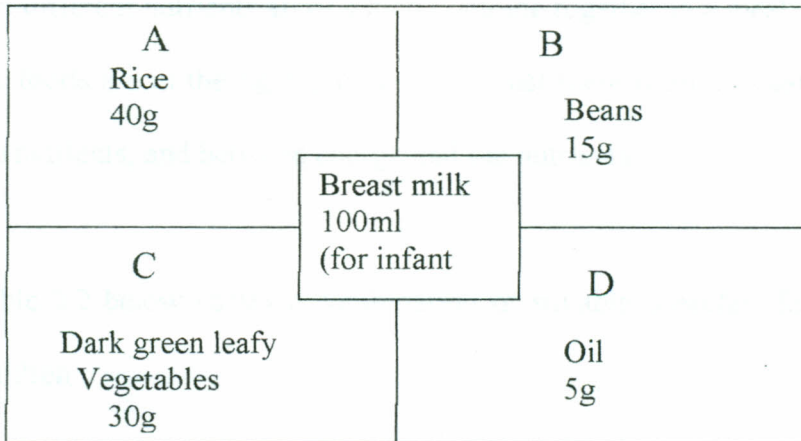
Figure 2.5: A Variety of Local Foods for Multi-mixes



Source: UNESCO, (1983)

Figure 2.5 shows different kinds of foods which can be used to make a family meal. These foods can be taken from the cooking pot in the amounts needed to make a suitable multi-mix for the young child. Breast milk is in the middle of the square because it has a complete food in itself. The four parts of the square are staple, protein foods, vitamins, mineral foods and energy foods.

Figure 2.6 An Example of a multi-mix meal



Source: UNESCO, (1983)

Figure 2.6 shows an example of a multi-mix meal using the four parts of a food square. The multi mix recipe is simple and easy to make. The mothers and other care-givers in local communities can use the locally available foods for a multi-mix meal.

It is very important to note that there is no prescribed food menu for children in pre-schools in Kenya. The NACECE and its DICECEs do not have a listing of specific foods or quantities for feeding programmes. Rather they suggest small quantities of locally available foods suitable for young children. The Food Square Mix is thus suggested for menu planning and some of the quantities are from the Happy Homes Programme (www.tripod.com/happy-homes/index).

A meal is usually made from several foods; each food supplies some energy and different nutrients all of which combine together in a meal. It is important that the foods are in the right proportion so that there is an adequate balance between the nutrients, and between energy and the nutrients.

Table 2.2 below shows a combination of suitable breakfast foods for pre-school children

Table 2.2 Suitable Breakfast Foods for pre-school children. Select from foods below according to the food square.

Food Components	Ages 3-6 years
Milk	$\frac{3}{4}$ Cup
Juice; Fruit or vegetable	$\frac{1}{2}$ Cup
Cereals; bread/roots/tubers	$\frac{1}{2}$ Cup/ $\frac{1}{2}$ slice
Porridge	$\frac{1}{4}$ cup
Sugar, oils, fats	14 g

Table 2.3 shows suitable snack food for pre-school children. According to this source breads and cereals are expected to be made from whole grain.

Table 2.3 Suitable Snack Foods for pre-school children. Select from foods below according to the food square.

Food Component	Ages 3-6
Milk	½ cup
Fruit/Vegetables	½ cup
Cereals/Tubers/Roots	½ serving
Porridge	¼ cup
Meat, poultry or legumes	14gm
Egg	½
Cooked beans or peas	3.5gm
Fats, oils, sugar	14gm
Sour milk (yoghurt)	56gm

Table 2.4 shows suitable lunch foods for pre-school children. According to this source a serving is equivalent to half a cup.

Table 2.4 Suitable Lunch Foods for pre-school children. Select from foods below according to the food square.

Food Component	Ages 3-6
Milk	¾ cup
Juice; Fruit/Vegetables	½ cup
Cereals/Tubers/Roots	½ serving
Porridge	¼ cup
Meat; poultry	42gm
Egg	¾
Cooked beans or peas	3 table spoons
Sour milk (yoghurt)	168gm

Source: update of Ndungi (1982)

2.1.3 Nutrition Education and Sources of Nutrition Knowledge

Nutrition education and nutrition programmes are guided by national policies.

Some of the goals for National Plan of Action for Nutrition (NPAN) are to:

Incorporate nutrition objectives into national development programmes and policies. General information for community based actions for nutritional assessment and implementation of appropriate interventions.

The underlying policies to support this plan of action include policies on nutrition interventions implemented which include: Salt iodisation and Vitamin A supplements for children under five years (Kenya Position Paper On Children In 21st Century, August, 2002). However, the health and nutrition programme is also addressing on high Chronic malnutrition levels of women and children under five years through a community based approach. It involves building and expanding on the Bamoko initiative.

In Kenya the specific objectives for nutrition education for pre-school teachers according to the National Center for Early Childhood Education should be to understand the concept and meaning of food and nutrition. Other objectives are: to appreciate locally available foods in order to encourage communities to utilize them appropriately; to guide other care-givers and community on proper utilization and preparation of food and nutrition; to understand the nutritional needs for specific age groups and be able to cater for them; to observe appropriate health practices and to take precautionary measures in the community; and to acquire skills and apply relevant knowledge in food storage and preservation. The last objective is to advise the community on various methods of increasing food

production (KIE, 1996). The content for pre-school teachers during DICECE training in the area of health and nutrition are; concept of food and nutrition, food groups and functions, diet, food hygiene, feeding the child and food production, Childhood diseases, personal hygiene and environmental sanitation (KIE, 1996).

In this study the pre-school teacher's nutrition knowledge about the daily diet of a pre-school child would help him or her give the required proportions of food per a particular child. Also, the knowledge of nutrient content would help the pre-school teacher to balance the child's food intake appropriately. Lack of nutrition knowledge may contribute to malnutrition in young children especially nowadays most day-care centres run from 8 am. to 4 pm. According to WHO (1999) with more children than ever receiving education, schools are an efficient way to reach school age children and their families about nutrition in an organized way. The teachers have the opportunity to discuss the importance of certain foods and to demonstrate positively the effects of feeding children on these foods. Of most importance, however, is that the teachers' nutrition knowledge is to come from various sources of nutrition knowledge.

Nutrition knowledge of pre-school teachers is obtained from indigenous sources, primary, secondary and teacher education home science programmes. In reference to the traditional source of knowledge it should be noted that traditionally African countries have a wealth of indigenous foods of high nutritional value. The foods

suitable for young children vary from one place to another depending on availability, cost, culture, food preferences, and so on. Children are given informal education of what is and is not suitable to eat according to that culture.

Another source of nutrition knowledge is in the school curriculum. The Government of Kenya together with the World Food Program (WFP) and NGOs are concerned with providing formal and non-formal nutrition education and sensitizing the general public on proper nutrition and feeding habits, diet diversification and food quality and safety. This is done deliberately through the school curriculum in primary and secondary, Ministry posters hanging in schools and information passed during parent-teacher meetings (Oniang'o 1998).

During primary education, the pre-school teachers were exposed to nutrition education through the subject of home science and the school feeding programmes. The schools are responsible for interpreting the nutrition and health programmes of the school to the community, the parents through the parent-teacher association meetings, school end of term, open days and other school activities (Oniang'o, 1980).

During primary education generally, pupils should be able to observe health practices and take precautionary measures in the home and the community in relation to personal hygiene, kitchen hygiene, sanitation, water, identification of poisonous substances and health hazards. They should be able to develop and use

appropriate skills and techniques for solving problems relating to choice of food, eating habits, food handling, cooking, preservation and storage (KIE, 1992). Before the inception of the 8-4-4 system of education which began in 1985 pupils studied the same topics but home science was not examinable.

In the secondary home science curriculum, one major area of study is foods and nutrition. In this area, specifically, the student is expected to acquire the necessary knowledge to enable him or her to practice principles of hygiene with respect to self, food and the environment. The learner is also expected to develop an appreciation of the nutritive value of various foods and the importance of a balanced diet.

The Secondary student is also expected to develop creative ability in the selection, preparation and use of a wide variety of foods. Other objectives are: to acquire basic knowledge and skills in the use, storage and preservation of foods; to acquire an appreciation of foods from different communities; to acquire relevant knowledge and skills in Home Science, to make items for home and income generating activities and to acquire a foundation for further professional training in various fields of Home Science. The content areas of Home Science are food hygiene, kitchen equipment and tools, food nutrients and related disorders, methods of cooking, flour mixtures and raising agents, meal planning and management, use of leftover foods and food preservation. KNEC, (2000-2001).

Generally, the teacher education programme on food and nutrition includes definition of foods, nutrients and nutrition; and how and why nutrients in food are used by the body. It consists of the classification of foods, plant and animal foods and food groups. It specifies food value especially about local foods: sources, functions, deficiencies and digestibility. The teacher education programme on food and nutrition also classifies physical changes in food during cooking, defines kitchen hygiene, home garden planning, preparation and care of small kitchen garden. It also defines economy of home production and the traditional and new crops that can be grown. It has a programme on malnutrition and under nutrition. Finally, it has basic methods of cooking, the principles involved, choice and cost of foods in season (UNESCO, 1988). Thus, pre-school teachers had been exposed to nutrition education at various times, primarily at home through the process of socialization. Indigenous nutrition knowledge is passed to them through families and communities, beliefs, attitudes, environmental influences and understanding about local foods which lead to family, dietary and food practices (Oniang'o 1998). Then later they received information from schools and formally in their professional training.

Pre-school teachers in Mumbuni have also been exposed to nutrition education from various projects. The projects are District Center for Early Childhood Education (DICECE); Mwana Mwendu Trust (Treasured Child), Compassion International, Christian Children's Fund, and Primary Health Care (PHC) from

Machakos General Hospital.

DICECE has trained pre-school teachers on food, health and nutrition during the two-year in-service course and during the five weeks short courses, while Mwana Mwende Trust has trained pre-school teachers as community health workers, on health and nutrition, management of feeding programmes, growth monitoring and promotion. Mwana Mwende Project has formed child village youth development committees in the zone. In this committee there is a representative from pre-school teachers. This committee chose one pre-school during one day of the week and they cooked a balanced meal for the pre-school children. Pre-school teachers were honoured with educational trips to Taveta, Kisumu and Wamuyu Zone in Machakos District. The main purpose of these trips was to learn more about feeding programmes. Mwana Mwende had also donated cups and buckets to two of the pre-schools. Pre-school teachers and other community members were also shown videos on proper nutrition. (Mwana Mwende project report. Nairobi June 2000)

Christian children's Fund (C.C.F) had been providing growth monitoring services to pre-schools and had been giving relevant advice on feeding children. In some cases they made referrals to the nutritionist.

Compassion International has been organizing feeding programmes on all

Saturdays for orphans and vulnerable children in the zone. They feed over 200 children some of whom were pre-school children. They provided uniforms and clothes for the children. Every Saturday there was a balanced snack and lunch for those children. In this project one pre-school teacher who was also a social worker was a member of the organizing committee. Pre-school teacher panels meet once a month to share their experiences. As a general practice HIV parents and children were provided with balanced foodstuff, discussed nutrition issues, nutritive foods and personal health care.

The community in this zone has Primary Health Care programme. Community health workers, some of whom are pre-school teachers, give advice on health and nutrition, personal and environmental hygiene, sanitation and treatment of minor ailments.

They also organized seminars for the rest of the pre-school teachers on children's health and nutrition; essence of proper health care and proper sanitation. They also conduct growth monitoring in pre-schools together with other children from the community. They operate Bamako pharmacies for minor ailments in the community.

2.2 Studies on Nutrition Knowledge, Its Relation to Practices and the Need for Transition

In this section some studies show correlation between consumption patterns and the level of caregivers' nutritional knowledge while other studies give reasons why nutrition knowledge does not always relate to practices. Other studies show that there is need for transition between home and school feeding of young children in which pre-school teachers coordinate with the families on the child's feeding.

2.2.1 Consumption Patterns and Nutrition Knowledge

Nutrition knowledge is significant as a determinant of food selection and consumption. Consumption patterns are positively correlated with the level of care givers nutritional knowledge (Pursell, 1972 as cited by Atebe, 1996).

This study was on assessment of socio-cultural and economic determinants of food selection and consumption among Nairobi households.

The UNICEF (1991) Report asserts that; "as a child grows older and for the adult population as a whole, an adequate diet is an obvious human priority" (p.64). Therefore, there is need to have knowledge about what the adequate diet is.

The mother's level of education had an inverse relationship with stunting level. For example children of mothers with at least some secondary education had the lowest stunting levels (19%) while children whose mothers had no education had the highest level of stunting (KDHS,2003).

2.2.2 Nutrition Knowledge and Practices

According to Kihato (1987) and Ojofeitumi and Olufokumbi (1986), the food intake and food preferences of the subjects in their studies did not reflect their nutrition knowledge in food selection. Despite the subjects' knowledge of nutrition, their food preferences were not for highly nutritious foods.

Findings by Kibuga (1990) and Coale (1972) established that the personal experience of the caregiver played a bigger role in determining food selection and consumption than possession of nutrition knowledge. Similarly the caregiver's nutrition knowledge did not translate to food selection and consumption if she could not afford the food. Her main concern was to satisfy hunger, rather than meet nutritional standards.

Sri-Lankan women from the lower-socio-economic strata were unable to put nutritional knowledge into practice due to financial constraints (Wandel & Ottensen, 1988, as cited by Atebe, 1996). Thus their main concern was to satisfy hunger as opposed to meeting nutritional needs. Hoorweg et.al (1984) reported that cultural patterns and availability of food were important variables to nutritional knowledge in food selection. Thus, child nutrition was not decided by individual cognition of the mother but rather by prevailing cultural patterns and the availability of resources.

Chernichovsky and Mesook (1984, as cited by Ojoifeitumi and Olufokumbi, 1986) came out with interesting findings in their study which revealed that inadequate diets were prevalent among the better off and educated. This they attributed to the fact that some of this advantaged people consumed more expensive but not necessarily nutritious diets.

2.2.3 Need For Transition of Child's Feeding From Home To School

According to Nkinyangi and Vynckt (1995) hunger in Kenyan schools was common in rural areas. Hunger is a stressful state that can interfere with the learning process. Many school children go for long periods of time without eating. Some go to school without breakfast and many miss lunch. Others miss both breakfast and lunch. School days are long and hungry children get tired and distracted easily. Numerous scientific studies among school children have shown the adverse effect of hunger on cognition, problem solving and concentration (Nkinyangi, 1995). Hungry children are found to be less alert and lethargic. Sending children home for lunch is no guarantee that they will eat or be fed. It is common for mothers to prepare and serve only one meal a day, usually in the evening.

In another study in Kenya by Nkinyangi and Vynckt (1995) the facilities found in pre-schools were poor and the schools were overcrowded. Some had a feeding program for which parents were required to contribute a fee each term (in some

establishments about 30 KSH, a term for provision of food twice a week). The kitchens of those pre-schools, however, were generally unsanitary. The majority of pre-schools, however, did not have any feeding arrangements for children. In those institutions, nutritional stunting, colds and respiratory infections, skin and eye diseases, and general lethargy were easily observable.

Nutrition affects school performance indirectly. Undernourished children (low height for age) tend to be enrolled later in school than better nourished children (Geneva: ACC/SCN 2002).

3.1 Nutrition in Schools

Therefore it is necessary for a pre-school teacher to have nutrition knowledge in order to provide the pre-school children with a balanced diet. This study focused on the relationship between pre-school teacher's nutrition knowledge and practices because based on other studies, teachers' knowledge is related to their practices in the schools in the feeding programmes. It is therefore important for caregivers to understand what an adequate diet is.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter provides a description of methodology that was used in carrying out the study. It covers research design, study area, target population and sampling procedures, research instruments, pre-testing research instruments, and data collection methods.

3.1 Research Design

A descriptive design was used in the study to investigate the relationship between the pre-school teachers' knowledge and practices. This approach attempts to report the way things are in naturalist setting. Descriptive research is a process of collecting data in order to test hypotheses or answer questions concerning the current status of subjects in the study (Borg and Gall, 1993).

The information that was gathered was used for the purpose of describing characteristics of the sample of the target population, identifying differences between pre-school teachers with exposure or non-exposure to nutrition education. Pre-schools with and without pre-school-based feeding programmes were sampled. Pre-school teachers who had been exposed to nutrition initiatives and those who had not been exposed were also part of the study. Mumbuni Zone was the area of the study.

Naturalistic observation of feeding practices including the daily plan of meals, frequency of feeding, food hygiene, sanitation, food storage and preservation was used because it records and studies behaviour as it normally occurs. The observer did not control or manipulate either the subjects or the environment in any way (Mugenda and Mugenda, 1999).

The information that was gathered was used for the purpose of describing characteristics of the sample of the target population; identifying differences between pre-school teachers' knowledge and practices and assessing interrelationships among variables within the sample.

3.2 The Study Variables

In any research carried out it is important to identify the research variables. These include both the independent and the dependent variables. Independent variables are those that cause or are associated with changes to dependent variables while dependent variables are those which change as a result of changes in the independent variable (Bless and Achola, 1987). The independent variables in this research were the pre-school teachers' nutrition education, including exposure to professional training and short courses as well as other types of exposure to nutrition education in primary, secondary school and through the media. The dependent variables were the pre-school teachers' knowledge of balanced diet, sources of nutrients, food hygiene, food storage and preservation, as well as the

observed and reported food practices, such as daily plan of meals, food hygiene, sanitation, frequency of meal, food preparation, food storage and preservation.

3.3 Location of the Study

The study was carried out in peri-urban Mumbuni Zone in the Central Division of Machakos District. There were 80 pre-schools with a total of 1589 children, 838 of whom were boys and 751 girls (Mwana Mwendu Project Annual Report June 2000 – May 2001). It was the most densely populated location in Machakos District with a density of 848 people per square kilometre. Most of the people were small scale farmers due to the large population and hence each family had a small piece of land which was insufficient for subsistence. They therefore depend on income through petty trade. The zone consists of five administrative sub-zones; Mumbuni, Mung'ala, Manza, Kiandani and Misakwani.

In the past the main food crops were millet, sweet potatoes, cowpeas, sorghum and maize. Today, the crops grown are maize, beans, coffee, arrowroots, cassava, sweet potatoes and different kinds of fruits. Since their shambas are small, they practice intercropping. The main cash crop is coffee.

3.4 Target Population

The target population of this study was pre-school teachers and the children in their classes from pre-schools in Mumbuni Zone of Machakos District. There were

80 pre-schools with a total population of 99 pre-school teachers at the time of the study. (Machakos Education Office, Annual Statistics 2002).

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Techniques

A sample is a representative subset of a population and therefore is far much smaller in size than the population. The sample in this study area was twenty pre-schools, the pre-school teachers and the children in their classes.

This sample of twenty pre-schools was derived by purposive selection from among the 80 pre-schools. Ten pre-schools had pre-school based feeding programmes while the other ten pre-schools had either snacks or meals from home or both.

There was simple random sampling of thirty (30) pre-school teachers from the twenty pre-schools sampled with at least one or more teachers from each selected pre-school. The respondents were picked from every first two streams in case of many streams and then the last stream. This procedure applied to every pre-school.

3.5.2 Sample Size

A total of twenty pre-schools and thirty pre-school teachers together with 779 children in their classes were sampled. Among the twenty pre-schools, ten were operating pre-school based feeding programmes while the other ten had snacks,

meals or both from home.

Table 3.1. Sampling Frame for Study

School type	No. of schools	No. of Teachers	No. of Children
Public	9	11	370
Private	11	19	409
Total	20	30	779

3.6 Research Instruments

Interview schedules and observation check-lists were the instruments used in this study.

(i) Interview Schedule

The interview schedule was meant to gather demographic information from pre-school teachers on gender, age, experience in pre-school, professional qualifications, academic qualifications, marital status, exposure to nutrition education and the length of courses and seminars attended. The interview schedule contains interview questions pertaining to pre-school teachers' knowledge and practices. Both open-ended and close-ended questions were used during interviews. The range of scores was between 1 – 100.

(ii) Observation Schedule

Naturalistic observation was used because it records and studies behaviour as it normally occurs and the information was recorded on an observation schedule.

The observation schedule was meant to gather information from the teachers and about the pre-school feeding programmes.

Appendix II contains the observation schedule. The range of scores in this schedule was from 1 – 40. The specific practices observed were children's hygiene, sanitation (cleanliness of toilets), food storage and preservation.

3.7 Pilot Study

The interview schedule and observation schedule were pre-tested prior to the main study by use of four pre-school teachers from two pre-schools. They were purposively selected from setting with a pre-school based feeding programme and from another with snacks from home. This allowed for checking on the validity of questions and reliability of the instrument by testing and retesting. It also helped the researcher to check if all questions were clear and if they covered the problem under investigation in order to work out the unforeseen pitfalls before the main study. Pre-testing also assessed time, accuracy and soundness of the instruments. In addition, the researcher had an opportunity to familiarize herself with the study area. The subjects used during pre-testing did not participate in the main study.

The questions in the interview schedule and observation that were lengthy, ambiguous were corrected were done before the field work began. Other areas where some information on knowledge and practices could not be captured were also corrected. The purpose of piloting was to enable the researcher to discover

weaknesses in the research instruments, check the clarity of the questions or the items, and also elicit comments from respondents that would assist in improvement of the instruments.

3.7.1 Validity

Validity refers to whether a measurement is measuring what it was intended to measure. Following the piloting results, content validity was assessed by reviewing questions that seemed un-clear. Questions that seemed ambiguous or too lengthy were also corrected with the help of peer and expert reviews.

3.7.2 Reliability

Pre-testing of the interview questions and observation check-lists was done to ensure reliability of the instrument. It was after the pilot study that reliability of instruments was confirmed. Reliability refers to a measure of consistency in producing similar results on different but comparable occasions. An interview guide was used consistently to make sure that the information asked of teachers was always the same. The researcher ensured reliability by use of detailed interview guides.

3.8 Data Collection Techniques

Interviews were arranged with each subject selected for the sample. All interviews were conducted in the respondent's pre-school. This allowed the interviewer to

make observation during feeding times and during pre-school daily activities. The interviews were conducted in each pre-school by the researcher herself. The interviewer asked prepared questions and recorded the response of answered questions. Pre-school teachers answered questions when asked.

A permit to conduct the study was obtained from the Permanent Secretary in the Ministry of Education Science and Technology. Further permission was sought from the District Education Officer and District Commissioner Machakos District. The heads of institutions were contacted before carrying out the interviews and observations.

3.8.1 Logistical and Ethical Considerations

The teachers were informed that the data collected would not be used for anything else apart from this study. Also they were told that their information would be kept confidential. The Pre-school teachers participated voluntarily in the study and provided informed consent. No teacher was forced to participate in the study.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.0 Introduction

This chapter provides an overview of the data analysis and a descriptive analysis of the pre-school teachers' knowledge and practices from Mumbuni Zone, in Machakos District. Knowledge of balanced diet, sources of nutrients, food hygiene, food storage and preservation are described and explained, and results from the hypotheses testing are presented. Analysis of Variance (ANOVA) and Pearson's Product Moment Correlation Coefficient (PPMCC) was used to see if there were relationships among variables.

4.1 Methods of Data Analysis

The interview schedule and observation checklists gave both quantitative and qualitative forms of data, hence both descriptive and inferential statistics were used. Each pre-school teacher was asked questions and all answers were recorded down. Each answer was valued, scores were awarded and then totaled up for each Pre-school teacher. The total score was 74. The total score indicated the level of knowledge for every pre-school teacher. Data were presented in tables, figures and graphs. Data from interviews were prepared for analysis by use of Statistical Package for Social Sciences (SPSS). Data from observations interviews were used as the basis of determining any relationship between nutrition knowledge and both observed and reported practices. An ANOVA was selected and used to test the

significance level of any differences in knowledge and practices because the data was categorical. Pearson Product Moment Correlation Coefficient (PPMCC) was also used to assess and determine the strength and direction of the relationship between study's dependent and independent variables.

4.1.1 Qualitative Data Analysis

Pattern codes were isolated to reduce large amounts of data to simpler themes to make them self-explanatory for deducing inferences. Clusters were used in patterns to be able to identify the variables that depict a general concept. Making notes, patterns, themes and making contrasts helped to evince meaning from a particular set of data. In descriptive statistics, frequencies, percentages, and measures of central tendency were used to present data from various variables.

This was followed by analyses and interpretation of the information.

4.1.2 Quantitative Data Analysis

Inferential data analysis employed two main hypothesis-testing techniques. These were one way ANOVA to establish the significant differences in teachers' knowledge and practices between those exposed or not exposed nutrition education. Pearson Product Moment Correlation Coefficient (PPMCC) was also used to determine the strength and direction of the relationship between the teachers' knowledge and practices.

4.1.3 Statistical Testing Of Hypotheses

The following null hypotheses were tested in the study.

HO₁ There is no significant difference between the knowledge of pre-schools exposed and not exposed to nutrition education. To test this hypothesis, two subsidiary null hypotheses were tested using the ANOVA:

HO_{1A} There is no significant difference between the knowledge of pre-school teachers who were professionally trained, were undergoing training and those who had not been trained.

HO_{1B} There is no significant difference between the knowledge of pre-school teachers who had attended short courses and seminars and those who had not.

HO₂ There is no significant difference between the practices of pre-school teachers who had been exposed to nutrition education and those who had not been exposed. To test this hypothesis, two subsidiary null hypotheses were tested using the ANOVA:

HO_{2A} There is no significant difference between the practices of pre-school teachers who professionally trained, were undergoing training and those who had not been trained.

HO_{2B} There is no significant difference between the practices of pre-school teachers who had attended short courses and seminars and those who had not.

Thus, in $HO_1 - HO_2$ ANOVA was employed to establish if there is any significant difference in pre-school teachers' knowledge and practices among those who were exposed to nutrition education and those who were not exposed at $p. = 0.05$ level of significance.

HO_3 There is no significant relationship between pre-school teachers' knowledge and practices. To determine the strength and direction of the relationship between the study's dependent and independent variables, Pearson's Product Moment Correlation Coefficient (PPMCC) was used.

4.2 Findings of the Study

This section presents the characteristics or personal attributes from 30 pre-school teachers in the sample. These include the respondents' characteristics on gender, age, experience in the pre-school, professional qualification, formal schooling level, exposure on nutrition education and the length of courses and seminars attended.

4.2.1 Gender

Contrary to the researcher's expectation, all the sampled respondents happened to be women, although during training sessions some male teachers were trained. This implies that caring for young children in Mumbuni is still a domain of women.

4.2.2 Age

The sampled pre-school teachers were classified into four age brackets as shown in Table 4.1.

Table 4.1: Age of the Pre-school Teachers

Age	Frequency	Percent
Below 29 years	10	33.3
30-39 years	14	46.7
40-49 years	1	3.3
50 and above	5	16.7
Total	30	100

The majority respondents (80%) were under 39 years. Only 20% of the respondents were above 40 years, probably because of moving to better positions elsewhere. These results concur with Gumo (2003), who also noted movement of pre-school teachers to better positions elsewhere (greener pastures).

4.2.3 Professional Qualifications

According to the findings of this study, 63.3% of the pre-school teachers were trained. This is shown in Table 4.2. The others were either undergoing training or were untrained.

Table 4.2: Professional Qualifications of Teachers

Professional Qualifications	Frequency	Percent
Trained	19	63.3
In-training	8	26.7
Untrained	3	10.0
Total	30	100.0

Table 4.2 reveals that, 63.3% of Pre-school teachers were trained, 26.7% were undergoing training and 10.0% were not trained. This is slightly different than other studies done in Nairobi (Ng'asike 2004; Ndegwa, 2005) that showed all of the teachers were trained.

4.2.4 Teaching Experience

The study also sought information on teaching experience of pre-school teachers.

This is presented in Table 4.3.

Table 4.3: Experience of Pre-school Teachers in Present Pre-school

Duration In Pre-School	Frequency	Percent
0-2 Years	16	53.3
2-5 Years	5	16.7
6-10 Years	4	13.3
Over 11 Years	5	16.7
Total	30	100.0

The analysis reveals that over half (53.3%) of the pre-school teachers have been in that pre-school for less than two years, suggesting that there is a large influx of new teachers and or older teachers leaving. Only 13.3% had 6-10 years of experience in the present pre-school. This result doesn't concur with Ng'asike (2004) who found that over 55% of pre-school teachers that he studied from Nairobi had four years teaching experience and above. This may suggest that the situation may be worse in rural areas.

4.2.5 Type of Training

There are three types of centers where the sampled pre-school teachers received their training. These centers are: District Centre for Early Childhood Education (DICECE), Private Centres and the County Council. Table 4.4 below is summary of the distribution of pre-school teachers by the type of training.

Table 4.4: Type of Training

Training Centre	Frequency	Percent
DICECE	17	89.5
County council	1	5.3
Private	1	5.3
Total	19	100.0

According to the findings of the study, the vast majority (89.5%) of the pre-school teachers received their training from the District Centre for Early Childhood Education while only 5.3% were trained by the County Council and the Private Centres, respectively. The high percentage recorded in DICECE is probably because of low fees that were being charged by the Ministry of Education Science and Technology through the subsidy of World Bank loan. Moreover, the County Council no longer trains pre-school teachers.

4.2.6 Duration of Training

The study wanted to find out the duration of pre-school teachers' training.

Table 4.5: Pre-school Teachers by Duration of Training

Duration Trained	Frequency and Percentage	
	No.	%
Trained		
4 – 6 months – Attendance	1	5.3
16 – 25 months –Certificate	16	84.2
25 months and above (Diploma)	2	10.5
Total	19	100.0
In Training		
First years	5	62.5
Second years	3	37.5
Total	8	100.0

The information in Table 4.5 suggests that majority of the pre-school teachers, 84.2% were trained for at least two years which is the complete period for certificate training.

Those who were trained for more than two years (10.5 %) had probably joined diploma courses, a sign that Early Childhood Development (ECD) is not static. Only 5.3% received less than six months of training. Most of those undergoing training (62.5%) were in their first year. About 37.5% of the pre-school teachers have joined private training centers. This may be attributed to lack of vacancies in the Government training centers. Three teachers, (10%) of the samples had no training at all.

4.2.7: Formal Schooling Level

The study also sought to establish the level of formal education of pre-school teachers. Table 4.6 below gives the distribution of respondents according to their

level of education.

Table 4.6: Pre-school Teachers by Level of Education

Level Of Formal Schooling	Frequency	Percent
Primary	2	6.7
Secondary	28	93.3
Total	30	100

The findings reveal that vast majority of the pre-school teachers (93.3%) have completed secondary school education while only 6.7% of the pre-school teachers stopped at primary school level. This is probably because the stakeholders associate quality education with more educated pre-school teachers and the increased availability of school leavers completing secondary school education.

4.2.8: Nutrition Education, Course Organizers/Attendance

It was important in this study to find out whether or not pre-school teachers had attended courses other than their training courses. These courses include seminars and workshops. This is shown in Table 4.7.

Table 4.7: Course Organizers/Attendance

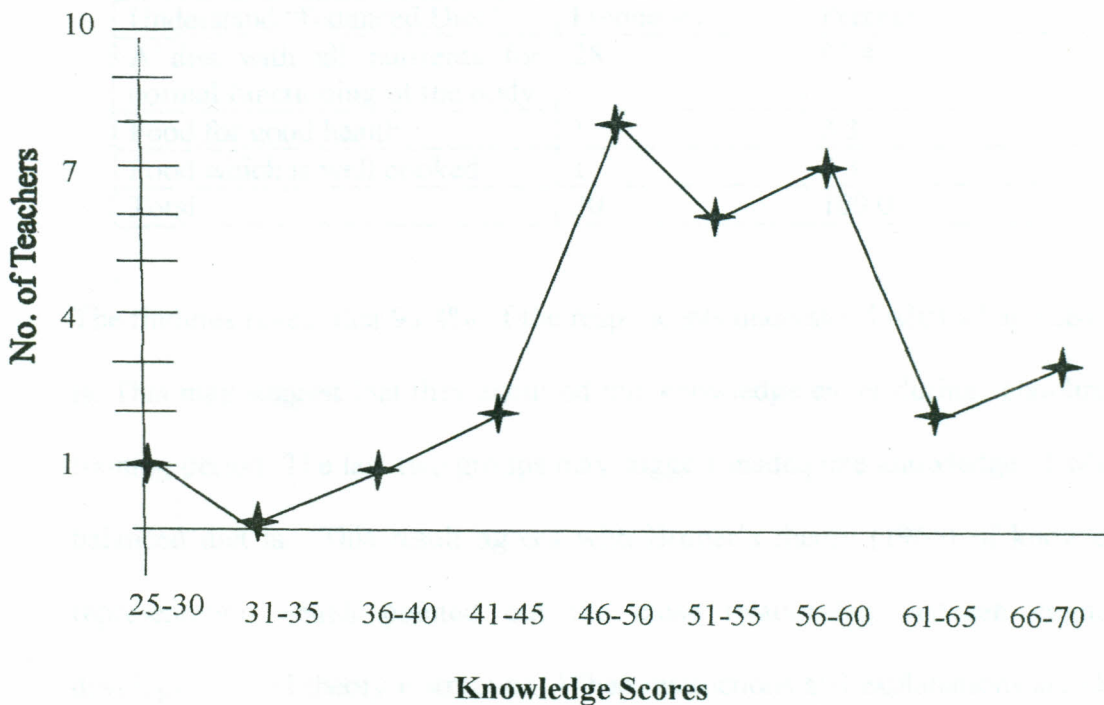
Attended course/seminars		Frequency	%
Yes		14	46.7
No		16	53.3
Total		30	100.0
Types of courses	Duration		
DICECE	25 days	14	100.0
Mwana Mwende	25 days	14	100.0
Ministry of Health	2 days	2	14.3
Ministry of Social Services	2 days	2	14.3

Data in Table 4.7 reveal that 53.3% of pre-school teachers have not attended nutrition education courses and seminars. This is slightly above a half of the pre-school teachers. This probably could be due to the increasing numbers of newly employed pre-school teachers. Less than half of the pre-school teachers (46.7%) who had attended courses organized by DICECE, Mwana Mwendu, Ministry of Health and Ministry of Social Services. This information may suggest that there is need for expansion of services.

4.3 Pre-school Teachers' Nutrition Knowledge

On the Figure 4.1, the knowledge scores of the pre-school teachers are represented.

Figure 4.1: Pre-School Teachers' Nutrition Knowledge.



The distribution of knowledge is positively skewed but there were few untrained teachers with very low knowledge scores. As can be seen, however, most teachers had knowledge of balanced diet, sources of nutrients, food hygiene, food storage and preservation. The discussion of the details of these areas of knowledge follows.

4.3.2 Knowledge of Balanced Diet

This study attempted to find out the pre-school teachers' understanding of a balanced diet. Table 4.8 presents the distribution of pre-school teachers' understanding of a balanced diet.

Table 4.8: Understanding of a Balanced Diet

Understand "Balanced Diet"	Frequency	Percent
A diet with all nutrients for normal functioning of the body	28	93.4
Food for good health	1	3.3
Food which is well cooked	1	3.3
Total	30	100.0

The findings reveal that 93.4% of the respondents understood what a balanced diet is. This may suggest that they acquired this knowledge either during schooling or training period. The last two groups may suggest inadequate knowledge of what a balanced diet is. This result agrees with Bruner's theory (1966) of knowledge representation which pointed out the close relationship between cognitive development and theory instruction. When instructions and explanations are clear, the learner will find it easy to follow. A UNICEF (1991) report asserted that as a

child grows older an adequate diet is an obvious priority. Therefore, perhaps these teachers need to have knowledge about what an adequate diet is.

4.3.3: Sources of Nutrients

In the table below, the frequencies of teachers' knowledge of the sources of nutrients is shown. The frequencies were obtained after the specific names of food were mentioned by the teachers.

Table 4.9: Knowledge on Sources of Nutrients

Mention of food per food group	Frequency	Percent
Proteins	30	100.0
Carbohydrates	29	96.7
Vitamins	27	90.0
Fats	14	46.7
Minerals	7	23.3

Table 4.9 reveals that one hundred percent (100%) of the respondents mentioned specific names of foods for proteins. Ninety-six point seven percent (96.7%) of the respondents correctly mentioned the specific names of carbohydrates foods. Ninety percent (90%) identified correctly specific names of foods for vitamins while 46.7% correctly mentioned the specific names for fats. Only 23.3% correctly named specific names of foods for minerals. These results reflect that pre-school teachers were less knowledgeable on the sources of minerals and fats as compared to the sources of proteins, carbohydrates and vitamins.

4.3.4: Knowledge of Food Hygiene

Data on the pre-school teachers' knowledge on food hygiene were also collected. The frequencies of teachers' knowledge of food hygiene is represented in the table below.

Table 4.10: Knowledge of Food Hygiene

Why wash vegetables before cutting	Frequency	Percent
To retain the nutrients	17	56.7
To remove dirt	11	36.7
Incorrect answer	2	6.7
Total	30	100.0

Table 4.10 shows whether teachers knew why we wash vegetables before cutting. These results indicate that more than a half (56.7%) of the pre-school teachers were knowledgeable about food hygiene. Thirty-six point seven percent Just over one third (36.7%) had little knowledge, while 6.7% had no knowledge as to why vegetables are washed before cutting. This lack of knowledge is significant as it may impact negatively on children's health.

4.3.5: Food Storage and Preservation

This study attempted to find out the respondents' knowledge on food storage

and preservation. This information is shown on the following table.

Table 4.11: Food Storage and Preservation

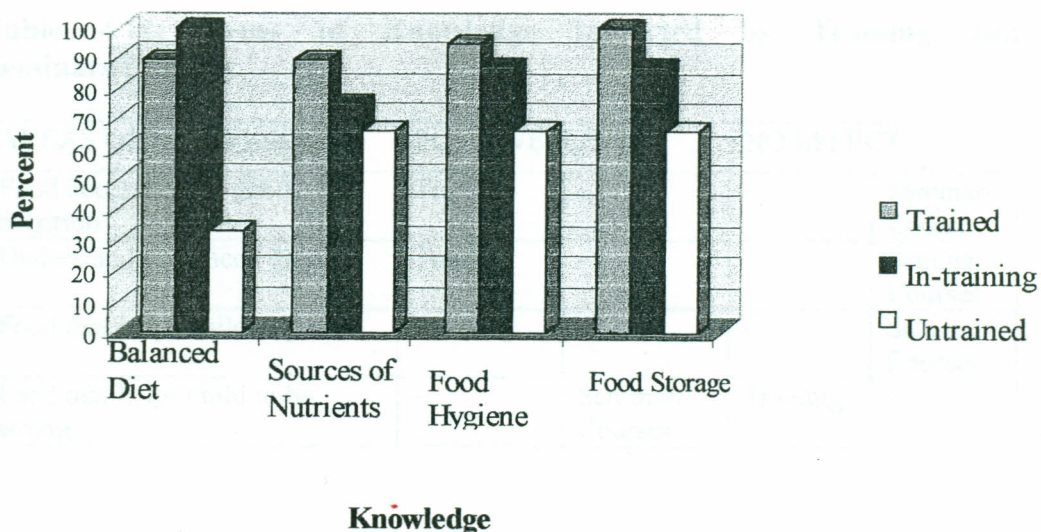
Preservation of green vegetables to last for 3-4 months	Frequency	Percent
Drying	29	96.7
Boiling	1	3.3
Total	30	100.0

Findings of the study reveal that (96.7%) of the respondents gave ‘drying’ as the best method for preservation of green vegetables to last for 3-4 months. It was only 3.3% of the respondents who gave the wrong answer of ‘boiling’ as the best method. This incorrect response may be due to lack of enough exposure to nutrition education through training.

4.3.6: Knowledge of the Trained, Trainees and the Untrained Teachers

The study compared the respondents’ knowledge within the three categories and the information is on the figure below.

Figure 4.2: Knowledge of Trained, Trainees and Un-trained Teachers



Results on Figure 4.2 show that the trained pre-school teachers had a mean knowledge score of 54.7 (73.9%), trainees had mean score of 41.3 (70.3%) and the untrained had a mean score of 41.3 (58.5%). It could be concluded that the untrained pre-school teachers were least knowledgeable in all the four areas of nutrition knowledge while the trained teachers were slightly more knowledgeable on nutrition than those in-training.

4.3.7: Knowledge Impacted by Training and Seminars/Courses

This study sought to find out knowledge impact by training and seminars as shown in Table 4.12. This information was derived from the output of the data analyses. It compares areas of nutrition knowledge (shown in the first column) of the pre-school teachers who attended two years in-service training to those of the pre-school teachers who attended seminars/courses. Positive effect means those areas of knowledge were effectively impacted by attendance of training or seminars/courses. No effect shows that these areas of knowledge were not effectively impacted by either training or seminars/courses.

Table 4.12: Areas of Knowledge Impacted by Training and Seminars/Courses

AREAS OF KNOWLEDGE	POSITIVE EFFECT		NO EFFECT	
	Training	-	-	Seminar/ Courses
Food necessary for good nutrition	Training	-	-	Seminar/ Courses
Understand “balanced diet”	Training	-	-	Seminar/ Courses
Food that helps child to grow	Training	-	-	Seminar/ Courses
Food that helps child to be strong	-	Seminar/ Courses	Training	-

Food that protects child from diseases	Training	Seminar/ Courses	-	-
Requirements for proper digestion	Training	-	-	Seminar/ Courses
Number of food groups	Training	-	-	Seminar/ Courses
Food per each food group	Training	-	-	Seminar/ Courses
Mention of food groups	Training	-	-	Seminar/ Courses
Malnutrition	-	Seminar/ Courses	Training	
No. of times to feed 3 –6 years old in a day	Training	-	-	Seminar/ Courses
Salt stored in a container not tightly closed	-	-	Training	-
Results of cooked vitamin 'C'	-	-	Training	-
Why wash vegetables before cutting	-	-	Training	Seminar/ Courses
Appropriate food for child having problems of seeing at night	Training	Seminar/ Courses	-	-
Appropriate food for child having sports	Training	-	-	Seminar/ Courses
Sources of carbohydrates	-	-	Training	-
Disease due to lack of protein	Training	Seminar/ Courses	-	-
Signs due to lack of fats	Training	-	-	-
Sources of fats	Training	-	-	Seminar/ Courses
Lack of iodine causes goiter	Training	-	-	-
Daily plan of meals	-	-	Training	Seminar/ Courses
Type of feeding programme	Training	-	-	Seminar/ Courses
Qualities of a good snack	Training	-	-	-
Qualities of a bad snack	Training	-	-	-
Feeding frequency while in pre-school	Training	-	-	Seminar/ Courses
Steps that would have been taken in case of malnutrition	Training	-	-	-
How often toilets were cleaned	Training	-	-	-
Food preparation	-	Seminar/ Courses	-	-
Cooking food	Training	-	-	Seminar/ Courses

General hygiene	Training	-	-	Seminar/ Courses
Feeding type/timetable	Training	-	-	Seminar/ Courses
Frequency of feeding in a pre-school day	Training	-	-	Seminar/ Courses
Storage and preservation	Training	-	-	Seminar/ Courses
Washing of hands before eating	Training	Seminar/ Courses	-	-
Sanitation (Cleanliness of toilets)	Training	Seminar/ Courses	-	-

Information from Table 4.12 reveals that more areas of knowledge were impacted by training than by seminars/courses. Specifically, 28 areas of knowledge were impacted by training and eight were impacted by seminars/courses. In contrast, seven knowledge areas were not impacted by training, and 18 were not influenced by seminars/courses. This suggests that knowledge gained during training had more effect than from seminars/courses.

Resources from both the Ministry of Education Science and Technology and from Kenya Institute of Education for training pre-school teachers were apparently of great benefit. However, it is evident that some areas of knowledge were emphasized during training or that some were not remembered if taught and learned during the training.

4.4: Pre-school Teachers' Practices

This study also sought to assess the practices of the pre-school teachers. These practices include: frequency of feeding, food hygiene and sanitation, plan of daily meals, food storage and preservation. This section will also present pre-

school teachers' practices in terms of those who were trained, untrained and in training. Practices of pre-school teachers who had attended nutrition education courses and those who had not attended is also presented. Some practices were self-reported while others were observed.

4.4.1: Frequency of Children's Feeding Within Pre-school

The pre-school teachers' feeding practices were analyzed by observing and getting reports on the feeding menus in their respective pre-schools. The results are presented in Table 4.13.

Table 4.13: Frequency of Children's Feeding Within Pre-school

Feeding frequency while in pre-school	Reported	Observed	Percent
Once (half day)	4	4	13.1
Two times (full day)	23	23	76.7
Three times (full day)	2	2	6.7
Four times (boarding)	1	1	3.3
Total	30	30	100.0

Findings of the study reveal that both reported and observed frequency of children's feeding were equivalent. The frequency of children's feeding varied according to the time spent at the pre-school. Majority of the respondents (76.7%) fed their pre-school children twice during the time they were at the pre-school. This may probably assist the child in case of food scarcity at home. According to Onyiang'o (1990), a pre-school child should be fed at least five times a day. Three types of feeding programmes were evident namely; pre-school based snacks and food from home and both pre-school based feeding and packed snack/food from home. This finding contrasts with those of

Nkinyangi (1990) who found that majority of pre-schools 14 years ago did not have any feeding arrangements for children. Perhaps schools now recognize the importance of school feeding programmes.

4.4.2: Hygiene Practices

This study also attempted to document the pre-school teachers practices as indicated by food hygiene. The findings are presented in Table 4.14.

Table 4.14 Hygiene Practices

Category of Teachers	Reported				Observed			
	Washing children's hands		Not washing children's hands		Washing children's hands		Not washing children's hands	
	N	%	N	%	N	%	N	%
Trained	8	100	-	-	8	100	-	-
In-training	19	100	-	-	16	84.2	3	15.8
Un-trained	3	100	-	-	2	66.7	1	33.3
Attended courses	14	100	-	-	13	92.8	1	7.2
Not attended Courses	16	100	-	-	13	81.3	3	18.7

Findings from Table 4.14 on the pre-school teachers' practices as indicated by hygiene reveal that all of the teachers reported that they washed their children's hands before eating. However, in practice according to the researcher's observations, some of the pre-school teachers were not washing children's hands at all. This may suggest laxity among those who were trained and have attended nutrition education courses but the respondents who were not trained and not attended nutrition education courses may be ignorant of the importance

of this hygiene practice.

4.4.3: Sanitation Practices (Cleanliness of Latrines/Toilets)

Data were collected to establish respondents practices as indicated by sanitation. This is presented in Table 4.15.

Table 4.15: Sanitation Practices

Cleaning of toilets									
Category of teachers	Reported				Observed				
	Clean		Unclean		Clean		Unclean		
	N	%	N	%	N	%	n	%	
Trained	19	100.0	-	-	16	84.2	3	15.8	
In-training	8	100.0	-	-	8	100.0	-	-	
Un-trained	3	100.0	-	-	1	33.3	2	66.7	
Attended courses	13	92.8	(No toilet)	7.2	8	57.1	5	42.9	
Not attended Courses	16	100.0	-	-	12	75	4	25	

Data from Table 4.15 indicate that all the thirty respondents in the sample reported to have schedules for cleaning toilets at the pre-school. According to the observed practice, however, 15.8% of the trained pre-school teachers, 66.7% of the un-trained pre-school teachers did not keep their toilets clean. Course attendance was not clearly associated with keeping toilets clean, and since 75.0% were observed to have kept pre-school toilets clean as compared to 57.1% who had attended nutrition education courses.

These results suggest that knowledge does not always relate to practices. This concurs with Kihato (1987), and Ojofeitumi and Olofokumbi (1986) who also found that knowledge did not always relate to practices.

4.4.4: Daily Plan of Meals

This study sought to know pre-school teachers' practices as indicated by a daily plan of meals. Table 4.16 presents the findings.

Table 4.16: Daily Plan of Meals.

Practices Daily plan of meals	Reported				Observed			
	Yes		No		Yes		No	
	N	%	N	%	n	%	n	%
Trained	19	100.0	-		3	15.80	16	84.2
In training	8	100.0	-	-	1	12.5	7	87.5
Untrained	3	100.0	-	-	0	0	3	100.0
Attended courses	14	100.0	-	-	1	7.1	13	92.9
Not Attended courses	16	100.0	-	-	3	18.8	13	81.2

Findings from Table 4.16 indicate that 15.8% of trained pre-school teachers were observed to have written plan of daily meals, while 12.5% of the pre-school teachers in training also had a written plan of daily meals but none of the untrained teachers had written plans. However, all the pre-school teachers reported that they had a daily plan of meals. Thus, their practices contrasted with their reports. Again, according to the observed practice only 7.1% of the pre-school teachers who had attended nutrition education courses had a daily plan of meals, 18.8% of the pre-school teachers who had not attended nutrition education courses had a daily plan of meals.

These results show that a large percentage of all the pre-school teachers did not have a written daily plan of meals. This probably may be attributed to the different leadership styles in the pre-schools. According to Bruner (1966),

learning by discovery is important because the learner is free to intervene the social and cultural context. The pre-school teacher is expected to make the daily plan of meals depending on the support received from the social and cultural environment.

4.4.5: Food Storage and Preservation

Data was collected to establish pre-school teachers' practices as indicated by food storage and preservation. If food is stored carelessly it can be dangerous to the health of the consumers. The findings are presented in the Table 4.17.

Table 4.17: Food Storage and Preservation

Teachers Bby Category	Reported				Observed			
	Yes		No		Yes		No	
	N	%	n	%	N	%	n	%
Trained	19	100.0	-	-	15	78.9	4	21.1
In Training	8	100.0	-	-	6	75.0	2	25.0
Untrained	2	66.7	1	33.3	1	33.3	2	66.7
Attended courses	13	92.9	1	7.1	10	71.4	4	28.6
Not attended courses	16	100.0	-	-	12	75.0	4	25.0

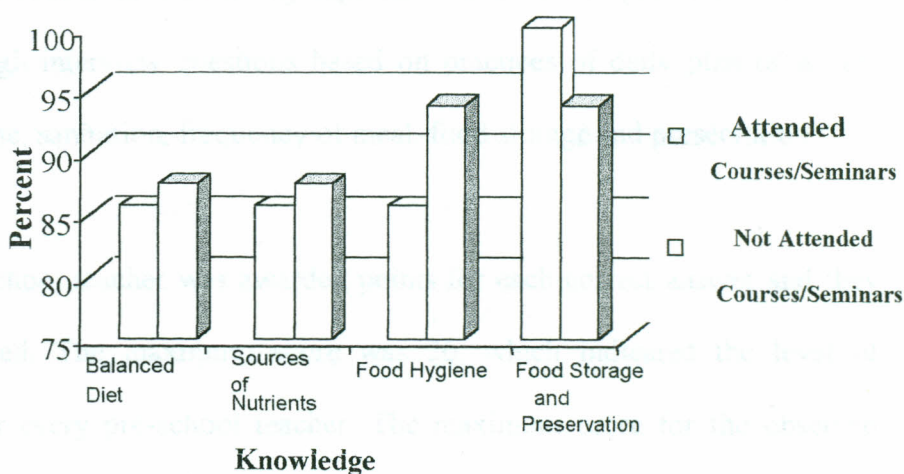
Data on pre-school teachers' practices as indicated by food storage and preservation in Table 4.17 reveal that 78.9% of the trained pre-school teachers, 75.0% of those who are in training and 33.3% of the untrained stored food in closed containers. Again there is contrast between the observed and the reported practice. Between 21.1% and 66.7% did not store food in closed containers. A greater percentage of the untrained pre-school teachers (66.6%)

kept their food in unclosed containers than the other categories of teachers. This may suggest that training has positive influence on practices as indicated by food storage and preservation.

4.5: Knowledge of Pre-school Teachers' Who Attended Nutrition Education Courses and Those Who Had Not Attended

The answers for each knowledge question were valued and points were totaled for each teacher. The maximum score was 74. The total score indicated the presumed level of knowledge for every pre-school teacher. Figure 4.3 shows distribution of pre-school teachers' knowledge between those who had attended nutrition education courses and those who had not attended.

Figure 4.3: Knowledge of Pre-school Teachers Who Had Attended Nutrition Education Courses and Those Who Had Not Attended.



Results from Figure 4.3: show that pre-school teachers who attended nutrition education courses had a mean of 54.3 (73.4%) and a mean of 50.8 (68.6%) for

those who had not attended courses.

In reference to knowledge of the first two attributes the scores those who had attended courses and seminars were similar. These attributes were: balanced diet and sources of nutrients. None of the pre-school teachers scored below 85% in any of the four attributes of knowledge and the differences in their knowledge did not appear significant. In reference to food hygiene those who attended courses and seminars was lower than those who had not, while teachers who had attended the courses and seminars were more knowledgeable of food preservation and storage than those who had not.

4.6: Exposure to Nutrition Education and Pre-school Teachers' Practices

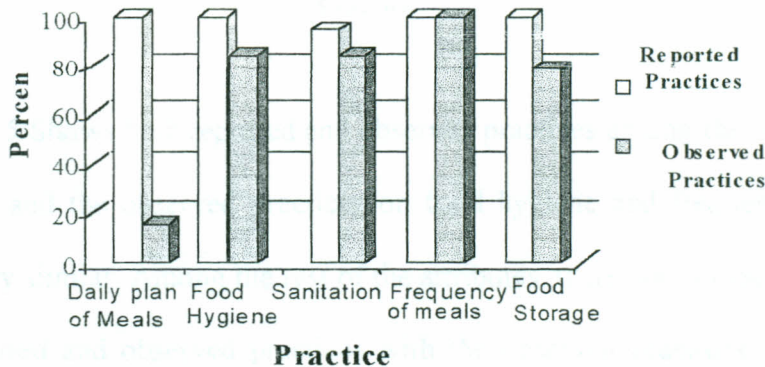
This section presents findings from the second part of the interview and observation schedules concerning reported and observed practices. This was done through interview questions based on practices of daily plan of meals, food hygiene, sanitation, frequency of meal, food storage and preservation.

Each pre-school teacher was awarded points for each correct answer and they were totalled. The maximum score was 26, which indicated the level of practice for every pre-school teacher. The maximum score for the observed practices was 40. Reported and observed practices for the trained, trainees, untrained, those who had attended or not attended courses and seminars were tabulated.

4.6.1: Reported and Observed Practices of the Trained Pre-school Teachers

Figure 4.4 presents reported and observed practices of the Trained Pre-school Teachers.

Figure 4.4: Reported and Observed Practices of Trained Pre-school Teachers



The findings from Figure 4.4 reveal that there was a big variation between reported and observed practices in reference to daily plan of meals. There was correspondence, however, between reported and observed practice of frequency of meal. Among the rest of the attributes, small variations between the reported and observed practice are revealed.

4.6.2: Reported and Observed Practices of the Trainees

Reported and observed practices of trainees is presented in Figure 4.5 on the next page.

Figure 4.5: Reported and Observed Practices of Trainees

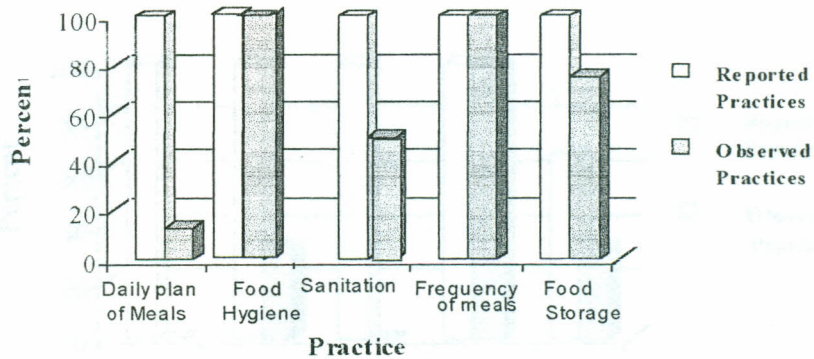
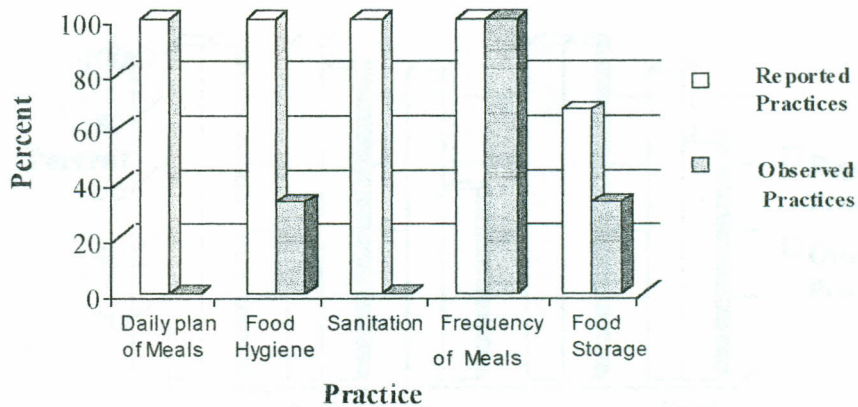


Figure 4.5 Shows both reported and observed practices among the trainees. The reported and the observed practices on food hygiene and frequency of meal were very similar. Among the rest of the attributes, there was variation between the reported and observed practices with the observed practices being lower than the reported practices.

4.6.3: Reported and Observed Practices of the Untrained Pre-school Teachers

Figure 4.6 shows the reported and observed practices of the un-trained pre-school teachers in reference to the same attributes.

Figure 4.6: Reported and Observed Practices of the Un-trained Pre-school Teachers

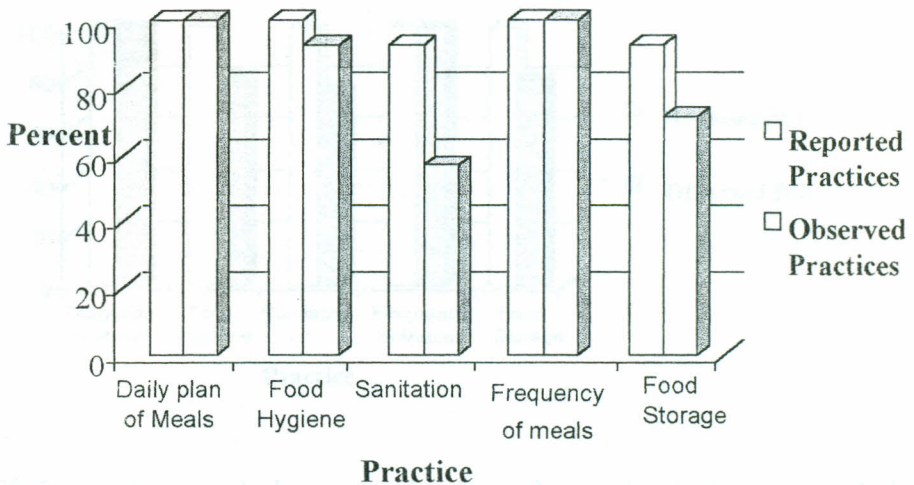


There was similarity between the reported and observed practice on frequency of meal, but there was a big variation among the rest of the attributes. The variations made it evident that the respondents made reports which were favourable to themselves while the observations showed that in reality of their actual practices, which were less frequent. This is one reason why it was advisable to do both self-reports and direct observations.

4.6.4: Reported and Observed Practices of Pre-school Teachers Who Had Attended Education Courses and Seminars

The figure below presents pre-school teachers' practices of those who had attended nutrition education courses and seminars.

Figure 4.7: Reported and Observed Practices of Pre-school Teachers Who Had Attended Nutrition Education Courses and Seminars

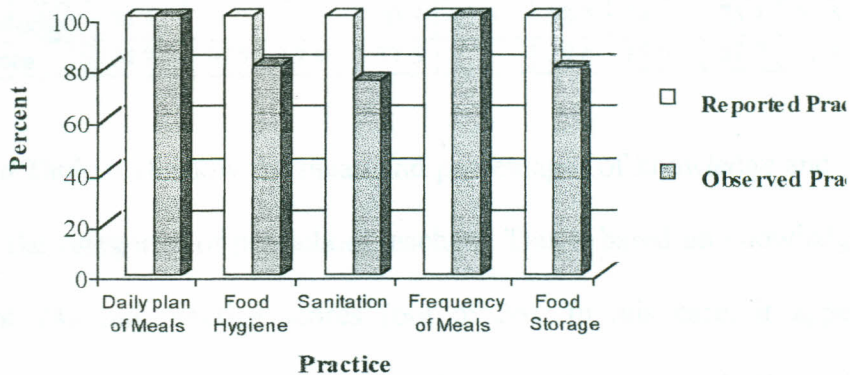


Results from Figure 4.7 reveal that reported practices among pre-school teachers who had attended courses and seminars were higher than the observed practices. Observations and reports on daily plan of meals and the frequency of meals were similar. The observed practices varied from their reported practices for the rest of their attributes.

4.6.5: Reported and Observed Practices of Pre-school Teachers Who Had Not Attended Nutrition Education Courses/Seminars

Figure 4.8 presents pre-school teachers' practices of those who had not attended courses and seminars.

Figure 4.8: Reported and Observed Practices of Pre-school Teachers Who Had Not Attended Courses and Seminars



Findings of the study reveal that pre-school teachers who had not attended courses and seminars scored higher in their reported than in the observed practices. Observations and reports on daily plan of meals and the frequency of meals corresponded again the results show that there is slight variations between reported and observed practices of respondents who had not attended courses and seminars.

4.6.6: Relationship between Pre-school Teachers' Knowledge and Practices

This section sought to understand whether there was any relationship between pre-school teachers' knowledge and practices. Table 4.18 presents the results.

Table 4.18: Relationship between Pre-school Teachers' Knowledge and Practices

Number of Teachers	Trained		In-training		Un-trained		Attended courses		Not Attended Courses	
	19		8		3		14		16	
	Mean	%	Mean	%	Mean	%	Mean	%	Mean	%
Knowledge	54.7	73.9	52.0	70.3	41.3	58.5	54.3	73.4	50.8	68.6
Practices	14.7	56.5	13.9	53.5	7.7	29.6	15.0	57.7	12.4	47.7

Data in Table 4.18 show the mean and percentages of knowledge and practices for all the categories of pre-school teachers. This is based on knowledge scores (out of 74) and practice scores (out of 26). In this case, it appears that knowledge relates to practices. The findings disagree with Kihato (1987), Ojofeitumi and Olufokumbi (1986), who found that food intake and food preferences in their studies did not reflect knowledge in food selection.

4.7: Hypotheses Testing

This section presents the results of the three major hypotheses of the study. In testing the specific hypothesis, ANOVA and Pearson's R. were used. These inferential statistical tools were used to test the differences among the groups of teachers in reference to knowledge and the relationship between knowledge of balanced diet, sources of nutrients, food storage and preservation and the teachers' practices in reference to frequency of feeding, hygiene, sanitation, plan of daily meals, food storage and preservation. The analysis is presented in three sections:

1. Differences in the knowledge of pre-school teachers exposed and those not exposed to nutrition education.

2. Differences in the practices of pre-school teachers exposed and those not exposed to nutrition education.
3. Relationship between pre-school teachers' knowledge and practices.

4.7.1: Pre-school Teachers' Knowledge and the Extent of Exposure to Nutrition Education

This section presents findings on pre-school teachers' exposure or lack of exposure to nutrition education and their knowledge. This was done through interview questions based on knowledge of balanced diet, sources of nutrients, food hygiene, food storage and preservation.

4.7.2: Knowledge of Pre-school Teachers with Different Levels of Professional Training

The study had hypothesized in H_{O1} that there is no significant difference between the knowledge of pre-school teachers' with different levels of professional training. To test this hypothesis, one way ANOVA was used and the results are shown in Table 4.19.

Table 4.19: Results of ANOVA on Professional Training and Knowledge.

	Sums of squares	df	Mean Sum of Squares	F	Sig.
Between Groups	15.9847	20	0.7992	0.7973	0.7930
Within Groups	9.0218	9	1.0024		
Total	22.967	29			

The F value was within the accepted levels so the null hypothesis was therefore accepted. Teachers with professional training did not have significantly different knowledge than those without professional training. Hence, we conclude that trained and untrained pre-school teachers were almost equally knowledgeable about nutrition.

4.7.3: Knowledge of Pre-school Teachers Who Had Attended Courses and Seminars And Those Who Had Not

The study had hypothesized that H_{01B} : There is no significant difference in the nutrition knowledge of pre-school teachers who attended courses and seminars and those who did not attend. To test this hypothesis, one way ANOVA was used and the results are shown in Table 4.20.

Table 4.20: Results of ANOVA on Course Attendance and Knowledge (H_{01B})

	Sum of squares	df	Mean sum of Squares	F	Sig.
Between Groups	4.467	20	0.223	0.783	0.670
Within Groups	3.000	9	0.333		
Total	7.467	29			

Further analysis involved testing of the hypothesis that there is no significant difference in nutrition knowledge of pre-school teachers who attended or did not attend short courses. The differences were found not to be statistically significant ($P \leq 0.05$). The results show that the f-value was 0.783 which is less than the critical at 0.05 level of significance. The stated null hypothesis therefore is accepted, suggesting that the differences observed were due to

chance. Attendance in short courses did not change teachers' nutrition knowledge significantly. One explanation for this similar knowledge was that there was sharing of ideas and knowledge during panel and cluster meetings that followed the short courses. This sharing may have had a great impact on those who did not attend as they learned the information vicariously from the others.

4.7.4: Practices of Pre-school Teachers With Different Levels of Professional Training.

The study had hypothesized that H_{02A} : There is no significant difference in the practices of pre-school teachers who trained, were undergoing training and those who had not trained. To test this hypothesis, one way ANOVA was used and the results are shown in the table 4.21.

Table 4.21: Results of ANOVA on Professional Training and Practices.

Source of Variation	Sum of Squares	Df	Mean Sum of squares	F	Sig
Between Groups	15.994	20	0.7997	0.7983	0.7930
Within Groups	9.0162	9	1.0018		
Total	25.0102	29			

Fisher's value calculated is greater than the Fisher's value tabulated. This suggests that the null hypothesis is accepted at $\alpha = 0.05$ level of significance.

Thus, it can be concluded that the practices of pre-school teachers who were trained undergoing training and those who had not been trained did not differ

significantly. According to Kibuga (1990) and Coale (1972), personal experience of care-givers played a bigger role in determining practices than training. Thus, it may have contributed to the similarities of the practices of these teachers. This study did not look at the impact of differences in experiences on teachers' practices, however.

4.7.5: Practices of Pre-School Teachers Who Attended Courses and Seminars And Those Who Did Not

The study had hypothesized in H_{02B}: There is no significant difference between the practices of pre-school teachers who had attended short courses and seminars and those who had not. To test this hypothesis, one way ANOVA was used and the results are shown in Table 4.22.

Table 4.22: Results of ANOVA on Course Attendance and Practices.

Source of Variation	Sum of Squares	df	Mean Sum of Squares	F	Sig
Between Groups	15.8549	20	0.7927	0.7979	0.7930
Within Groups	8.9413	9	0.9935		
Total	24.7962	29			

The Fisher's value that is calculated is greater than the tabulated. This suggests that the null hypothesis is accepted at $\alpha = 0.05$ level of significance. Hence, we conclude that there is no significant difference between practices of pre-school teachers who attended courses and seminars and those who had not.

4.7.6: Relationship between Pre-school Teachers' Knowledge and Practices

The study had hypothesized that HO₃: There is no significant relationship between pre-school teachers' knowledge and practices. To test the hypothesis, Pearson's Product Moment Correlation Test was used, and the results are shown in Table 4.23.

Table 4.23: Relationship between Pre-school Teachers' Knowledge and Practices

	Value	Asymp. Std. Error	Approx. T.	Approx. Sig.
Pearson's R	0.609	0.137	4.064	0.000
Number of valid cases	30			

The results in Table 4.23 reveal that there is a significant relationship between pre-school teachers' knowledge and their practices. The Pearson's R value 0.609 was shown to be statistically significant at 100% confidence level which is far above the study's 95% confidence level, thus the (H₀) Null hypothesis of no relationship between the pre-school teacher's knowledge and practices was rejected in favor of the alternative hypothesis. Hence, it can be concluded that the Mumbuni pre-school teachers' nutrition knowledge is related to their practices.

One explanation may be that in their earlier academic and personal experiences, the teachers learnt about nutrition and this knowledge impacted their practices. Since their formal professional training did not appear to impact

significantly, it may be due to earlier knowledge gained. This concurs with KDHS (2003), who noted children of mothers with at least some secondary education (knowledge) had the lowest stunting levels, while children whose mothers had no education had the highest level of stunting. In this present study it is possible that that knowledge learned in the secondary schools or even primary schools or at their homes when they were children may have impacted their practices in relation to food hygiene, food storage and preservation as well as food preparation.

4.8 Discussion of Research Findings

4.8.1 Knowledge and Professional Training

Results showed that more areas of knowledge were impacted by full professional training than by short courses and seminars. This suggests the positive impact of the two-year in-service course. Thus, according to Bruner (1966), teachers were able to more thoroughly represent the nutritional information after the two year in-service courses than after short courses or seminars. Perhaps the emphasis in the long course is more than in the short course.

Pre-school teachers, regardless of professional development experiences, were almost equally knowledgeable. Trained pre-school teachers tended to be more knowledgeable on nutrition content assessed in the study than the trainees and the untrained, but the differences were not statistically significant. Also, the trainees generally had more knowledge than the untrained. However, nutrition

knowledge of the two-year certificate holders was not significantly different from the other categories of teachers. Normally Pre-school teachers in Mumbuni zone share ideas and experiences during panel and cluster meetings. The trainees and the untrained benefit from the knowledge of the trained teachers.

4.8.2 Knowledge and Attendance at Courses and Seminars

The research clarified that pre-school teachers' exposure to nutrition knowledge begins at home through the process of socialization, through the media and at school in primary and secondary levels. This is seen by a review of the curriculum content areas of nutrition and by the lack of significant differences in knowledge of teachers who had not attended short courses and seminars and those who had attended. Pre-school teachers who had attended nutrition short courses and seminars scored 73.4% while those who had not attended scored 68.6%. The variations were not statistically significant so both categories were almost equally knowledgeable. This finding is consistent with Bruner (1966), who suggests that any body of knowledge can be presented in a simple form for learning. Nutrition information is presented early to children through the process of socialization, the media and at school in primary and secondary levels and the impact appears to be lasting as later information about nutrition builds up what is known and incorporates the unknown into the known.

4.8.3 Teachers' Practices and Professional Training

Some of the reported and observed nutrition practices were similar, but not all. For example, reported and observed frequency of feeding children in the pre-schools was similar, however there was variation between reported and observed daily plan of meals, food hygiene, sanitation, food storage and preservation. The variations were noted most among the untrained pre-school teachers and those who had not attended courses and seminars. Those that were in-training and had undergone full training had a higher similarity between their reported and observed practices. Training in the two-year in-service course appears to have empowered the teachers to practice what they had learned. The two-year training course, using Bruner's framework (1966), would move the teachers to a higher developmental level of knowledge that they are then able to enact it into practice. It is also consistent with the increase of feeding programmes and increase in pre-school teachers being trained. It is believed these are correlated, since pre-school feeding programmes are emphasized in the training. Since the World Bank Loan to the Ministry of Education for ECD (in 1995), many pre-school teachers have been trained for example, in Machakos DICECE, 911 teachers have been trained between 1987-2004.

4.8.4 Teachers' Practices and Attendance At Courses and Seminars

The differences between nutrition practices of pre-school teachers who had attended courses and seminars and those who had not attended were similar but not statistically significant. Normally Pre-school teachers in Mumbuni Zone

share experiences during panel and cluster meetings. Those who had not attended short courses and seminars benefited from the experiences of the teachers who had attended.

4.8.5 Relationship Between Teachers' Knowledge and Practices

The relationship between pre-school teachers' knowledge and practices was found to be statistically significant. Knowledge and practices of pre-school teachers were related. This concurs with Bruner's theory (1966) which suggests that, "Nutrition knowledge which is obtained by pre-school teachers during training, courses and seminars becomes meaningful when it is put into practice." However, it disagrees with Ojofeitumi and Olofokumbi (1986) who found that food intake and food preferences of the subjects in their studies did not reflect their knowledge of nutritious food selection.

According to Wandel & Ottensen (1988 as cited by Atebe, 1996), other factors such as financial constraints can reduce any relationship between knowledge and practice. For example, although a pre-school teacher may know the right diet for the pre-school children, lack of food may hinder her putting the knowledge into practice. However, in this present study these issues did not impact the practices as some of the food was provided by the parents in addition to that which was provided in some schools.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This study investigated the relationship between nutrition knowledge and practices of pre-school teachers from Mumbuni Zone in Machakos District. The data for analysis were collected using interview schedule and observation checklist in which a total of 30 pre-school teachers (from 20 pre-schools) were interviewed. The feeding programme of seven hundred and seventy nine (779) children who were in their classes were observed. Computation and presentation of descriptive statistics were done to show pattern in knowledge and practices. Test of significance have been done using one way analysis of variance (ANOVA) and Pearson Product Moment Correlation Coefficient (PPMCC). This chapter summarizes the findings of the study, draws conclusions and makes recommendations.

5.1 Summary of Research Findings

1. The knowledge of pre-school teachers exposed to nutrition education through professional training and those not exposed was similar though not statistically significant. The trained teachers and the trainees had slightly more knowledge than the untrained.
2. Pre-school teachers are not only exposed to nutrition education through professional training, courses and seminars, but also through the process of socialization, the media and at school in primary and secondary levels. This may be why the nutrition knowledge of pre-school teachers who attended courses and

seminars and those who had not did not vary greatly.

3. The practices of pre-school teachers exposed to nutrition education through professional training and those not exposed were similar though not statistically significant.
4. Pre-school teachers who attended courses and seminars and those who had not attended had similar nutrition practices though not statistically significant. The nutrition education initiatives, cluster and panel meetings assisted pre-school teachers in sharing their experiences.
5. Nutrition knowledge and practices of pre-school teachers in Mumbuni zone were related. Pre-school teachers who scored high in knowledge questions also scored high in practice questions.

5.2 Implications

5.2.1 The study suggests that pre-school teachers' knowledge and the exposure or lack of exposure to nutrition education including professional training or attendance of courses and seminars had an influence on knowledge though not statistically significant. This implies that pre-school children under the care of trained teachers benefit from their teachers' knowledge on nutrition compared to their counterparts under the care of untrained teachers. This also reflects that the MOE/ST training of pre-school teachers had an impact on their knowledge.

The finding that the difference in nutrition knowledge and practices between trained and untrained teachers was not significant implies that the training

programmes may lack equipment and chemicals to assess nutrient value. In addition, it may imply that the content of health and nutrition education given to pre-school teachers does not include specific content. For example, whereas it may say foods should not be overcooked, it does not give a timeframe for boiling foods and vegetables to avoid loss of nutrients. It may also imply that trainers of pre-school teachers may lack enough knowledge and skill on nutrition to answer trainees specific questions. These needs further investigation.

5.2.2 Attendance of short courses and seminars appears to contribute to nutrition knowledge but not significantly. This may imply that exposure to nutrition knowledge at home, through the media, and at school in primary and secondary education levels contribute in bridging the gap of nutrition knowledge of teachers attending short courses and seminars and those not attending.

5.2.3 Since the two-year training shows similarity between reported and observed practices, it is suggested that the resources put into the training of Pre-school teachers by the World Bank loan through the Moe/st were of some benefit to the teachers. The fact that the difference in the practices of teachers exposed to training and those not exposed are not statistically significant may imply that the training component may need improvement.

5.2.4 The apparent low impact of short courses and seminars on professionally

trained teachers may be due to a large extent of sharing of ideas in panel and cluster meetings. Those who did not attend the short courses and seminars benefited from the knowledge of those who attended. Consequently, short courses and seminars should be encouraged and strengthened by having them more regularly and with pre-school teachers provided with more opportunities for them to share (teacher to teacher) after the short courses and seminars.

5.2.5 Pre-school teachers who scored high in knowledge questions, also scored high in practice questions and their observed practices were also high. These findings reveal that there is a relationship between Pre-school teachers' knowledge and practices. This implies that pre-school teachers knowledgeable in nutrition will demonstrate acceptable nutrition practices in their centres to the benefit of their pre-school children.

5.3 Recommendations

Pre-school nutrition knowledge and practices is an area for further research to uncover more salient information not covered by this study for the purpose of investigating more about Pre-school teachers' knowledge in relation to practices. This section presents recommendations for various sectors.

5.3.1 For Moe/st, Inspectorate, NACECE, DICECE

1. First, there is need to strengthen the existing knowledge which has been acquired informally at home and formally at primary and secondary levels of education. This can be achieved by providing

teachers and other care-givers with updated knowledge and powers to put the knowledge into practice. Therefore, the training of primary and secondary teachers in nutrition is an important component for developing nutrition knowledge in Kenya. The media should give more nutrition knowledge in their coverage.

2. There is need for more short courses, seminars and workshops to be organized by the Moe/st, NGOs and other stake-holders in order to sensitize, create awareness and update care-givers on nutrition needs of children and how to fulfill them. Inspection of ECD centres need to be strengthened with ECE trained inspectors to ensure quality care. In addition, Public expenditure and development aid for basic services need to be increased. Cost sharing with the community could also be helpful.
3. This study found that resources from the Moe/st, KIE and DICECE were of benefit to pre-school teachers. It is recommended that field follow ups to be done by qualified trained inspectors to ensure continuity and guidance of care givers with correct information. There is need to include health and nutrition component as well as community support grant to the pre-school programme.
4. There is need for Pre-school teachers to assimilate knowledge from both non-formal and formal sectors. According to Bruner, 1966,

learning process is from known to unknown, and also from simple to complex. During pre-school teachers' training sessions, theory only doesn't guarantee practice. There are various constraints, which may affect transformation of knowledge into practice. Teacher training requires kits, and proper equipment to do experiments. The Moe/st need to consider pre-school teachers' by supporting them with the provision of proper policy guidelines and a scheme of service. This would encourage them to discharge their duties with confidence.

5. Pre-school teachers should also be equipped with knowledge in order to be able to read the signs of malnutrition in advance. Caregivers need to be knowledgeable so as to advocate for better feeding patterns for a young child. Children need to be fed more frequently and in small amounts for maximum nutrition. NACECE may achieve this by intensifying the curriculum in reference to health and nutrition to cover the most vital content in nutrition (for example steps to be taken in case of malnutrition).

5.3.2 For Pre-School Teachers

6. Interaction of caregivers leads to sharing of ideas and experiences acquired during training, short courses and seminars. This could inspire them to have more quest for knowledge by joining higher ECE institutions of learning. Pre-schools have the role of educating

parents during cooking demonstrations/ parents days. After workshops, they should be encouraged to share what they have learned with parents and other teachers. These opportunities for learning through interaction need to be more formal. The knowledge should be disseminated further after seminars for example in their places of work. Some forum (time) should be given and feed-back given. Based on the positive impact on knowledge, teachers should be encouraged to get more training and more scholarship, sponsorship and bursary should be given to them to continue learning.

5.3.3 For Community

6. The pre-school committees need to include health and nutrition components in their discussions so as to tap and share knowledge with care-givers. The level of cleanliness and meal quality imply quality services and safety in ECD centres. Proper food storage within community level will ensure food security for ECD centres. Communities need to provide modalities to motivate care givers. Head/teachers should be notified by the DICECE that their pre-school committees have forums to discuss.

5.3.4 For Universities

7. There is need for Universities to do research on nutrition matters related to ECE and advise the government accordingly on the way

forward. Also, ECE curriculum in Universities should have grounded courses in health and nutrition for the pre-school children who are the immediate beneficiaries of the knowledge obtained by ECD teachers, trainers and administrators. Specifically they should have nutrient content of local foods and growth charts and monitoring children's nutrient needs and feeding patterns.

5.4 Suggestions for Further Research

1. There is need for further studies on the same area of pre-school teachers knowledge and practices in other communities should be investigated to confirm these findings.
2. The study should be replicated in another district or using a larger sample to find out if the findings will be similar or not.
3. There needs to be a full impact study of ECE training with a larger sample of untrained pre-school teachers to compare the impact of training on teachers' knowledge. This may be important to policy makers who plan for the materials and the type of instructions to be disseminated to the pre-school teachers during training

In addition, further research in the following areas is recommended;

1. Nutrition status of pre-school children in pre-schools with and without feeding programmes. To show the importance of feeding programmes in improving children's nutrition status.
2. There is a need to investigate the relationship between parent's

nutrition knowledge and practices among parents with children in pre-schools. Parents' nutrition knowledge and practices will impact their children's nutrition status because they spend the rest of the time at home.

3. There needs to be a comparative study of pre-school feeding programmes between public and private pre-schools. This will help to create harmony in the feeding patterns within all pre-schools.
4. There is a need to study the effect of hunger on learning process during pre-school years. This will bring out the benefits of adequate feeding for the under fives.

5.5 Conclusion

The findings of this study reveal that more areas of knowledge were impacted but not significantly by full professional training than by short courses/seminars. It appears that the nutrition initiatives by various projects in Mumbuni that targeted pre-school teachers appeared to have improved their nutrition knowledge and practices, but the impact of training is not clear.

According to the Fifth Nutrition Survey (1994) a well educated population is a prerequisite for the development of a modern and industrialized nation, which Kenya aims to be by the year 2020. Education is a fundamental right for all. Lack of access to education mainly affects the poor and poverty is a main contributor to malnutrition. Therefore, further investigation is needed to determine what specific types and levels of nutrition education contribute most to pre-school knowledge and practices.

REFERENCES

- Atebe, J. (1996). *Assessment of socio-cultural and economic determinants of food selection and consumption among Nairobi households*. Unpublished master's thesis, Kenyatta University, Nairobi, Kenya.
- Bali, S.K., Kabiru, M., & Bronstein, M. (1995). *The influence of maternal age and employment status on mother infant interaction*. Nairobi: Unpublished Manuscript.
- Borg, W.R., Gall, M.D., & Gall, J.P. (1996). *Education research* (6th ed.). New York: Longman Publishers.
- Bruner, J.S. (1966). *Toward a theory of instruction*. London: Oxford University.
- Bruner, J., & Carton, A. (1978). *Human growth and development*. Oxford: Clarendon Publishers.
- Buss, D., & Robertson, J. (1976). *Manual of nutrition, ministry of agriculture, fisheries and food* (8th ed.). London: Her Majesty's Stationery Office.
- Cameron, M., & Hofrander, Y. (1983). *Manual on feeding infants and young children*. New York: Oxford University Press.
- Central Bureau of statistics [Kenya], Ministry of Health [Kenya] & ORC Macro. 2004. *Kenya Demographic and Health Survey 2003*. Calverton, Maryland: Authors.
- Coale J., & Kibuga. (1972). *The growth and structure of human populations*. Princeton: Princeton University Press.
- Food Agricultural Organization. (1999). *Field programme management, food, nutrition and development*. Rome: Author.
- Food Agricultural Organization. (2001). *Food, Nutrition and Agriculture. A*

limentation, nutrition et agriculture. 28.

Food Agricultural Organization., World Health Organization., & United Nations. (1974). *Report on first sub-regional seminar on nutrition in Education* (pp. 19-24). Khartoum: United Nations.

Food and Nutrition Planning Unit., & Ministry of Planning and National Development. (1994). *National Plan of Action for Nutrition*. Nairobi: Office of the President.

Gakuru, O.N., & Koech, B. (1994). *The experiences of young children (A conceptualized case study of early childhood care and education in Kenya.)* Nairobi: Kenya Institute of Education/NACECE.

Government of Kenya & UNICEF. (2004-2008). *Country Programme Action Plan*, 16.

Government of Kenya. (1992). *Kenya programmes of action for children in 1990's* (A national programme to operationalize the world summit declaration and plan of action for the survival, protection and development of children.). Nairobi: United Nations Children's Education Fund.

Government of Kenya., & United Nations Children's Education Fund. (1998). *Situation analysis of children and women in Kenya*. Nairobi: United Nations Children's Education Fund.

Gumo, A. W. M. (2003). *Factors related to the teaching of art and craft in Kilifi District Pre-schools*. Unpublished master's thesis, Kenyatta University, Nairobi, Kenya.

Jelliffe. D.B. (1985). *Child health in tropics*. (5th ed.). London: Edward Arnold Publishers (Ltd.).

Kabiru, M., & Njenga, A. (1997). *Teenage motherhood: Children raising children*(A report of baseline and the needs assessment survey

carried out in Mumbuni and Mjini Locations in Machakos District). Unpublished Manuscript.

Kariuki, L. (1983), *A study on nutrition education programme in Kenyan hospitals*. Unpublished post graduate diploma thesis, Nairobi University, Kenya.

Kenyatta University & Kenya Institute of Education. (1990). *The report of a symposium on early childhood education*. Nairobi: Kenya Institute of Education.

Kenya Institute of Education. (1995). *Child health: A module for training of early childhood education and caregivers*. Nairobi: Kenya Institute of Education.

Kenya Institute of Education. (1996). *Food and Nutrition*. Nairobi: Author.

Kenya Institute of Education. (1992). *Primary education syllabus (Vol. 2)*. Nairobi: Kenya Literature Bureau.

Kramer, E. (1990). *Improving nutrition interventions for women*. Washington, DC: International Centre for Research on Women.

Kenya National Examination Council. (2000-2001). *Kenya certificate of secondary education*. Nairobi: Kenya Literature Bureau.

Machakos district health plan (2002-2004). Unpublished Manuscript.

Machakos education office, annual statistics (2002). Unpublished Manuscript.

Mugenda, O.M., & Mugenda, A.G. (1999). *Research methods: Quantitative and qualitative approaches*. Nairobi: African Centre for Technology Studies Press.

Mwana mwende annual report (June 2000-May 2001). Unpublished manuscript

- National Centre for Early Childhood. (1999). *Guidelines for early childhood education in Kenya*. Nairobi: Kenya Institute of Education.
- Ng'asike, J. (2004) *Use of play as a bridge to teaching Mathematics* Unpublished master's thesis, Kenyatta University, Nairobi, Kenya.
- Nkinyangi., J.A & van der Vynckt, S (1995) childhealth nutrition and educational participation, report of Kenya. Nairobi: UNESCO Office.
- Ojofeitumi, E., & Olofokumbi, B. (1986). Food preferences: An implication for nutrition education and agricultural production. *Food and nutrition bulletin* 8, 11-13.
- Oniang'o, R.K. (1990). *An evaluation of pre-school feeding and health programs in Kenya*. Nairobi: Kenyatta University.
- Oniang'o, R.K. (1988). *Feeding the child*. Nairobi: Heinemann Kenya Limited.
- Oniang'o, R.K., & Kimokoti, A. (1998). United Nations: Sub-committee on nutrition news. *Nutrition News* 16, 12-18.
- Our Children our Future. (2002). *Kenya position paper on children in 21st Century, based on the national conference on children*.
- Piper, B. (1996). *Diet and nutrition*. London: Chapman & Hall printing press.
- Pipes P., & Trahms, C. (1993). *Nutrition in infancy and childhood* (5th ed.). St. Louis: Mosby College Publishing Press.
- Pollit, E. (1990). *Malnutrition and infection in the classroom*. Paris: United Nation's Educational, Scientific and Cultural Organization.
- Reva, T., & Frankle, O. (1993). *Nutrition in the community* (3rd ed.). St. Louis: Chapman & Hall printing press.

- Rural Planning Department of finance and planning (2003-2008). *Machakos district development plan*. Machakos: District development office.
- Swadener, B., Kabiru, M., & Njenga, A. (1995). *Does it take the whole village to rear a child?: a collaborative study of change in child rearing practices and early education in Kenya*. New York: State University of New York Press.
- The U205 Course Team. (1986). *The health of nations*. London: The Open University Press.
- The World Bank. (1997). *A new agenda for women's health and nutrition development in practice*: Washington, DC: Author.
- The World National Centre for Early Childhood Education. & Colleta, N.J. (1996). *The condition of young children in sub-Saharan Africa: The convergence of health, nutrition and early education*. Washington DC: Author.
- United Nations Educational Scientific and Cultural Organization. (1988). *Manual for developing a nutrition education curriculum*. Paris. *Nutrition education series issue 16 & 17*. (ED.88/WS-42 & ED.88/WS/53).
- United Nations Educational Scientific and Cultural Organization. (1983). *Nutrition education: role of colleges of education*. *Nutrition education series No. 2* (ED.82/WS/119).
- United Nations Children's Education Fund. (1994). *Fifth nutrition survey*. Nairobi: Author.
- United Nations Children's Education Fund. (1992). *Situation Analysis of Children and Women in Kenya*. Nairobi: Author.
- United Nations Children's Education Fund. (1992). *Kenya's programme of action for children in the 1990's*. Nairobi: Reata printers Limited.

United Nations Children's Education Fund. (1997). *Food and nutrition assessment in drought-prone areas of Kenya*. Nairobi: Author.

United Nations. (2002). *A foundation for development, nutrition and education*. Geneva: World Health Organisation.

United Nations. (1998, december). *Common country assessment for Kenya: Final report*. Nairobi: Author.

United States Agency of International Development. (2002). *Food and nutrition technical assistance academic of education development*. Washington DC: Author

Web: www.ext.colostate.edu/pubs/foodnut/09366.pdf.

Web: <http://members.wpou.com/happy-Homes/IUZ/.uuu>.

Web: www.tripod.com/happy-homes/index.

Whitney, E.N., Cataldo, C.B., & Rolfes, S.R. (1991). *Understanding normal and clinical nutrition* (3rd ed.). New York: West Publishing Company.

World Health Organization (2002-2005) Country cooperation strategy: Republic of Kenya Brazzaville. Pg7.

World Health Organisation (1999). *Information series on school health. Improving health through schools*. Geneva: Author.

World Health Organization. (1999). *Global data base on child growth and malnutrition: Department of nutrition for health development 27 (CH-1211)*. Geneva: Author.

World Health Organization., & Food Agricultural Organization. (1992). *International conference on nutrition: Major issues for nutrition strategies*. Rome: Author.

World Health Organization. (1989). *The health of youth*. Geneva. Author.

William. S.R. (1989). *Nutrition and diet therapy* (6th ed.). St Louis: Times Mirror Mosby College Publishing Press.

1. PERSONAL INFORMATION

CHARACTERISTICS

(1) Sex Male Female

(2) How long have you been in this profession?

(a) 0-5 years (b) 6-10 years

(c) 11-15 years (d) 16+ years

(3) Do you have a degree?

(4) What are your professional qualifications?

(a) Trained

(c) Where?

(ii) For how long?

(b) Untrained

(c) Training

(d) Where?

(e) For how long?

(5) What is your formal schooling level?

(a) Primary level - No. of years

(b) Secondary - No. of years

(c) Above-secondary education - No. of years

(6) In the past year of your working period, have you attended any course or

APPENDICES

APPENDIX I

INTERVIEW GUIDE FOR TEACHERS

1.0 PRE-SCHOOL TEACHER DEMOGRAPHIC CHARACTERISTICS

- (i) Sex Male Female
- (ii) For how long have you been in this pre-school?
 (a) 0 –2 years (c) 6 –10 years
 (b) 2 –5 years (d) over 11 years
- (iii) How old are you
- (iv) What are your professional qualifications?
 a) Trained
 (i) Where?
 (ii) For how long?
 b) Untrained
 c) In-training
 (i) Where?
 (ii) For how long?
- (v) What is your formal schooling level?
 a) Primary level – No. of years
 b) Secondary – No. of years
 c) Above secondary education – No. of years
- (vi) During your working period, have you attended any course or

seminar on nutritional education?

- (a) Yes (b) No

(vii) If yes, who had organized?

(viii) What was the length of the course?

PRE-SCHOOL TEACHERS' KNOWLEDGE

(i) What groups of foods are necessary for good nutrition?

.....

(ii) What do you understand by "a balanced diet"?

(iii) Mention some locally available foods in this area? -----

(i) Which of those help the child to grow?-----

(ii) Which of those help the child to be strong?-----

(iii) Which of those protect the child from disease?-----

(iv) For proper digestion what is needed? -----

- (iv) (a) How many food groups do you know of?
- (i) Two (b) Mention them-----

- (ii) Three -----

- (iii) Four (c) Identify food for each. -----

- (iv) Five -----

- (v) Do you have foods that are not eaten because of customs?
- (a) Yes (b) No
- (i) If yes, which one?
 (ii) Why?

- (vi) If a child is not well nourished, what is he/she likely to suffer from?
 Mention at least two likely disorders.
- (a) _____
 (b) _____
- (vii) How many times should children ages 3-6 years be fed in a day?
- (a) Three times (b) Four times
 (c) Five or six times (d) Ten times
- (viii) At the pre-school which pattern do you use to feed your children?
- (a) When they ask for food

(b) Leave the food for them to feed themselves

(c) Follow a feeding time table

(ix) What happens to salt when stored in a container which is not tightly closed?

(x) If vitamin 'C' is cooked, what is the result?

(xi) Why do you wash vegetables before cutting?

(xii) If a child has a problem of seeing at night, which foods are good for that child?

(xiii) When children are having sports, which foods are appropriate for them?

(xiv) If a child has diarrhoea, what foods are good for this child?

(a) Cereal foods (c) A balanced diet with a lot of fluids

(b) Vegetables (d) Mixture of maize and beans (isyo)

(xv) Fill in the table below with appropriate words:

	Food group	Two (2) sources	Disease due to lack of	Signs and symptoms	Preventative or curative measures
1	Carbohydrates	..... .....	Weakness	Weakness	Eat foods rich in carbohydrates
2	Proteins	Meat milk	..... ...	Oedema (swelling of limbs)	Eat foods rich in proteins
3	Fats	Pork/coconut	Weakness	.....	Eat foods rich in fats
4	Vitamins	..... .....	Rickets	Deformed bones	Eat foods rich in vitamins
5	Minerals	Eggs /milk	Anaemia	.....	Eat foods rich in minerals

(xvi) How can green vegetables (cowpeas leaves) be preserved so that they can last for 3 - 4 months?

(Cowpeas leaves)

- (a) Smoking (c) boiling
 (b) Cooking (d) drying
 (e) None

(xvii) What does lack of iodine in the body cause?

- (a) Goitre (c) rickets
 (b) Mental disorder (d) anaemia

PRACTICES

(i) Do you have a feeding programme in your pre-school?

- a) Yes
 b) No

c) If yes, what type of feeding programme?

(i) Packed food from home

(ii) Pre-school based feeding

(iii) Both packed food and pre-school based programme

(ii) Describe your feeding timetable

Feeding menu

	Break / snack	Lunch	Others specify
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

(iii) Defined Undefined

(iv) What is a good snack? -----

(v) What is bad snack?-----

(vi) What points do you consider when preparing children's food?

(vii) How many times do children in your pre-school feed during the time they are in pre-school?

(a) Once (b) Two times

(c) Three times (d) Four times

(viii) Has any child suffered any persistent illness in the last one month?

(a) Yes

(b) No

c) If yes, what illness? -----

(d) What action did you take? -----

(ix) If 'no' what action would you have taken if a child suffered persistent illness?

- a) Bought medicine
- b) Taken the child to the dispensary/hospital
- c) Consulted health worker
- d) Stopped giving food
- e) Took to witchdoctor

(x) If malnourished what steps have you taken?-----

(xi) In case they became malnourished, what steps would you have taken-----

(xii) Where do you get water for cooking?-----

(xiii) How often are toilets cleaned? -----

(xiv) Describe clearly how your pre-school children wash their hands

(xv) When washing hands what do they use? -----

(xvi) Who does the following activities for children's feeding?

Planning	
Purchasing	
Costing	
Food preparation	
Storage	
Serving	

APPENDIX II: Observation schedule**Observation checklist**

1. Nutrition Consumption

	Carbohydrate	Protein	Vitamins	Minerals	Fats
Snack					
Meal					

2. Preparation and cooking of food

i) Preparation

Early	Early enough	Late

ii) Cooking

a) Sufficient

b) Undercooked

c) Overcooked

d) Early

iii) Hygiene

Water spilled	Droppings	flies	Dusty	Clean and neat

3. Feeding

i. Types of feeding

Individual	Teacher assisted

ii. A copy of feeding timetable

YES []

NO []

iii. Frequency of feeding at pre school

1	2	3	4	5	6

iv. Time taken for serving

10 – 15 min	16 – 30 min
Adequate	Inadequate

4. Storage and preservation

Rats	Food kept on the ground	Infestations	Cockroaches	Clean and neat

5. Leftovers

Thrown	Taken home for pests	No leftovers

1 Personal hygiene

i	Hands are rinsed and wiped before eating	
ii	Hands are rinsed before eating	
iii	Hands are not rinsed	

2 Environmental hygiene

i	Toilet is clean	
ii	Toilet is dirty	
Iii	Not toilet	

APPENDIX III

BUDGET

ACTIVITY	COST IN KSH.
(i) Stationery	
a) Fullscaps	3000.00
b) Plain papers	2000.00
c) Writing materials	1000.00
Sub Total	6000.00
(ii) Internent	
a) Browsing for Literature	3000.00
b) Browsing for Empirical studies	3000.00
c) Printing relevant information	2000.00
Sub Total	8000.00
(iii) Secretarial services	
a) Proposal typing and printing 40 pages @ 50/-	2000.00
b) Thesis typing and printing 140pgs @ 50/-	7000.00
Sub-Total	9000.00
(iv) Photocopying services	
a) proposal at 3/- a page for 40 pagés (6 copies)	720.00
b) Thesis at 3/- a page for 140 (6 copies)	2520.00
Sub-Total	3240.00
v) Binding	
a) proposal 6 copies at 150/-	900.00
b) Thesis 6 copies at 300/-	1800.00
Sub-Total	2700.00
vi) Data Collection	
a) Transportation	20000.00
b) Subsistence and accommodation	60000.00
c) Data entry and analysis	20000.00
Sub-total	100,000.00
TOTAL	128,940.00

APPENDIX IV

RESEARCH TIMETABLE

PHASE	DESCRIPTION/ACTIVITY	TIMETABLE
1	Writing/submission. Defense of proposal at the department	Jan-Sept. Nov. 2003
2.	Correction/submission/defense of proposal at the school level and registration	Sep-Oct .2003
3.	Detailed secondary literature reviews and pre-testing of tools	Feb-March 2004
4.	Data collection	April-May 2004
5.	Data editing/coding/entry and analysis	June-July 2004
6.	Draft of masters thesis	August 2004
7.	Submission of supervisory work on the thesis	September 2004
8.	Revision/correction of draft and writing of final thesis.	October 2004
9.	Submission of thesis for examination	October 2004
10.	Defense of thesis/final correction and re-submission	September 2005
11	Graduation	May 2006

KENYATTA UNIVERSITY LIBRARY

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

grams: "EDUCATION", Nairobi
Phone: Nairobi 334411
Replying please quote

No. MOEST 13/001/34C 88/2
and date



JOGOO HOUSE "B"
HARAMBEE AVENUE
P.O. Box 30040-00100
NAIROBI

5th April, 2004

Jane Nduku Mutingau
Kenyatta University
P.O. BOX 43844
NAIROBI

Dear Madama

RE: RESEARCH AUTHORISATION

Please refer to your application for authority to conduct research on 'Relationship between Nutrition knowledge and practices of pre-School Teachers from Mumbuni Zone, Machakos District, I am pleased to inform you that you have been authorised to conduct research in Machakos District for a period ending 31st December, 2004.

You are advised to report to the District Commissioner and the District before embarking on your research project.

You are further expected to deposit two copies of your research report to this Office upon completion of your research project.

Yours faithfully

A handwritten signature in black ink, appearing to read 'T. Moturi'.

T. MOTURI
FOR: PERMANENT SECRETARY/EDUCATION

CC

The District Commissioner
Machakos District
Machakos

The District Education Officer
Machakos District
Machakos

OFFICE OF THE PRESIDENT

is: "DISTRICTIER", Machakos
e: Machakos 21009 or 21983
lying please quote

ADM 15/21 VOL.IV/42

and date



DISTRICT COMMISSIONER
P.O. Box 1-90100
MACHAKOS

14th May, 2004

The District Officer,
CENTRAL DIVISION

RE : RESEARCH AUTHORISATION - JANE NDUKU MUTINGAU

The above named who is a student in Kenyatta University has been authorised to conduct a Research on "Relationship between Nutrition knowledge and Practices of Pre-School Teachers from Mumbuni Zone", in your Division.

She will conduct the research upto 31st December, 2004.

Please extend all possible assistance to her in order to make the exercise a success.

A handwritten signature in black ink, appearing to be 'P. C. Komien'.

(P. C. KOMIEN)
FOR : DISTRICT COMMISSIONER
MACHAKOS

C.C. Jane Nduku Mutingau,
Kenyatta University,
P. O. BOX 43844,
NAIROBI.

