CHILDCARE PRACTICES AND NUTRITIONAL STATUS OF CHILDREN (6- 59 MONTHS) IN A WORLD VISION PROJECT AREA AND A NON-PROJECT AREA IN KATHONZWENI DIVISION, KENYA

BY

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DECLARATION

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

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DEDICATION

To my parents Johnson and Jedidah Macharia

who invested greatly in my education.

and

To my brother Kuira and sisters Kui, Chiku, Rachael, Joan and Mumbi who

were a source of inspiration, moral support and encouragement,

ACKNOWLEDGEMENT

EBENEZER!

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ABBREVIATIONS

ACC/SCN- Administrative Committee on Co-ordination/Sub-committee on Nutrition

ADP- Area Development Programmes

AMREF- African Medical Research Foundation

ANP- Applied Nutrition Programme

CI- Confidence Interval

CRC- Convention on the Rights of the Child

CU- Consumer Units

GOK- Government of Kenya

HAZ- Height for Age Z score

KDHS- Kenya Demographic and Health Survey

MUAC- Mid Upper Arm Circumference

NCHS- National Centre for Health Statistics

NGO(s)- Non Governmental Organization(s)

OR- Odds Ratio

p-value- Probability Value

SD- Standard Deviation

SDDP- Social Dimension Development Programme

SPSS- Statistical Package for Social Scientists

UNICEF- United Nations Children's Fund

URTI- Upper Respiratory Tract Infections

WAZ- Weight for Age Z score

WHO- World Health Organization

WHZ- Weight for Height Z score

WVK-World Vision Kenya

ABSTRACT

In August-September 2000, a comparative cross-sectional survey aimed at assessing and comparing childcare practices and nutritional status of children (6-59 months) drawn from households participating in a World Vision project vis-a-vis non-project area was conducted in Kithuki, Kanthuni and Kathonzweni locations of Kathonzweni division, Makueni district

The principal tool of investigation was a structured questionnaire that was administered to mothers and other children caretakers Methods used were anthropometric measurements and dietary intake recall Purposive sampling was done at the programme level whereas simple random sampling was done at the household level giving a sample size of 320 households in which there had to be a child aged between 6-59 months In households with more than one child at this age category, only one child was picked as the index child and preferably the elder one. A sub-sample of 60 households was randomly selected for the 24-hour dietary recall. Data was collected with assistance of two field assistants and the SPSS/PC' computer package was used for data entry and analysis. Nutritional status indices such as weight-for-age, height-for-age and weight-for-height were computed using the Epi-Info programme

The study established that there was no significant difference in prevalence of stunting, wasting and underweight between the two areas However, the prevalence of stunting in the project area (46.5%) was slightly higher than in the non-project area (42.1%) The study found that there was a significant relationship between the children's age and their nutritional status based on the level of wasting and underweight ($p < 0.01$) suggesting that there is something about age that reduces risk to wasting and underweight and this could probably be in relation to the palatability of the food given to children with age increase A significant relationship between childbirth order and nutritional status based on stunting was found

indicating that as the birth order increased, the chances of stunting increased This could be attributed to the fact that as the childbirth order increases, then the possibility of having more people sharing from the same pot increases thus increasing the risk of malnutrition due to chronic shortage of food

A significantly higher proportion of children in the non-project area (63.8%) than in the project area (37.5%) were introduced to complementary foods within the first three months (p=0.00) indicating that exclusive breastfeeding within the first six months was not a common practice and the projects health education on supplementation initiation may have had a positive effect For both of the study groups the main food first given to children was un-enriched cereal porridge while protein foods and fruits were rarely used as complementary foods.

Although not significant a higher proportion of households in the project area (47.5%) use enclosures as latrines compared to the non-project area (36.9%). Slightly less than a half of the children in both the project area (43%) and non-project area (36.9%) were reportedly ill within two weeks preceding the survey. Symptoms of upper respiratory tract infections were the most common in both study areas Grandmothers were reported to be the main alternative caregivers though most of the mothers prepared food for the children while other caretakers did the actual feeding

Finally, no significant difference was noted in both the childcare practices and nutritional status in the two areas contrary to what may have been expected Therefore, the alternative hypotheses are rejected and the null hypotheses that "there was no difference in the childcare practices and nutritional status in the two areas" accepted

It is therefore recommended that mothers be encouraged to exclusively breastfeed for at least the first four months and continue breastfeeding preferably to the second year. This could be achieved by making them understand why it is a good strategy. Other recommendations include provision of safe water sources and pit latrines to the community as well as conducting regular nutritional surveillance.

OPERATIONAL DEFINITIONS

Child Care – Consist of actions necessary to promote survival, growth and development, involving actions at the household level parallel with household food security and health promoting behaviour for the child. The components of child care include, breastfeeding and complementary feeding behaviours, feeding frequencies, health seeking practices and encouraging the child to eat during the event of illness rather than withholding food

Complementary Feeding- the gradual introduction of non-milk foods in addition to breast milk .

Consumer Units- It is the nutrient requirement of an individual expressed as a ratio of the requirement of an arbitrarily chosen person (nominal adult male) whose requirement is equivalent to one and the rest expressed as a fraction of it. Figures have been calculated that allow for the expressing of energy requirements and intake for individuals according to their ages and sex groups based on international recommendations (WHO, 1985)

Enclosures- Refers to shallow pits enclosed with twigs and used as toilets.

Energy Requirement- Amount of energy that will balance energy expenditure when the individual has a body size and composition, and level of physical activity consistent with long term good health and that will allow for the maintenance of economically necessary and socially desirable physical activity (WHO, 1985)

Household- "A person or group of people living in the same compound (fenced or unfenced), answerable to the same head and sharing a common source of food and income during the study period including unrelated servants, labourers and relatives "

Malnutrition- defined as a state of nutrition where the height-for-age, weight-for-age and weight-for-height indices fall below -2 Z- scores of the National Centre for Health Statistics (NCHS) reference

Mid Upper Arm Circumference (MUAC)- the circumference of the upper-arm measured at the midpoint between the tip of the elbow and the tip of the shoulder. Used to assess the nutritional situation in emergency circumstances

Protein requirement- the lowest level of dietary protein intake that will balance the losses of nitrogen from the body in persons maintaining energy balance at modest level of physical activity.

Risk – Chance of an undesirable event occurring.

Standard Deviation score or Z- score (SD) - The deviation of the anthropometric value for an individual child from the median value of the reference population (National Centre for Health Statistics of USA/World Health Organization [NCHS/WHO] standards) divided by the standard deviation for the reference population.

Stunting – A chronic nutritional deficiency, expressed by anthropometric status height- for-age, whereby height for a child is below minus two Z-score of the expected height of a reference child (NCHS/WHO) of the same age. It is an indicator of longitudinal nutritional deficit.

Under five- Refers to the age group between six and sixty months i e less than five years

Underweight- A nutritional deficiency expressed by anthropometric status weight- for- age whereby weight of a child is below minus two Z-score of the expected weight of a reference child (NCHS/WHO) of the same age

Wasting - A nutritional deficiency expressed by anthropometric status weight- for -height, whereby weight of a child is below minus two Z-score of the expected weight of a reference child (NCHS/WHO) of the same height. It is an indicator of acute nutritional deficit in the period just prior to the measurements.

Weaning period – Time during which a child receives liquid, semisolid or solid foods in addition to breast milk

CHAPTER ONE

1.1 INTRODUCTION

1.1.1 Background Information

Malnutrition is a primary cause of poor health and death in developing countries (Jansen and Bailey, 1972) and continues to be a major public health problem (Sanghvi and Murray, 1997, United Nations Children's Fund {UNICEF}, 1998) Its crisis is implicated in the over half of all child deaths worldwide and especially so in the developing world (Kent, 1994, UNICEF, 1998, WHO, 1999) However, it is rarely regarded as an emergency since most of the children affected are not facing famine and show few or no obvious signs of malnutrition (UNICEF, 1998).

Food and health are necessary but not sufficient conditions for good nutrition outcomes and thus, childcare as an underlying determinant for good nutrition becomes important (UNICEF, 1997). Childcare practices refer to the behaviours of the caregivers, which translate food security and health care resources into child growth and development (Engle, 1992) The major aspects of care practices have been outlined in the "Care Initiative" (UNICEF 1997) as; care for women, breastfeeding and feeding practices, psychosocial care practice, hygiene practices, food preparation, home health practices and other health seeking behaviours that are necessary for good growth and development of children

Community-based activities aimed at changing care practices and improving the nutritional status of children require substantial resources in form of time and funds Since this involves partnership between communities, government, non-governmental organizations and other interested parties have been involved in intervention projects within the marginalized semi-

arid and arid areas of this country to maximize the quality of human life. These activities include assistance in food production, provision of health services and water projects among others (Maingi, 1999)

World Vision Kenya is one of the non governmental organizations which have been involved in different activities to alleviate poverty through its 27 multi-sectoral projects called Area Development Programs (ADPs) in the drought prone districts like Wajir, Makueni, Laikipia, Turkana and Marsabit (Maingi, 1999). Its activities include relief interventions, rehabilitation interventions, development of health institutions and health programmes, provision of safe water and shelter improvement. Other interventions by World Vision Kenya include; food security, micro enterprise development, vocational training and spiritual nurture (Maingi, 1999).

World Vision Kenya has also childcare projects, which were originally institutionalised providing the sponsored children with basic needs as school fees, uniforms and food. With time, this changed to "family to family" projects with the child becoming the entry point into the family. The focus later moved from the family to the community in order to enhance the child and family development (Maingi, 1999)

In this study, Makueni ADP, which has been in operation since 1990, has been selected. Entry by World Vision Kenya was through participatory evaluation process in which needs were ranked as water, food, health, education, communication and evangelism. The goal of this ADP is to contribute to the alleviation of poverty in Kathonzweni division. To achieve this, world Vision Kenya has assisted the community to construct water tanks and health

centres and educates needy children through sponsorship. Community health volunteers have also been trained and are involved in delivering home-based health services.

In this connection, this study becomes important as it will provide baseline data for the under five year old children in this area which can then be used in designing intervention programmes that are properly targeted and especially in relation to childcare practices within the World Vision Project area.

1.1.2 Statement of Problem

Malnutrition continues to be a major public health problem and of considerable concern in the developing countries (Sanghvi and Murray, 1997). Studies have shown that, poor economic status, socio-cultural factors, infection, poor food security and the environment in addition to inadequate childcare practices play a significant role in the nutritional status of any given community (Mitzner, 1984, Kennedy, 1987; UNICEF, 1998, Abate, 1998, Owor *et al*, 2000). However, human and economic resources to enable the caregivers provide care effectively are limited in all the organizational levels namely, family, community, national and regional levels (UNICEF, 1997).

The social responsibility of parents, community and governments for children to enjoy their highest attainable health standards is outlined in several articles of the Convention on the Rights of the Child (CRC), (UNICEF, 2000). This however, is rarely achieved in many poor families and especially in the tropics where the economic well being of households is low. In addition, investments in social services such as health, education, water and household food security have had little impact on the nutritional status and prevalence of malnutrition continues to increase (UNICEF, 1997) accounting for high infant morbidity and mortality.

Efforts to improve child growth and development have often overlooked direct childcare practices and health seeking behaviours Thus, progress towards improving childcare practices and reducing the under five malnutrition rates has been inadequate (Kiminyo *et al.*, 2000) In Kenya, for example, it is estimated that 50% of all child deaths are related to malnutrition (Mtalo, 1998)

Understanding the childcare practices and their resources in general can help local people to identify the practices and resources that are important from their cultural and ecological setting It is out of this concern that the nutrition and care assessment survey was conducted in Kathonzweni division, Makueni, to understand the position of this community in regard to childcare practices and nutritional status The information obtained would be used in formulation of strategies for improvement of the existing intervention programmes in the area.

1.1.3 Justification and Benefits

Though many studies have been done all over the developing world in relation to child care practices and nutritional status of under five, scanty national data (GOK, 1998) and lack of appreciation of the available regional data (UNICEF, 1998) on childcare practices and child malnutrition has resulted in interventions that are poorly targeted and thus have no sustainable solutions In this regard, local data from community-based research that has incorporated responses from the particular community would be more useful for further interventions.

In this perspective, this study becomes important, as it will provide specific baseline data on the care practices and nutritional status of the under five year old children in the World Vision Kenya operational area of Makueni This information will be used as a basis for

comparison with the non-project area. It could also be used as a database as well as in the formulation of strategies in planning of further development or intervention programmes. This will eventually improve the conditions of those at risk and especially the under five year old children who live in marginal semi-arid areas.

1.1.4 Purpose

The purpose of this study was to determine the childcare practices and their effects on nutritional status of children 6-59 months in the World Vision project area of Kathonzweni Division, Makueni district and to establish whether there is any significant difference in both the childcare practices and nutritional status of children between the project area and non-project areas.

1.1.5 Objectives

The overall objective of the study was to compare the socio economic characteristics, childcare and feeding practices and nutritional status of the under fives in the project and non-project area.

The specific objectives of the study were:

1. To determine the social economic characteristics of the households in the project area and those outside the project area.

2. To determine the feeding practices (duration of breastfeeding and complementary feeding, types of supplementary foods, method of feeding and food withholding practices) in the project area and those outside the project area.

3. To determine the care practices of children (meal preparation, health seeking practices, sanitation and hygiene practices) in the two study groups.

4. To determine the dietary intake of the under five year old children in the study groups

5. To determine the nutritional status of under five year old children in the study groups

1.1.6 Research Questions

1. What are the childcare practices in the study area?

2. What proportion of children meet the caloric and protein requirement in the two areas?

3. What is the prevalence of malnutrition among the under fives in the two areas by age and sex using anthropometry?

4. What factors are significantly related to the levels of malnutrition in the two areas?

5. Are there significant differences in the characteristics mentioned above between the two areas?

1.1.7 Hypotheses

This study tested the following hypotheses:

1. The childcare practices in the project area are better than in the non-project area

2. **The nutritional status of children in the project area is better than in the non-project area**

REFERENCES

Abate, G. (1998). "Child care practices in households with malnourished children and those with well nourished children in a slum area of Addis Ababa Ethiopia" MSc Thesis, University of Nairobi Pp 1-6, 37-51

Engle P. L (1992). 'Care and child nutrition ' Theme paper for the international conference on nutrition (ICN): Paper prepared for nutrition section, UNICEF New York Pp 5-8

GOK (1998). First report on poverty in Kenya Vol 2 Poverty and social indicators Ministry of Planning and National Development Pp 4-11, 105.

Jansen, A and Bailey, K.O. (1972) The early detection of childhood malnutrition in South Pacific. Geneva, Switzerland Pp 1-2.

Kennedy E. and Cogill B. (1987) Income and nutritional effects of the commercialisation of agriculture in South Western Kenya International Food Policy Research Institute, Newyork Research Report 63, 1987.

Kent George (1994). Children's right to adequate nutrition *Food and Nutrition Bulletin.* 1994; 15(4): 343-344

Kiminyo, D.M, Ngige, L.W, Ngesa, A.A., Ngaruiya, S., Wambani, V. (2000). A report of the early childhood development baseline survey in Kwale, Migori, Kisumu district and municipality UNICEF Kenya Pp 1-6, 37-85.

Maingi, C. (Ed) (1999). World Vision Kenya silver jubilee brochure World Vision Kenya Communication Department Nairobi, Kenya

Mitzer K., Scrimshaw N. & Morgan R. (Ed) (1984). Improving the nutritional Status of children during weaning period HOVIPREP (Home and Village prepared weaning foods) project publication Cambridge Massachusetts, USA pp 1-4, 32-37

Mtalo, C. (1998). Community nutrition and care survey. Report for UNICEF. Kenya Country Office. Pp 1-22.

Owor, M. J., J.K Tumwine and J.K. Kikafunda (2000). Socio-economic risk factors for severe protein energy malnutrition among children in Mulago hospital, Kampala. *East African Medical Journal.* 2000; 77 (9) 471-475

Sanghvi, T. and Murray J. (1997). Improving child health through nutrition, the nutrition minimum package. Arlington, Va; BASICS project, for USAID. USA. Pp 3-10.

UNICEF (1997). The care initiative; Assessment, analysis and action to improve care for nutrition. UNICEF, New York. Pp 2-32.

UNICEF (1998). The state of the world's children 1998. Oxford and New York. Pp 7-35.

UNICEF (2000). The state of the world's children 2000. Oxford and New York. Pp 9-11.

UNICEF (1998). The situation analysis of children and women in Kenya, Nairobi. Ministry of planning and national development and UNICEF, Kenya Country Office. Pp 11-26,121-140,159-195.

WHO/BASICS/UNICEF (1999). Nutrition essentials, A guide for health managers. Pp 1-21.

CHAPTER TWO

DIETARY INTAKE, FEEDING AND CARE PRACTICES OF CHILDREN 6-59 MONTHS IN MAKUENI DISTRICT, KENYA

2.0 ABSTRACT

In August-September 2000, a comparative cross-sectional survey aimed at assessing and comparing childcare practices of children (6-59 months) drawn from households participating in a World Vision project vis-a-vis non-project area was conducted in Kithuki, Kanthuni and Kathonzweni locations of Kathonzweni division, Makueni district.

The principal tool of investigation was a structured questionnaire that was administered to mothers and other children caretakers. Dietary intake recall was also done for the children. Purposive sampling was done at the programme level whereas simple random sampling was done at the household level giving a sample size of 320 households in which there had to be a child aged between 6-59 months. A sub-sample of 60 households was randomly selected for the 24-hour dietary recall. The SPSS/PC[+] computer package was used for data entry and analysis.

The study established that a significantly higher proportion of children in the non-project area (63.8%) than in the project area (37.5%) were introduced to complementary foods within the first three months (p=0.00) indicating that exclusive breastfeeding within the first six months was not a common practice and the projects health education on supplementation initiation may have had a positive effect. For both of the study groups the main food first given to children was un-enriched cereal porridge while protein foods and fruits were rarely used as complementary foods.

Although not significant a higher proportion of households in the project area (47 5%) use enclosures as latrines compared to the non-project area (36 9%) Slightly less than a half of the children in both the project area (43%) and non-project area (36 9%) were reportedly ill within two weeks preceding the survey Symptoms of upper respiratory tract infections were the most common in both study areas Grandmothers were reported to be the main alternative caregivers though most of the mothers prepared food for the children while other caretakers did the actual feeding

No significant difference was noted in the childcare practices in the two areas contrary to what may have been expected Therefore, the alternative hypothesis is rejected and the null hypotheses that "there was no difference in the childcare practices in the two areas" accepted.

It is therefore recommended that mothers be encouraged to exclusively breastfeed for at least the first four months and continue breastfeeding preferably to the second year This could be achieved by making them understand why it is a good strategy Other recommendations include provision of safe water sources and pit latrines to the community.

2.1 INTRODUCTION

Good feeding is a pre-requisite to good nutritional status in any given time of human life as malnutrition is likely to strike those who lack nutritionally adequate diets (Jansen and Bailey, 1972). Despite general improvements in food availability, health and social services, hunger and malnutrition continue to exist in nearly all countries Good nutrition in the early years of life is usually determined by feeding practices, whether the food is given at the right time and

in the right way, at the right frequency and whether appropriate feeding methods are used Other factors include severity and duration of disease (Ramalingaswani *et al* , 1997)

Good child feeding practices must be accompanied by other aspects of childcare Childcare in addition to being inclusive of how well and frequently a young child is fed, also includes degree of stimulation and interaction with parents, prevention of diseases, good domestic hygiene, use of health services and regular growth monitoring (Ramalingaswani *et al.*, 1997) Nutritionally, care encompasses all measures and behaviours that translate available food and health resources into good child growth and development

Childcare practices play a great role in influencing the nutritional status of infants and children (UNICEF, 1998). Factors that contribute to childcare practices in a specific setting need to be properly understood and described This is because it is the only way that sustainable solutions to the problems on care practices and nutritional status could be achieved in an area The care practices and nutritional status of children has not been previously explored in the study area, hence the need to assess on the same The study will provide the relevant information for planning by World Vision Kenya in its nutritional and health projects

The purpose of this study therefore was to determine the childcare practices of children 6-59 months in the World Vision project area of Kathonzweni Division, Makueni district and to establish whether there is any significant difference in the childcare practices of children between the project area and non-project areas

The overall objective of the study was to compare the socio economic characteristics, childcare and feeding practices of the under fives in the project and non-project area. The specific objectives of the study were:

1. To determine the social economic characteristics of the households in the project area and those outside the project area

2. To determine the feeding practices (duration of breastfeeding and complementary feeding, types of supplementary foods, method of feeding and food withholding practices) in the project area and those outside the project area

3. To determine the care practices of children (meal preparation, health seeking practices, sanitation and hygiene practices) in the two study groups

4. To determine the dietary intake of the under five year old children in the study groups

This study tested the hypothesis that "the childcare practices in the project area are better than in the non-project area".

2.2 LITERATURE REVIEW

2.2.1 Childcare and Feeding Practices

Whereas many organizations are in support of community development activities, childcare has received little emphasis perhaps due to the fact that it has rarely been reported as one of the immediate underlying cause of malnutrition (UNICEF, 1997, UNICEF, 1998) Among the range of caring behaviours that affect child nutrition and health, the following are the most critical, psychological support, care and support for mothers, hygiene practices, health seeking behaviours and feeding (UNICEF, 1997, UNICEF, 1998, Lamountague *et al.*, 1998, Abate, 1998).

The complex of caring behaviours is often mistakenly assumed to be the exclusive domain of mothers. Unfortunately, much as a mother may love her children, it is all but impossible for her to provide high quality childcare if she herself is oppressed, uninformed, poor and unhealthy. Clean water, safe sanitation and support from health services, society, father and other children are also of ultimate importance (Ramalingaswani *et al*, 1997, UNICEF, 1998).

Since good childcare and feeding practices is one of the best ways to assure the child a smooth transition into adulthood, influencing social skills and behavioural choices then should be a domain of the entire family and community (UNICEF, 1998). Attention to early childhood is therefore a critical aspect of anti-poverty strategies to break inter-generational cycle of chronic poor health and sub-optimal human development (UNICEF, 2000).

2.2.1.1 Psychological support

The caregivers affection, attention, involvement and encouragement of autonomy, exploration and learning to the child are correlated with better nutritional status of children (UNICEF, 1997). Studies have found out that malnourished children who were given verbal and cognitive stimulation had higher growth rates than those who were not (UNICEF, 1998). Quality of these actions can be enhanced through education of parents and other caregivers. Policy makers therefore need to recognize the significance of such measures and actions and take them into account when devising policies and programmes (UNICEF, 1998)

2.2.1.2 Care and support for mothers

The well being of the mother and the support she receives both in her family and from the community affects the nutritional well being of the child and subsequently the child's growth and development either positively or negatively (UNICEF, 1997) Optimal care and support should be given to mothers especially during pregnancy and lactation by providing extra

amount of family foods, reduction of workload, facilitation of prenatal care and safe delivery and post partum rest.

2.2.1.3 Hygiene practices

Hygiene practices directly affect the cleanliness of the environment and the number of infectious agents that children may ingest. They are divided into personal and household hygiene practices. The personal hygiene practices include, hand washing, bathing and cleaning the child while household hygiene practices include cleaning of house and child's play area, adequate waste disposal, use of sanitary facilities and use of safe water (UNICEF, 1997; UNICEF, 1998; Lamountagne *et al.*, 1998; Abate, 1998)

2.2.1.4 Health seeking behaviours

This is rooted in good knowledge and information about the importance of seeking appropriate health care for children at the right time (UNICEF, 1998). Good health seeking behaviour as well as giving good treatment helps prevent illness thus reducing the negative impact of illness on children's growth and development. Growth monitoring attendance, which is a preventive and promotive health service, is usually high in the first two years of life but this reduces drastically especially after the measles vaccine which is given at nine months. Unfortunately, it is at this stage that malnutrition is at its peak, quality of care deteriorates and sometimes the next baby is expected. This then affects the nutritional status of children, which may then hinder the smooth transition into primary school (UNICEF, 2000).

2.2.1.5 Feeding

Appropriate feeding can prevent or reduce the effects of malnutrition and illnesses. Breast milk can provide all the required nutrients upto six months of age and is a safer option for developing populations. Studies have shown that there is no advantage attached to complementary feeding before six months of age with regard to growth of breastfed infants

and that exclusive breastfeeding for the first six months is a safer option for developing country populations (UNICEF, 1997, UNICEF, 1998) This however is turning out to be difficult due to the risk of HIV transmission through breast milk Recent reports suggest that in every seven mothers, one infect the child with HIV virus This possibly rises twice as high if women Sero-convert while breastfeeding (Foster, 1997)

The persons involved in child food preparation and the feeding are also crucial for children below five years of age A child is also put at increased risk of malnutrition and illness if these foods are introduced at the wrong time (less than six months) or if there is no hygienic preparation and storage of food in the home (UNICEF, 1997, UNICEF, 1998) Studies have shown that early introduction of cereals and vegetables can interfere with the absorption of iron in breast milk thus potentially resulting in iron deficiency while prolonged exclusive breastfeeding and delayed weaning can also contribute to a high prevalence of growth faltering (UNICEF, 1998)

Often, complementary foods are introduced much earlier than the recommended age of six months often even in the first month of life (UNICEF, 1997) Most of the traditional first supplementary foods are prepared from cereal or starchy roots This food becomes viscous and gelatinised on cooking and this increases their bulk making it difficult for children to consume adequate amounts. Consequently, the children though fed frequently which is rarely the case do not meet their nutritional requirements (Tontisirin and Yamborusit, 1995, Saghhvi and Murray, 1997)

In Kenya for example, the percentage of children who are exclusively breastfed for the first three months account for 17%, 90% are introduced to complementary foods by the age of 6

months and 54% are still breastfeeding at the age of 20-23 months (CBS, 1998). In Makueni district the average length of breastfeeding is 17.2 months while the average number of months that children are exclusively breastfed is 2.4 months. Only a fifth are breastfed during diarrhoea (CBS, 1999).

2.2.1.6 Role of demographic and socio economic characteristics on childcare and feeding practices

Childcare and feeding practices are also influenced by socio-demographic and socio-economic factors which include household, size, sex of child and age as well as age of the mother (UNICEF, 1992). Education is another basic pre-requisite for development. It enables informed decision making in such areas as health and nutrition, family planning as well as food production and management. According to UNICEF, (1997 and 1998) environmental factors may also affect quality of care.

2.2.2 Dietary Assessment

In this study, dietary patterns will be investigated as a dimension of child feeding practices.

Dietary assessment is an important part of nutritional assessment but cannot be used alone to make a diagnosis of nutritional health. Through this assessment it is possible to estimate whether or not individuals are consuming adequate amounts and compositions of the nutrients that are necessary for good nutrition (Den Hartog and Van Staveren 1985; Den Hartog *et al*, 1995).

The methods used in dietary assessment include,

1. Daily food consumption methods e.g. 24 hour recall designed to measure the quantity of foods consumed by an individual during the preceding 24 hours or the preceding day by means of detailed questions. Food intake is usually assessed in terms of household

measures This method estimates the foods that are actually eaten as recalled from memory.

2 Recalled usual food consumption methods e g diet history and food frequency questionnaire Diet history is based on the premise that everyone has a constant daily pattern in his food habit Amounts are recorded in common household measures It requires skilled interviewers

3. Recording of present intake e g weighing methods and estimated records

4 Shortcut methods - Give information on quality of the diets It permits rating or grading of items into categories so that extremes can be identified

5 Combination methods- it involves combination of any two methods e g weighing records at household level and 24-hr recall for individuals

The advantages for recall methods are that the satisfactory co-operation by the participants is easily achieved and gives a more exact picture of the actual food intake of groups and individuals. The limitations are that respondents must have a good memory and a well-defined pattern of diet This makes heavy demands on the interviewer, as he/she has to gain confidence of the participant to make good estimates, avoid suggestion and judge the reliability of the replies correctly (Den Hartog and Van Staveren 1985, Den Hartog *et al.*, 1995).

The present food intake recording gives a fair picture of the actual food intake of a group and if continued long enough, reliable information about food intake of an individual can be obtained However, it can only be done for relatively short periods and may alter the usual pattern of intake (Den Hartog and Van Staveren 1985, Den Hartog *et al*, 1995)

Since all methods have specific advantages and disadvantages, there is no best method for all purposes. Investigations should carefully consider what the best method is for their purpose and very often, a combination of two methods give fuller information. The purpose of dietary assessment in epidemiology is to identify groups of individuals by their intake. Therefore, adequate sample size and number of records per subject depends on the required precision of the assessment of nutrient intake

2.3 RESEARCH METHODOLOGY

2.3.1 Study Setting

2.3.1.1 Location and Population

The study was conducted in Kathonzweni division of Makueni district (Appendix 10). Makueni district, previously part of Machakos district is one of the 12 districts in Eastern Province. It borders Kajiado, Taita Taveta, Kitui and Machakos district. Makueni district has an area of 7,966km^2. The district has fourteen divisions and is subdivided into 52 locations and 172 sub-locations.

With an area of 880km^2, the study division (Kathonzweni) has 6 locations and 16 sub-locations. Out of these, World Vision Kenya has projects in three locations namely, Mavindini, Kithuki and Kanzokea (Figure 3.1).

The population of Makueni is 771,545 with a growth rate of 3.09%. The district's dependency ratio is 108:100 (i.e. every 108 dependants rely on 100 productive persons) and has an average household size of six. Eighteen percent of the population comprise of children aged less than five years of age. Rapid increase in the district's population is partly attributed

to immigration of people from neighbouring districts into the settlement schemes in the district (GOK, 1994, GOK, 1997, CBS, 1999, CBS, 2001)

2.3.1.2 Climate

Rainfall is generally scarce and varies from slightly over 1000 mm in the highlands to slightly below 500mm in the low-lying south and southeast parts of the district Rainfall pattern is bimodal with the long rain season starting from March to April while the short rain season is from November to December

There are three main standard soil types in the district namely, red clay, sandy soils and black cotton soils There are few permanent rivers and streams of which river Athi is the major perennial river It drains most of the district Water for domestic use is mainly from rivers, springs and dams. The distance to the water points increase in the dry season when some of the water sources dry up (GOK, 1994, GOK, 1997)

2.3.1.3 Crops and Livestock

Kathonzweni division falls within the Upper Midland 2 (UM2) agro-ecological zone and is characterized by sandy soil Livestock farming is a major economic activity in the district while crop farming is mainly for subsistence purposes There is a high potential for livestock rearing but is adversely affected by the recurrent drought situations The main food crops grown in the division are maize, beans, peas and cowpeas while cotton and green grams are the major cash crops (GOK, 1994, GOK, 1997)

2.3.1.4 Health and Nutrition Situation

There are 60 established health facilities in the district Kathonzweni division, with 4 health centres and 4 dispensaries ranks among the divisions with the highest number of health

facilities in the area The most prevalent childhood illnesses in the district are malaria, upper respiratory tract infections, skin diseases, intestinal worms, diarrhoea, pneumonia and eye infections. Inaccessibility to clean drinking water is the main cause of water borne diseases while dirty environment causes diseases like malaria which is a major killer of the district's under-fives (GOK, 1994; GOK, 1997) High poverty levels hinder the use of preventive measures such as use of mosquito nets to reduce the disease incidence The infant mortality rate is 96 per 1000 live births (GOK, 1997). The average malnutrition level in the district is 30% but with a rising trend. This is even higher in the low potential areas of the district like Kathonzweni and is attributed to the recurrent food deficit, low income and hence low purchasing power for food.

2.3.1.5 Development Projects

Half of the population in the district lives below the absolute poverty line, which is estimated at Ksh 978 per adult equivalent per month in the rural areas (GOK, 1997, GOK, 1998) The government has intervened through the social dimension of development programme (SDDP), which operates under the district development committee and is responsible for the selection of community-projects based on the individual needs of the group Five major voluntary agencies namely; Action Aid, World Vision, African Medical Research Foundation (AMREF), Catholic Secretariat and African Inland Church are involved in development projects that include school sponsorship, environmental protection, agriculture, and health services. The three locations in which World Vision is assisting are located in the lower potential area of the division and the majority of the people are nutritionally vulnerable

2.3.2 Research Methods

2.3.2.1 Study Design

This was a comparative cross-sectional survey, which was descriptive and analytical in nature. It was carried out between August and September 2000. Households within the World Vision project area in Kathonzweni division and with children aged between 6-59 months were compared with those outside the project area but within the division

Observation, interviews and informal key informant interviews were some of the methods employed in the data collection

2.3.2.2 Study Population

The study population consisted of children aged 6-59 months and their respective households in World Vision project area (Kimundi and Yinthungu sub-locations) and in non-project area (Thavu and Yeekanga sub-locations) Hereinafter, these groups are identified as project and non-project areas respectively

2.3.2.3 Sampling Frame

It consisted of all households in the study area with children aged 6-59 months with their mothers/caretakers as the respondents. From the list of households developed by registering all the households with children 6-59 months in the sub-locations, 160 households from the project area and 160 households in the non-project area were randomly selected giving a sample of 320 households.

2.3.2.4 Sample Size Determination

According to the Kenya Demographic Health Survey conducted in 1998, the proportion of children with chronic malnutrition (stunting) in Kenya is approximately 30% (CBS, 1999). This assumption and a confidence interval (CI) of 95% were taken into account for sample size determination

The following statistical formula for comparative studies was used (Fisher *et al*, 1991)

$$n = \frac{2Z^2(pq)}{d^2}$$

Where:

n= The desired sample size for each group

Z= The standard normal deviate, set at 1.96 which corresponds to 95% confidence level

p= The proportion in the total target population expected to be malnourished =0.3

q = 1-p :proportion of well nourished children in the study community = 0.7

d= 0.1 :The approximate test difference in child care practices and nutritional status between the two groups of household which is significant at alpha level of 0.05

Therefore

$$n= 2 \times 1.96^2 \times 0.3 \times 0.7/0.1^2 = 160 \text{ households}$$

2.3.2.5 Sampling Procedure

The sampling procedure is as presented in Figure 2.1 Multi stage sampling was used as described in the following paragraphs.

The study was carried out in Makueni Area Development Programme (ADP), which covers part of Kathonzweni division and had been purposively selected from the 27 ADPs of World Vision Kenya In the Makueni ADP, simple random selection of the three community projects (Mavindini, Kithuki and Kanzokea), which covers two locations, was done in which Kanzokea project was selected. Purposive sampling of the project sub locations was then done. Kimundi and a part of Yinthungu sub-location were selected.

Random sampling of the non-project area with characteristics similar to the project area was done. From the four locations without the project, two of them that had the highest number of sub-locations were selected. In each of the selected location, a sub-location was randomly

selected of which Yeekanga and Thavu sub-locations were selected A register of each set of households with children aged 6-59 months was developed and used as the sampling frame Each household constituted a unit of analysis and had an equal probability of being included in the study. From the sampling frame, 160 households with children aged 6-59 months for each of the study area were systematically selected This was achieved by first calculating the proportionate sample size for every village From the list, every household with an even number was selected until the intended sample size was achieved   For dietary intake, a sub-sample of 30 children from each area was selected by systematic sampling This was achieved by selecting every first and last household where a questionnaire was administered per day for dietary assessment until the required sample size was achieved.

Figure 2.1: Flow chart showing the sampling procedure
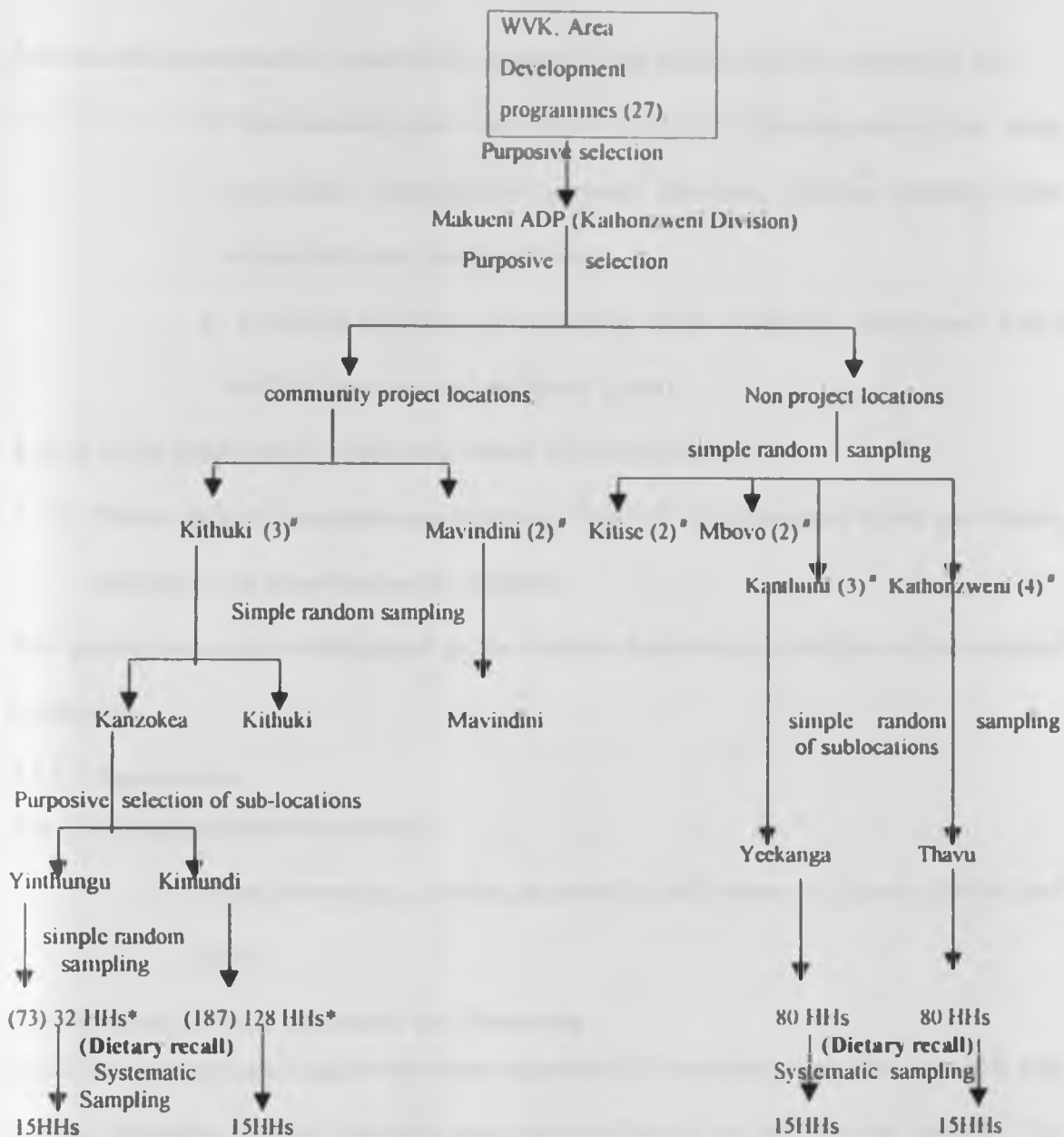

```
                        ┌─────────────────┐
                        │ WVK. Area       │
                        │ Development     │
                        │ programmes (27) │
                        └─────────────────┘
                        Purposive selection

                    Makueni ADP (Kathonzweni Division)
                        Purposive   selection


        community project locations              Non project locations

                                           simple random   sampling


    Kithuki (3)⁰      Mavindini (2)⁰   Kitise (2)⁰  Mbovo (2)⁰

         Simple random sampling                Kanthuni (3)⁰  Kathonzweni (4)⁰


  Kanzokea    Kithuki      Mavindini            simple   random   sampling
                                                of sublocations

Purposive  selection of sub-locations

                                                Yeekanga         Thavu
Yinthungu      Kimundi

   simple random
   sampling

(73) 32 HHs*    (187) 128 HHs*                  80 HHs        80 HHs
   (Dietary recall)                              (Dietary recall)
   Systematic                                   Systematic  sampling
   Sampling
15HHs           15HHs                           15HHs         15HHs
```

KEY

WVK - World Vision Kenya
ADP - Area Development Programme (consists of several community projects)
HHs - Households
() - Number of households in the area
()⁰ Number of sub locations
*   - Unequal sample size because the project area covers only a small part of Yinthungu sub-location as it was originally in Kimundi sub-location

2.3.3 Study Tools

2.3.3.1 Questionnaire

A structured questionnaire (Appendix 6) was used in the study to collect information on

> ❖ Socio-demographic and socio- economic characteristics of the study households (demography, parental education, income sources, water accessibility and health facilities)

> ❖ Childcare practices and activities (child morbidity experience, health seeking behaviour and treatment given)

A form in the questionnaire was used to record information on,

> ❖ Dietary aspects (complementary feeding, types of complementary foods and dietary adequacy) and breastfeeding for children

This questionnaire was administered to the mothers /caretakers of children in the selected households

2.3.3.2 Equipments
The following equipments were used:

> ❖ Liquid measuring cylinders graduated in millimetres of capacity 1000ml and 100ml

2.3.4 Training of Field Assistants and Pretesting
Two field assistants and a guide who were volunteers in the project, were from the study area and had secondary level of education were recruited having met the required qualities. The field assistants were trained for two days on questionnaire interpretation, method of interaction data collection techniques as well as recording. They were also trained on the basic field ethics. This training continued through the pre-testing period making the period of training into five days. The assistants were also closely monitored in the early stages of the actual data collection

Pre-testing of the study tools was carried out in Kanzokea, a village that neighbours the study villages. A total of 21 households were pre-tested on. The results of the pilot study were then used to adjust the original questionnaire. An average of fifteen households were visited per day since the assistants worked separately on some days while on others they were accompanied by the principal investigator. This was in accordance with the days allocated for data collection in the Gantt chart.

2.3.5 Data Collection

2.3.5.1 Entry into the Community

Data was collected between mid- August and September 2000. Before the start of the actual data collection, the researcher obtained permission to carry out the study from the Ministry of Education. Thereafter the researcher visited the offices of the Makueni district commissioner and medical officer of health, who both gave permission for the study to be carried out.

Through the Makueni ADP manager and Kanzokea community project motivator, the purpose of the study was made clear to the Kanzokea project functional committee as well as the assistant chiefs of the areas concerned

2.3.5.2 Dietary Recall

Food intake measurements for the index children were done to determine the caloric and protein intakes. Food intake data was collected using a single 24-hour recall in the sub-sample of 30 households for each group. Respondents were made to recall and state all the meals consumed by the index child during the preceding 24 hours. The method as described by Den Hartog and Van Staveren (1985) and Den Hartog *et al*, (1995) was applied in which the respondents were asked to show amounts similar to the amount of each ingredient used to prepare the meal using household measures and food models. Detailed descriptions of all

meals eaten within the period were recorded in a table designed for this purpose (Appendix 6). The dietary recalls were spread over the week with an assumption that it will be a representative feeding habit of the child all the other days, whereas the sub-sample was to represent the study group

2.3.6 Data Entry, Cleaning and Analysis

The data was transformed into codes that had been developed during questionnaire preparation, entered and analysed at the Crop Science Computer room, Upper Kabete Campus, University of Nairobi, using SPSS version 8 (Statistical Package for Social Scientists) computer package. Thereafter, frequencies of all the variables were generated and used in checking for outliers. To ensure that all the information had been correctly entered frequencies for non-continuous data and the mean values for continuous data were obtained before carrying out statistical analysis.

Comparison of the two study groups was done by administering chi-square and t-test at p-value less than 0.05 level of significance. Odds ratio was applied where appropriate. Confidence intervals were determined as applicable so as to indicate the precision of the study estimates as population values

For the 24-hr recall the recorded volumes of foods and ingredients were then converted to their gram equivalents using conversion factors given in the Kenya National Food Composition Tables (Sehmi, 1993) and Nutrition Almanac tables (Kirschmann and Kirschmann, 1996). The food composition tables were also used to estimate the amount of calories and protein derived from all the ingredients ingested by the index child (Appendix 8). The total calorie and protein consumption of the household during the previous 24 hours

were obtained by adding the amount of calories and protein derived from all the ingredients ingested (Den Hartog and Van Staveren 1985, Den Hartog *et al.*, 1995)

The dietary intake data was analysed by administering t-test to compare the mean caloric and protein intake between the two groups (Norman and Streine, 1986) Adequacy of the diet was calculated using consumer units (CU) which is the physiological weighting of the needs according to the nutritional requirements of individual household members in reference to an adult male of 20-29 years whose requirements is estimated to be 2960 Kcal per day (FAO/WHO/UNU, 1985; Hoorweg *et al.*, 1991) (Appendix 8).

2.3.7 Data Quality Control

This was achieved through pre-testing of the questionnaire Counter checking of the filled questionnaires was done every day by the researcher to check for completeness and clarity of entries.

After entering the data, frequencies of all the variables were done to ensure that all information had been correctly entered

2.3.8 Limitations

Since this is one of the areas that was curved out of Machakos district just about ten years ago, the infrastructure is still very poor and transport from one place to another was a problem The households, especially those in the non-project area were scattered and coupled with the fact that the respondents were hesitant to give information at the beginning of the interview consumed a lot of time Other households were not willing to give information if there was no immediate assistance forthcoming while others thought that the investigators had ill motives

2.4 RESULTS

2.4.1 Socio-Demographic and Socio-Economic Characteristics

Sample population size and structure

The sample population size and structure is shown in Figure 2 2, Table 2 1 and Appendix 2.

Three hundred and twenty households were included in the study of which there had to be a

child aged 6-59 months. The total population in the 320 households was 2215 persons of

which 1127 (50 9%) were in the World Vision project area. The observed household size

ranged from 2-15 in both areas. The average household size was not significantly different in

the two areas with the project area having 7 persons and 6 8 persons in the non-project area

Figure 2.2: Population distribution by age and sex in the project and non-project area
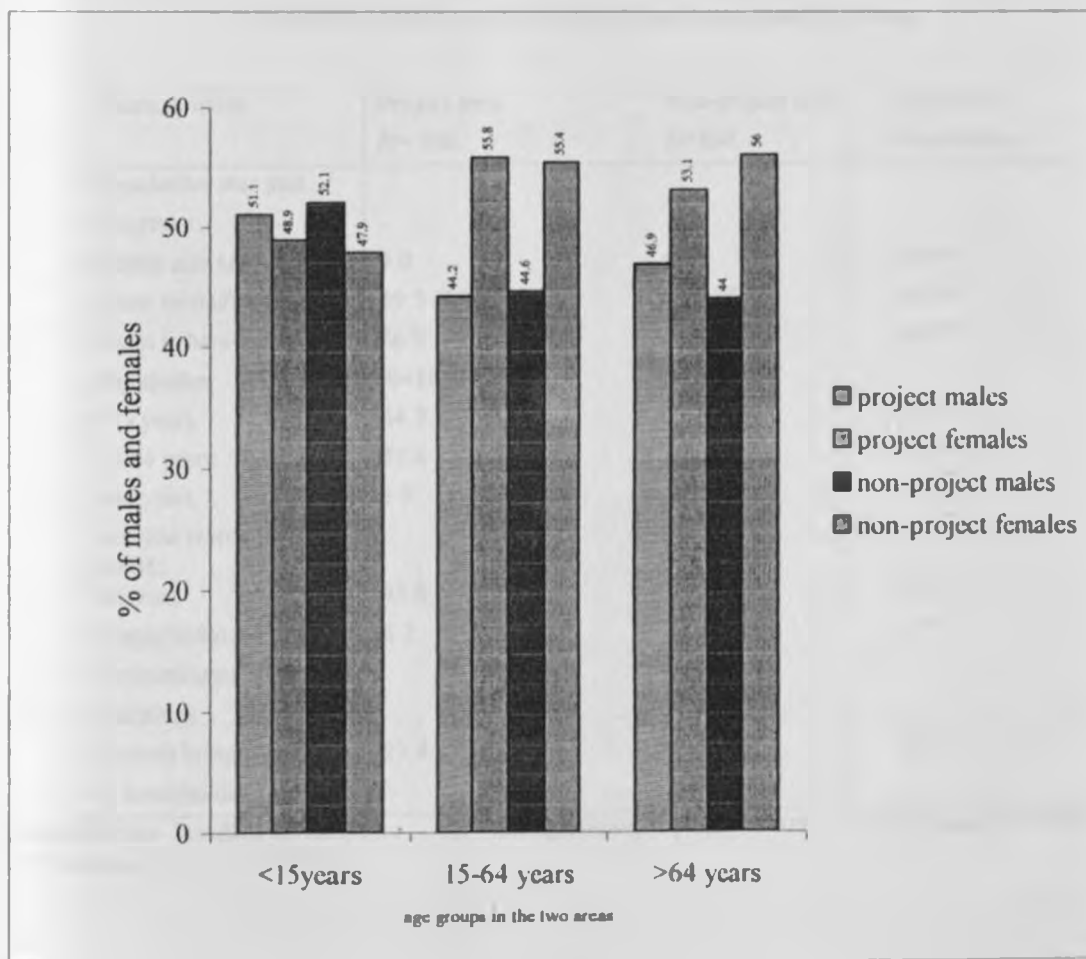
Six hundred and seven (607) children were below the age of five years of which 293 (48 3%) were in the World Vision project area The mean number of the under fives in the project and non- project households was 1 8 and 2 0 respectively More than half of the population in the project (54 7%) and non-project area (56 8%) were less than 15 years of age   In the productive age (15-64 years), the proportion was higher (42 4%) in the project area than in the non-project area (40 9%) but not significantly different The dependency ratio was similar in both the project and non-project area standing at 1:1 3   The mean age of fathers and mothers, which was 36 2 ±1.2 years and 29.5 ±0 8 with a range of 23-70 and 18-53 years respectively, was not significantly different in the two areas

Table 2.1: Distribution of households by selected socio-demographic and economic characteristics in the project and non-project area

Characteristics	Project area N= 160	Non-project area N=160	Statistical Significance
Population size and structure			
Family size (Average)	7.0	6.8	NS**
Mean mothers age	29.5 (7.8)	29.5 (6.5)	NS**
Mean fathers age	36.9 (9.9)	35.6 (8)	NS**
Population	**N=1099**	**N=1073**	
<15 years	54.7	56 8	NS*
15-64 years	42.4	40.9	NS*
+64 years	2.9	2.3	NS*
Marital status of HHH:			
Married	93.8	91.3	NS*
Single/widowed/ divorced/separated	6.2	8.7	NS*
Earnings			
Persons bringing money to households	21 4	19 6	NS*

In parentheses- Standard deviation   NS - not significant at p value<0 05   HHH- household head
*Chi-square test   **T-test

Socio-economic characteristics

Tests of statistical significance show that the two groups were similar in the socio-economic and demographic characteristics (Table 2.1). Most of the households were male-headed in both the project area (93.8 %) and non-project area (91.9%). A higher but not significant proportion of the adult household members brought money to the households in the project area (21.4%) than in the non-project area

The education levels of the population were essentially the same in both the project and non-project areas. About a third in the study group were pre-school children (33.5% and 33.4%) in the project and non-project area respectively. Casual labour is the major source of income for slightly more than half of the households in both the project area (55%) and non-project area (58.8%). Mixed farming ranks second as a source of income with project area having a lower number of households (46.9%) engaged with this occupation than the non-project area (55.6%).

2.4.2 Feeding Practices and Dietary Intake

2.4.2.1 Breastfeeding

More than a third (38.4%) of the index children were breastfeeding, both in the project (35%) and in the non-project area (41.9%). Among those who were not breastfeeding (n=197), there was a higher but not significantly different proportion of children in the project area (11.5%) who breastfed for 12 months or less compared to the non-project area (6.5%)(Table 2.2a). Less than a quarter of the mothers in both areas (22.1% and 22.6% in the project and non-project areas respectively) breastfed for more than two years

Table 2.2a: Distribution of children by breastfeeding status by age in project and non-project areas

Age in months	Project Area N=160		Non-project area N= 160	
	Breastfeeding Status			
	Still breastfeeding n=56	Stopped breastfeeding n=104	Still breastfeeding n=67	Stopped breastfeeding n=93
6-12 mths	19 (33.9)	12 (11.5)	16 (23.9)	6 (6.5)
13-18 mths	17 (30.4)	45 (43.3)	25 (37.3)	35 (37.6)
19-24 mths	14 (25)	24 (23.1)	17 (25.4)	31 (33.3)
>24 mths	6 (10.7)	23 (22.1)	9 (13.4)	21 (22.6)

Chi-square test- Not significant   In parentheses- percentages

Next pregnancy was a major reason to stop breastfeeding for children below 18 months and especially between 12-18 months as reported by 48 9% of the households in the project area and 45.7% in the non-project area (Table 2.2b)

Table 2.2b: Distribution of children by age and reasons for stopping breastfeeding in project and non-project areas

Age/ Reasons for stopping breastfeeding	Project Area n=104				Non-project area n=93			
	6-12 months n=12	13-18 months n=45	19-24 months n=24	>24 months n=23	6-12 months n=6	13-18 months n=35	19-24 months n=31	>24 months n=21
Next pregnancy	4(33)	22(48.9)	8(33.3)	3(13)	1(16.7)	16(45.7)	5(16.1)	3(14.3)
Other foods	3 (25)	19 (42.2)	12 (50)	16 (69.6)	1(16.7)	13(37.1)	17(54.8)	14(66.7)
Resume work	2 (16.7)	2 (4.4)	2 (8.3)	0 (0)	1(16.7)	1(2.9)	2(6.5)	0 (0)
Others [a]	3 (25)	2 (4.4)	2 (8.3)	4 (17.3)	3(50)	5(14.3)	7(22.6)	4(19)

Chi-square test- Not significant. In parentheses- percentages

[a] Others include death, sickness and refusal by the child

2.4.2.2 Complementary Feeding

Data from this study reveal that the number of children who were exclusively breastfed for the first 3 months was significantly lower in the non-project area as reported by nearly two

thirds (63 8%) of the households than in the project area where slightly over a third (37 5%) reported that they started feeding complementary foods to the index child within the first three months of life This was however different at the age of 4-6 months where the project area had more children being introduced to complementary foods (57 5%) than in the non-project area (32.5%) Only a small proportion of children was introduced to complementary foods at the recommended age of six months (Table 2 3)

Table 2.3: Distribution of the study children by age at introduction of complementary foods

Age	Project Area N=160	Non-project Area N= 160	P value	95% Confidence interval
1- 3 months	60 (37.5)	102 (63.8)	0 00*	0 217-0.537
4-6 months	92 (57.5)	52 (32.5)	0.00*	1 781-4.432
> 6 months	8 (5)	6 (3.8)	0.585	0 458-3.986

Chi-square test   * p value significant   in parentheses - Percentages

2.4.2.3 Types of complementary foods and method of feeding

Porridge is the most common food that is first given to children in nearly all the households within the project (96.9%) and non-project (93 2%) area (Table 2.4). A higher but statistically insignificant proportion of mothers in the project area (90%) than in the non-project area (86 3%) used milk as complementary food Only a small proportion of children in both the project (6 9%) and non-project (5%) area were given fruits as complementary food

Table 2.4: Distribution of study children by types of foods given, method of feeding and food withholding practices

Variable	Project Area		Non-project Area		Significance/P-value
	n	%[c]	n	%[c]	
Type of food					
Porridge	155	96.9	154	93.2	NS
Milk	144	90	138	86.3	NS
Fruits	11	6.9	8	5	NS
Ugali	54	33.8	89	55.6	NS
Others[a]	50	31.3	30	18.8	NS
Method of feeding[b]					
Spoon	335	81.3	348	84.1	NS
Bottle	36	8.7	20	4.8	NS
Hand feeding	41	10	46	11.1	NS
Food Withholding					
Yes	21	13.1	6	3.8	
No	139	86.9	154	96.8	0.03 (CI 1.521-9.885)

Chi-square test

[a] Include rice and mashed potatoes and bananas

[b] Sample size greater since different types of food use similar method of feeding

[c] Percentages do not add to 100 because some children consumed more than one type of food or used different method of feeding.

More than three-quarters of the children in both the project (80.9%) and non-project (83.1%) were spoon-fed. A higher proportion of children in the project area (8.7%) but not significantly different were bottle-fed compared to the non-project area (4.8%).

2.4.2.4 Food Withholding

Only a small proportion (8.4%) of the households withhold food from the children. A chi-square test on the reported cases of food withholding showed a significant difference (p= 0.03, CI 1.521-9.885) in the two areas with a higher proportion in the project area (13.8%) compared to non-project area (3.8%)(Table 2.4). Some of the foods withheld include salt, porridge, meat, beans and ugali (thick mixture of maize flour and water).

2.4.2.5 Dietary Intake

Results of the dietary intake are as shown in Table 2.5. Student's T-test showed that the mean caloric intake though higher in the project area, (1354± 261) than in the non-project area,

(1298 6±196 3) was not statistically different (p= 0 742) The mean protein intake on the other hand was higher in the non-project area, (48 1±11 5) compared to the project area, (37 7±7 4) but was also not statistically different (p= 0 196)

Table 2.5: Caloric and protein intake/consumer units of under fives in the project and non-project areas

Caloric intake Age in months[1]	CU	% Receiving less than RDA[a]			% Receiving < 80% of RDA		
		PA[b] n=30	NPA[b] n=30	Significance[a]	PA	NPA	Significance[a]
6-12	0.3	5	3 3	NS	3.3	3.3	NS
13-24	0.4	6.7	11.7	NS	5	10	NS
25-59	0.5	15	6.7	NS	6.7	1.7	NS
Protein intake Age in months[1]							
6-12	0.3	0	1.7	NS	0	1.7	NS
13-24	0.4	0	0	NS	0	0	NS
25-59	0.5	3.3	0	NS	3.3	0	NS
Average intakes	**Project Area**		**Non- Project Area**		**P value**		
Caloric intake	1354±261		1298±196.3		0 742		
Protein intake	37.72±7.4		48 1±11 5		0.196		

[1] – based on the physiological weighting of consumer units T- test PA[b]- Project area NPA[b]- Non-project area. RDA[a] - Recommended Dietary Allowance CU- Consumer Units

2.4.3 Child-Care Activities

Various aspects related to care practices, which include alternative caregivers, meal preparations, child feeding, health and health seeking practices, sanitation and hygiene practices are described in this section

2.4.3.1 Care givers

Though the primary caregiver of the index child was the mother, alternative caregivers were very instrumental especially when the mother is away (Table 2 6) Grandmothers were the main alternative caregivers accounting for practically a similar number of households (which was slightly less than half) in both areas (48 8% and 46 3% in the project and non-project

areas respectively) Elder siblings ranked second in alternative care giving and accounted for close to third in both areas (37 5% and 34 4% in the project area and non-project area respectively) The other caregivers include fathers and other relatives

Table 2.6: Percentage of persons used in meal preparation, child feeding and as alternative care givers

Variable	Alternative caregivers				Meal preparation				Child feeding			
Variable	Project area N=148[b]		Non-project area N= 152[b]		Project area N=160		Non-project area N=160		Project area N=160		Non-project area N=160	
	n	%	n	%	n	%	n	%	n	%	n	%
Mother	-	-	-	-	140	87.5	145	90.6	122	76.3	130	81 3
Sibling	60	37.5	55	34.4	6	3 8	2	1.3	8	5	5	3.1
Grandmother	78	48 8	74	46 3	13	8 1	12	7.5	27	16.9	23	14.4
Others[a]	10	6.25	23	14.4	1	0.6	1	0.6	3	1.9	2	1.3

[a] Include father, maid, friends and neighbours
[b] Sample size changes as the mother is considered to be the primary care giver.
Chi-square tests- not significant

2.4.3.2 Meal preparation and child feeding

The study shows practically the same proportion of mothers in both areas prepare the food for the index child, 87.5% and 90.6% in the project and non-project area respectively. Similarly, no significant difference was observed between the two areas in the proportions of different persons who fed the child. About 15% of children in both areas (16 4% and 14 4% in the project area and non-project area respectively) were fed by grandmothers while the rest were fed either by siblings, relative or other persons (Table 2 6)

2.4.3.3 Health and health seeking practices

A significantly higher proportion (59.4%) of households in the project area than in the non-project area (35.6%) use more than one hour to travel to the nearest health facility (Table 2.7). More than half of the households in the non-project area (56%) are located more than 4 km from the health facility which is a significantly higher proportion than in the project area (30%).

Table 2.7: Distribution of households by distance and time to health facilities

	Project area N=160		Non-project area N=160		P value	Confidence intervals
	n	%	n	%		
Time to health facility						
0-1 hour	103	64.4	65	40.6		
Over 1 hour	57	35.6	95	59.4	0.00*	1.681-4.150
Distance to health facility						
0-4 km	112	70	70	44		
Over 4 km	48	30	90	56	0.00*	1.893-4.574
Where treated						
Home	21	30.4	25	42.4	0.524	0.436-1.527
Hospital	31	44.9	18	30.5	0.044*	1.012-3.552
Traditional doctor	2	2.9	2	3.4	1.000	0.139-7.187
No treatment	15	21.7	14	23.7	0.846	0.503-2.315

* p value significant Significance at p<0.05.   NS- Not significant.   S- Significant

More than three-quarters of the children had received full immunization in both the project (80.6%) and non-project area (87.5%) at the time of the study. The proportion of the ill children was not significantly different in the two areas (p=0.254, OR 1.298, CI 0.829-2.032) within the last 14 days preceding the survey. A significantly higher proportion of the sick children in the project area (44.9%) were treated in hospital than in the non-project area (30.5%) (p=0.04) (Table 2.7).

Symptoms of upper respiratory tract infections (URTI), which include running nose, cough and ear infections, however, were reported in a higher proportion of households in the project

area (50 7%) than in the non-project area (37 3%) (Figure 2 3) On the other hand, more cases of diarrhoea were reported in the non-project area (16 9%) as compared to the project area (14 5%).

Figure 2.3: Distribution of children by type of illness
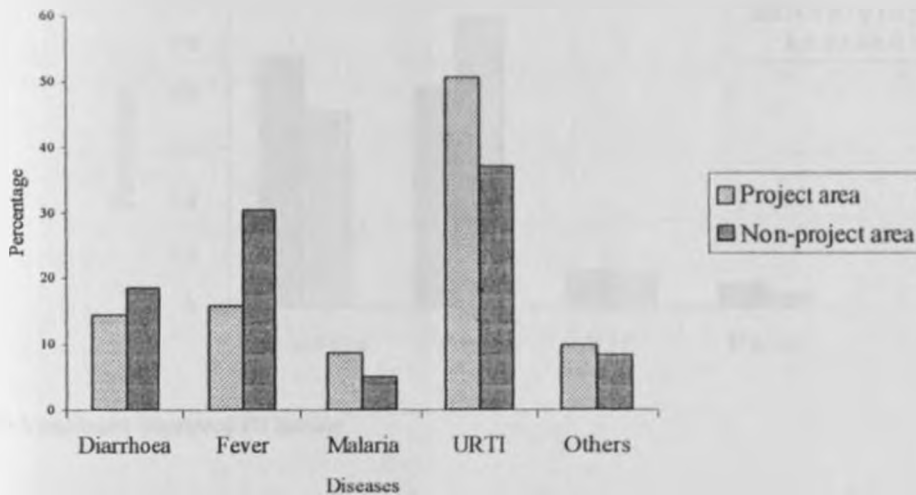
*Others include eye and skin infections URTI- Upper Respiratory Tract Infections

2.4.3.4 Sanitation and household hygiene practices

Sanitation and household practices are socio economic characteristics that reflect on the quality of care that can be accorded a child They have been found to be risk factors for infection and eventually malnutrition in children.

There was no significant difference in practically all the modes of rubbish disposal in the two areas. More households in the non-project area (54 3%) though not significantly different than in the project area (41 3%) have a pit latrine (Figure 2 4) Enclosures were used by similarly high proportions of households with more of these in the project area (47 5%) than the non-project area (36 9%) A small proportion of the households (3 4%) did not have latrines, 4 4% and 2 5% in the project area and non-project area respectively

Figure 2.4: Distribution of latrine facilities by area
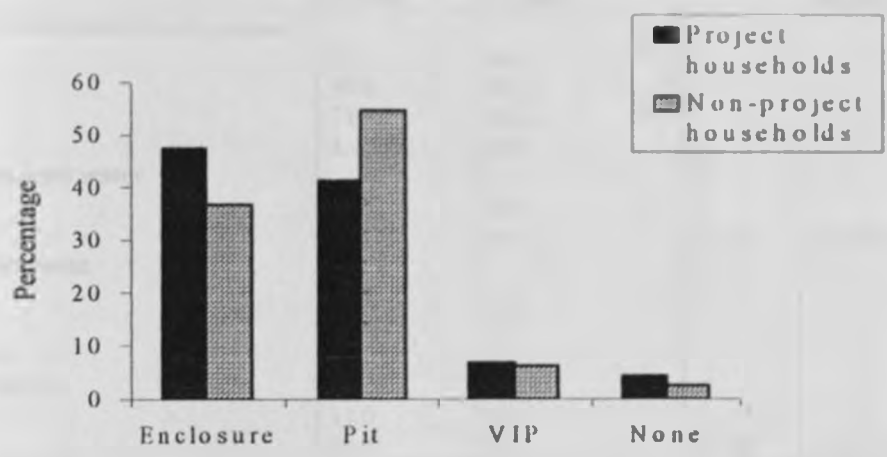
*VIP-Ventilated Improved Pit latrine

2.4.3.5 Water Sources, Storage and Treatment

None of the households had tap/piped water. Dams, wells and rivers are the main water sources in both the project and non-project area (Table 2 8) However, households in the project area had access to tap water that had been collected from the rains and stored in a big tank which was then sold for Ksh2 in a 20 litre container. This however was mainly used by only a few households and mainly for drinking purposes

A practically similar proportion of households in both areas (i e 79.4% in the project area and 74.4% in the non-project area) take more than one hour to get to the nearest water source This then affects the childcare practices negatively since most mothers have to be away for long periods as they are the ones who are mainly involved in fetching water

Table 2.8: Distribution of households by source of drinking water, time spent to fetch
water, water storage and method of water treatment

Characteristic	Project area N=160	Non-project area N=160	P value	Confidence intervals
Source of drinking water in dry season				
River	5.0	44 4		
Dams	40.6	52.5		
Wells	71.9	28 1		
Bore-hole	3.1	0.0		
Time spent to fetch water				
0-60 min	20.6	25 6		
Over 60 min	79.4	74.4	0 289	0.447-1 271
Method of treatment				
Filtering	19.4	4 6		
Boil	72 4	81.7		
Sedimentation	8.2	13.7		
Amount of water)				
<80 litres	11.0	13 6		
> 80 litres	89.0	86 4	0 488	0 397-1 555

Chi-square test   Significance at p<0 05

No significant difference was observed for water used per day in both areas More than three-
quarters of the households in both the project (89%) and non-project (86 4%) area use more
than 80 litres of water per day.

A smaller but not significantly different proportion of households in the project area (72 4%)
than in the non-project area (81 7%) reported that they boil water for drinking Filtering as a
method of treatment was used by a significantly higher proportion of households in the
project area (19 4%) than in the non-project area (4 6%)

2.5 SUMMARY

The findings of this study show that there was no significant difference in the care practices
of children between the two study groups The only exceptions were found in the time taken
to the water sources and health facilities as well as age of introduction to complementary
foods. This similarity could be explained by the fact that World Vision Kenya has helped the

community in the construction of health facilities and water tanks in their operational area

On the age of complementary food introduction, this could be influenced by the fact that the health workers encourage the mothers to breastfeed for a longer duration within the project area

The key findings are,

- ❖ High dependence ratios with an average household size of 6 8 and 7 persons in the project area and non-project area respectively

- ❖ Poor exclusive breastfeeding practices with about half (50.6%) receiving complementary foods within the first three months

- ❖ Short duration of breastfeeding with the main reason for stopping breastfeeding being next pregnancy especially at the age of 13-18 months

- ❖ Porridge is the main complementary food with very little amounts of animal proteins and fruits in complementary foods

- ❖ Child immunization was common with over three-quarters of the children having undergone full immunization by the time of the study

- ❖ Nearly half of the children in the project area were taken to hospital when ill though more households use more than one hour to the nearest health facility

- ❖ No latrines in several homes although majority have enclosures

2.6 DISCUSSION

Demographic and socio-economic characteristics

Households in both areas were found to have almost similar characteristics that are reflective of the general characteristics of Eastern Province Both types of households had an almost equal and a relatively larger average household size (6 8 and 7 in the project and non-project

areas respectively) compared to the average household size of 4 8 persons in Eastern Province (CBS, 1999)

Education and Sources of Income

The education level is relatively low compared with other provinces in Kenya with less than 10% of both males and females attaining post secondary education in both areas. Low education levels may account for the high ranking of casual labour as a source of income compared to salaried income in both areas. This explains the poor economic status of the households in both areas since returns from casual labour are low. Further, during dry season there is almost no work to be done in the farms. These observations explain the fact that most mothers were able to prepare and feed their children in most households. However, the quality and quantity of food given is low as reflected in the types of complementary foods given to the children.

Health and Sanitation

Levels of child mortality have been found to decrease with use of safe water sources and latrines (UNICEF, 1998). It is however regrettable to note that the majority of the households in the study area use unsafe water sources. Coupled with the fact that a half of the households take more than two hours to the nearest water sources, this negatively affects the childcare practices and eventually the nutritional status of children as reflected in the UNICEF conceptual framework

The prevalence of fever and diarrhoea is almost similar to the prevalence reported in the Kenya Demographic Health Survey (KDHS) 1998 in both areas. However, prevalence of malaria was lower as compared to the findings of 1994 Kenya nutritional survey (CBS,

1996) The prevalence of some of these diseases could be explained by the fact that a high proportion (>84%) of the households use unprotected water

Although many households reported that they boil water for drinking, it was observed from the homesteads that when the researcher asked for drinking water that this was not the actual practice.

Health Seeking Behaviours

The availability of quality healthy services is a major factor influencing health status of a population. High coverage of immunizations against diseases of childhood is considered to be a safeguard to better nutrition and health (Viteri, 1987). It was observed that a big proportion of the children had completed immunization in both areas. Medical attention was sought by almost a half of the households in the project area in case of illness. This is an indicator that provision of health facilities close to the people enhances the use of the same, which indicates good child health care (UNICEF, 1992)

Child Nutrition

Questions on appropriateness of exclusive breastfeeding up to four months have led to many observational studies regarding this issue. For instance, in Honduras, it was found out that no additional nutritional advantage is derived from complementary foods given at the age of four months rather than six months (Dop *et al.*, 1999). In this study, prevalence of exclusive breastfeeding was very low with nearly all (95%) children receiving complementary foods by the first three months of life. This observation is practically similar with the observation made in the 1998 demographic health survey in which 94% of the children had received supplementation foods within the first four months of life. This could be explained by the fact

that mothers have not yet appreciated the role of exclusive breastfeeding in the early months of life of a child

It has been established that, breastfeeding for up to the age of 24 months has both nutritional and psychological benefits and has been recommended by WHO (Dop *et al.*, 1999). However, it was found that the majority of the children stopped breastfeeding between 13-18 months in both areas, which compares with the findings in an Ethiopian slum area (Abate, 1998). This may be explained by the fact that next pregnancy which is classified as an underlying cause for malnutrition in the UNICEF's conceptual framework (Appendix 1) was one of the major reasons for stopping breastfeeding for children less than 18 months thus, calling for a stop in further breastfeeding. It would also indicate that child spacing is very thin and this is detrimental to the welfare of the elder as well as the younger child. This affects the care practices for children since the mother has to share out her time to care for the newborn. If food for the child being weaned is insufficient then risk to malnutrition increases.

Cereal porridge is the main first complementary food that is given to African infants (Dop *et al.*, 1999) yet starchy cereal porridges have energy and nutrient densities that are lower than those of breast milk (i.e. 30kcal/100ml and 70kcal/100ml respectively). Thus, since cereal porridges was the main complementary food and was not enriched with milk, the energy and nutrient quality of the children's diet was poor. Due to the drought situation in the area, the inadequacy of the diet is even aggravated. This can explain the high prevalence of malnutrition once complementary feeding and eventually weaning begins

The low consumption of animal proteins observed in this study is typical of many developing countries (JICA/GOK, 2000). Dop *et al.* (1999) reported that animal products in Africa are

not frequently added in complementary foods like porridge except in Nigeria Although cow's milk was reported to be given to children in both areas the intake was low because of the drought situation in the area The observations that indicate little difference in the types of complementary foods used in both areas can be explained by the fact that the general level of socio-economic and demographic characteristics was not different

The findings of this study then lead to the conclusion that, the childcare practices in the project area are not significantly different with those in non-project area This then leads to the rejection of the alternative hypothesis (H_1) that, "the childcare practices in the project area are better than in the non-project area" and acceptance of the null hypothesis (H_0) that "there is no difference in childcare practices in the two areas".

2.7 CONCLUSIONS AND RECOMMENDATIONS

Conclusion

On the social economic and demographic characteristics, it is concluded that,

1. The dependency ratio is high in the area yet the sources of income for the majority are poor and unreliable thus poverty level continues to be high affecting the childcare practices negatively

Findings on childcare and feeding practices and dietary intake leads to the conclusion that,

1. Consumption of proteins (especially animal protein) and vitamins among the under five years old is low in both areas and that porridge is the main complementary food

2. With over 95% of the children in Kathonzweni being introduced to complementary foods before the age of six months exclusive breastfeeding up to the age of six months is rarely practiced and almost non-existent.

3   The children's intake of calories and proteins as well as the variety are not different in the two areas because the household's socio-demographic and economic characteristics are similar.

4. Despite the fact that the project area community had their health facilities near, they are no better in their utilisation. Thus, other factors could be attributed to influencing the health seeking behaviours.

Recommendations

It is recommended that:

1. Mothers are encouraged to exclusively breastfeed for at least four months and continue to breastfeed for up to two years,

2. Mothers be encouraged to use the locally available foods to provide a balanced diet for their children.

3. More safe water sources be provided in the area

4. The community be encouraged and assisted to build pit latrines with locally available materials.

5. Further research on the feeding practices is recommended to be able to find out what are the main hindrances to good breastfeeding practices in the area.

REFERENCES

Abate, G. (1998). "Child care practices in households with malnourished children and those with well nourished children in a slum area of Addis Ababa Ethiopia" MSc Thesis, University of Nairobi. Pp 1-6, 37-51.

Central Bureau of Statistics (1996). Kenya fifth nutrition survey 1994, Office of the Vice President and ministry of planning and national development, Kenya. Pp 6-12

Central Bureau of Statistics, (2001). 1999 Population and housing census Vol 1 Ministry of Finance and Economic Planning, Nairobi, Kenya. Pp i-56

Central Bureau of Statistics. Kenya (1999). Kenya demographic and health survey, 1998 National Council for Population and Development, Ministry of Planning and National Development, Nairobi Kenya. Macro International Inc. Calverton, Maryland USA. Pp 9-27,115-124

Den Hartog A.P., Van Steveren W.A. & Brouwer I.D., (1995). Manual for social surveys on food habits and consumption in developing countries Margraf Verlag Weikershem, Germany. Pp 7-10, 67-79

Den Hartog, A.P. and Van Steveren, W.A. (1985). Manual for social surveys on food habits and consumption in developing countries PUDOC, Wageningen, Netherlands. Pp 51-61.

Dop, M.C., Benbouzid, D., Treche, S., De Benoist, B., Verster, A. and Delpeuch, F. (eds) (1999). Complementary feeding of young children in Africa and the Middle East WHO Geneva. Pp 9-58

FAO/WHO/UNU (1985). Energy and protein requirements WHO, Technical report series 724. Geneva. Pp 130-140

Fisher, A.A., Laing, J.A. and Townsend, J.W. (1991) Handbook for family planning operations research, 2nd ed Population Council New York, USA Pp 40-46

Foster, Geoff (1997) Realistic alternatives to breastfeeding in the HIV/AIDS era *AIDS STD Health Promotion Exchange Journal.* 1997, 4 9-11

GOK (1994). Makueni district development plan 1994 – 1996 Office of the Vice President and Ministry of Planning and National Development Nairobi Pp 1-17

GOK (1997). Makueni district development plan 1997 – 2001 Office of the Vice President and Ministry of Planning and National Development Nairobi Pp 3-43.

GOK (1998). First report on poverty in Kenya Vol 2 Poverty and social indicators Ministry of Planning and National Development Pp 4-11, 105

GOK and JICA (2000). "Survey for development and improvement of quality of life in Western Kenya." Ministry of Home Affairs, Kenya Pp 44

Hoorweg, J., Niemeijer, R., Foeken, D., Okello, W. and Veerman, W. (1991). Economic and nutritional conditions at settlement schemes in Coast Province Food and Nutrition Planning Unit, Ministry of Planning and National Development, Kenya and African Studies Centre, Leiden Netherlands Pp 183-187

Jansen, A and Bailey, K O. (1972) The early detection of childhood malnutrition in South Pacific. Geneva, Switzerland Pp 1-2

Kirschmann G. J & Kirschmann J. D. (1996) Nutrition Almanac 4th ed McGraw Hill Book Company. New York, USA Pp 396-466

Norman, G. R. and Streine, D. L. (1986) PDQ Statistics BC Decker Inc Philadelphia, Pennsylvania Pp 27-45.

Ramalingaswani, V., Jonsson, U. and Rhode, J. (1997). Malnutrition A South Asian enigma Malnutrition in South Asia Regional profile UNICEF, Regional Office of South Asia Publication No 5 Kathmandu, Nepal Pp 11-22

Sanghvi, T. and Murray J. (1997). Improving child health through nutrition, the nutrition minimum package Arlington, Va, BASICS project, for USAID USA Pp 3-10

Sehmi, J. K. (1993). National Food Composition Tables and the Planning of Satisfactory Diets in Kenya Government printer, Nairobi Kenya Pp 51-92

Tontisirin K. and Yamborusit U. (1995). Appropriate weaning practices and foods to prevent protein-energy malnutrition, An Asian review *Food and Nutrition Bulletin* 1995; 16 (1): 34-35.

UNICEF (1992) The situation analysis of children and women in Kenya, Nairobi Ministry of planning and national development and UNICEF, Kenya Country Office Pp 1-4,57-92.

UNICEF (1998). The situation analysis of children and women in Kenya, Nairobi Ministry of planning and national development and UNICEF, Kenya Country Office Pp 11-26,121-140,159-195.

UNICEF (1997). The care initiative, Assessment, analysis and action to improve care for nutrition. UNICEF, New York Pp 2-32

UNICEF (1998). The state of the world's children 1998 Oxford and New York Pp 7-35

UNICEF (2000). The state of the world's children 2000 Oxford and New York Pp 9-11

Viteri, F. (1983). Nutrition related health consequences of urbanization *Food and Nutrition bulletin*, 1987; 9 (4): 33-49

CHAPTER THREE

NUTRITIONAL STATUS OF CHILDREN (6-59 MONTHS) IN KATHONZWENI DIVISION, KENYA

3.0 ABSTRACT

In August-September 2000, a comparative cross-sectional survey aimed at assessing and comparing nutritional status of children (6-59 months) drawn from households participating in a World Vision project vis-à-vis non-project area was conducted in Kithuki, Kanthuni and Kathonzweni locations of Kathonzweni division, Makueni district

The principal tool of investigation was a structured questionnaire that was administered to mothers and other children caretakers Anthropometric measurements were taken on all children Purposive sampling was done at the programme level whereas simple random sampling was done at the household level giving a sample size of 320 households in which there had to be a child aged between 6-59 months In households with more than one child at this age category, only one child was picked as the index child and preferably the elder one. Data was collected with assistance of two field assistants and the SPSS/PC computer package was used for data entry and analysis Nutritional status indices such as weight-for-age, height-for-age and weight-for-height were computed using the Epi-Info programme

The study established that there was no significant difference in prevalence of stunting, wasting and underweight between the two areas However, the prevalence of stunting in the project area (46 5%) was slightly higher than in the non-project area (42 1%) The study found that there was a significant relationship between the children's age and their nutritional status based on the level of wasting and underweight (p<0 01) suggesting that there is something about age that reduces risk to wasting and underweight and this could probably be

in relation to the palatability of the food given to children with age increase. A significant relationship between childbirth order and nutritional status based on stunting was found indicating that as the birth order increased, the chances of stunting increased. This could be attributed to the fact that as the childbirth order increases, then the possibility of having more people sharing from the same pot increases thus increasing the risk of malnutrition due to chronic shortage of food.

Finally, no significant difference was noted in the nutritional status in the two areas contrary to what may have been expected. Therefore, the alternative hypothesis is rejected and the null hypothesis that "there was no difference in the nutritional status in the two areas" accepted. It is therefore recommended that mothers be encouraged to exclusively breastfeed for at least the first four months and continue breastfeeding preferably to the second year as it reduces the risk of malnutrition. This could be achieved by making them understand why it is a good strategy. Other recommendations include conducting regular nutritional surveillance.

3.1 INTRODUCTION

The nutritional status of infants and children under five years of age is of particular concern since the early years of life are crucial for future growth and development (Prechulek, *et al.*, 1999). Their nutritional well-being reflects household, community and national investments in family health thereby contributing both directly and indirectly in overall country development (CBS, 1999). The nutritional status of under fives has been used as a proxy under which statements regarding the nutritional situation in developing countries are made and are used as a basis for nutritional planning.

Collection of anthropometric data at the population level helps in the definition of health and nutritional status for purposes of population planning, programming and resource identification as well as in articulation of problems and priorities at the state and national response to MCH health programmes. It is also essential for directing intervention resources to populations or subsections with greatest health and nutritional needs (WHO, 1995)

In this study area, World Vision Kenya has been assisting the community through its maternal projects. However, very little has been done directly to children under five years of age. There is therefore no data on the nutritional situation in World Vision operational area. This nutritional situation data is however important for purposes of comparison especially in nutrition, and health related problems. Out of this concern, a nutritional assessment was conducted to determine the nutritional status of children 6-59 months in the World Vision project area of Kathonzweni Division, Makueni district and to identify whether there is any significant difference in nutritional status of children between the project area and non-project areas. This information could be used by World Vision Kenya for planning in its maternal and infant projects.

The overall objective of the study was to compare the main economic characteristics and nutritional status of the under fives in the project and non-project area. The specific objectives of the study were:

- To determine some selected socio-economic and demographic characteristics of the households in the project area and those outside the project area.
- To determine the levels of malnutrition of children 6 months to the finding positions in both the project area and non-project area.

Collection of anthropometric data at the population level helps in the definition of health and nutritional status for purposes of programme planning, implementation and evaluation, identification of current or past health or socio-economic problems and prediction of future risks and potential response to intervention programmes It is also essential for directing programme resources to populations or communities with greatest health and or nutritional needs (WHO, 1995).

In this study area, World Vision Kenya has been assisting the community through development projects. However, very little has been done directly to children under five years of age. There is therefore no data on the nutrition situation in World Vision operational area This nutritional situation data is however important for purposes of intervention especially in nutrition, and health related practices Out of this concern, a nutritional assessment was conducted to determine the nutritional status of children 6-59 months in the World Vision project area of Kathonzweni Division, Makueni district and to establish whether there is any significant difference in nutritional status of children between the project area and non-project areas This information could be used by World Vision Kenya for planning in its nutritional and health projects

The overall objective of the study was to compare the socio economic characteristics and nutritional status of the under fives in the project and non-project area The specific objectives of the study were:

1   To determine some selected social economic and demographic characteristics of the households in the project area and those outside the project area

2. To determine the levels of malnutrition of children in relation to the feeding practices in both the project area and non- project area

3. To determine the nutritional status of under five year old children by age and sex in the study groups

This study tested the following hypothesis:

1. The nutritional status of children in the project area is better than in the non-project area

3.2 LITERATURE REVIEW

3.2.1 Child Malnutrition

Child malnutrition is the most widely spread disorder in tropical and subtropical areas (Jansen and Bailey, 1972). It is not a simple matter of whether one has satisfied his appetite or not since a child who eats enough to satisfy immediate hunger can still be malnourished (UNICEF, 1998). Malnutrition has been recognized as a consequence of poverty (UNICEF, 1998) and is known to cause a great deal of human suffering, both physical and emotional, while it is viewed in the context of violation of child's human rights (Smith, 2000) The most critically vulnerable groups are children up to the age of three years and women during pregnancy and lactation In children, malnutrition is prone to strike those who lack nutritionally adequate diets, are not protected from frequent illnesses and do not receive adequate care (UNICEF, 1998)

Many children suffer from various kinds of malnutrition It is reliably estimated that, globally 226 million children are stunted, 67 million are wasted and 183 million weigh less than they should for their age (UNICEF, 1998) Increase in prevalence of malnutrition has been reported in Sub-Saharan Africa especially in the 1990's due to regional economic decline Despite years of research, it is still a mystery why some children develop kwashiorkor and others marasmus (UNICEF, 1998).

3.2.1.1 Indicators of Malnutrition

To determine the seriousness of malnutrition, well-established methods like anthropometry, biochemical analysis, chemical examination and dietary intakes are used (Omwega, 2000) These give primary indicators of malnutrition, which include prevalence of stunting, wasting and other deficiency diseases like goitre. Information on social and economic characteristics of the households and the individual survey respondents which constitute the proxy indicators such as age, sex, education, environmental profile of households, childhood and infant mortality rates provide a context for the interpretation of demographic and health indices (Central Bureau of Statistics [CBS], 1999)

3.2.1.2 Causes of Malnutrition

Malnutrition is a pathological condition resulting from a combination of inadequate dietary intake and infection (Jelliffe, 1966) Its causes are complex, multidimensional and interrelated. This multifaceted condition results from a broad range of factors which include; political instability, slow economic growth and the interaction of several factors such as social economic, environmental, agricultural, demographic and cultural factors as well as infections (WHO, 1999, Smith, 2000) Due to these interrelations, a series of multifaceted and multisectoral approaches are needed to deal with it. Causes of malnutrition can be analysed using the conceptual framework that was developed in 1990 as part of the UNICEF Nutrition Strategy (Appendix 1)

According to the strategy, malnutrition is caused by disease, low levels of dietary intake manifested in household food insecurity, inadequate care for women and children, inadequate maternal and child health resulting in morbidity and limited access to other basic services such as education, water and sanitation. Affecting these underlying and immediate causes are

level of knowledge and technology, organizational structures, level and control of income
These are in turn affected by the endogenous circumstances that evolve slowly such as
traditional beliefs and practices, the national resource base and the political and ideological
super structures (UNICEF, 1992, UNICEF, 1997)

In the Kenyan situation, factors pertaining to shelter, women's workload and decision making
opportunities, traditional beliefs and practices and men's attitude towards child care
contribute to malnutrition and eventually maternal and child deaths At location and sub-
location levels, lack of basic services, weak community participation, resource mobilization
and administrative structures that are unresponsive to the community needs further aggravate
the situation of malnutrition (UNICEF, 1992).

3.2.2 Nutrition Assessment
In this study, anthropometry will be used for determination of nutritional status

3.2.2.1 Anthropometric Assessment
Anthropometry is defined as measurement of variations of the physical dimensions and the
gross composition of the human body at different age level and degree of malnutrition in an
individual or a population providing information on past nutritional history (Jelliffe, 1966)
Some of the measurements used in assessment of nutritional status are height, weight and
age. These measures make up the three major anthropometric indices of nutritional status i.e.
height for age, weight for height and weight for age

3.2.2.2 Advantages of Anthropometric Measurements
❖ Procedures are simple, safe and applicable to large sample sizes

❖ Equipment required is inexpensive, portable, durable and can be made or
   purchased locally

❖ Methods are precise and accurate if/when standardized

Identifies mild to severe forms of malnutrition (Omwega, 2000)

3.3 RESEARCH METHODOLOGY

3.3.1 Study Setting

3.3.1.1 Location and Population

The study was conducted in Kathonzweni division of Makueni district (Appendix 10).
Makueni district, previously part of Machakos district is one of the 12 districts in Eastern
Province. It borders Kajiado, Taita Taveta, Kitui and Machakos district. Makueni district has
an area of 7,966km^2. The district has fourteen divisions and is subdivided into 52 locations
and 172 sub-locations.

With an area of 880km^2, the study division (Kathonzweni) has 6 locations and 16 sub-
locations. Out of these, World Vision Kenya has projects in three locations namely,
Mavindini, Kithuki and Kanzokea (Figure 3.1).

The population of Makueni is 771,545 with a growth rate of 3.09%. The district's
dependency ratio is 108:100 (i.e. every 108 dependants rely on 100 productive persons) and
has an average household size of six. Eighteen percent of the population comprise of children
aged less than five years of age. Rapid increase in the district's population is partly attributed
to immigration of people from neighbouring districts into the settlement schemes in the
district (GOK, 1994, GOK, 1997, CBS, 1999, CBS, 2001)

3.3.1.2 Climate

Rainfall is generally scarce and varies from slightly over 1000 mm in the highlands to slightly below 500mm in the low-lying south and southeast parts of the district. Rainfall pattern is bimodal with the long rain season starting from March to April while the short rain season is from November to December

There are three main standard soil types in the district namely, red clay, sandy soils and black cotton soils. There are few permanent rivers and streams of which river Athi is the major perennial river. It drains most of the district. Water for domestic use is mainly from rivers, springs and dams. The distance to the water points increase in the dry season when some of the water sources dry up (GOK, 1994, GOK, 1997).

3.3.1.3 Crops and Livestock

Kathonzweni division falls within the Upper Midland 2 (UM2) agro-ecological zone and is characterized by sandy soil. Livestock farming is a major economic activity in the district while crop farming is mainly for subsistence purposes. There is a high potential for livestock rearing but is adversely affected by the recurrent drought situations. The main food crops grown in the division are maize, beans, peas and cowpeas while cotton and green grams are the major cash crops (GOK, 1994, GOK, 1997)

3.3.1.4 Health and Nutrition Situation

There are 60 established health facilities in the district. Kathonzweni division, with 4 health centres and 4 dispensaries ranks among the divisions with the highest number of health facilities in the area. The most prevalent childhood illnesses in the district are malaria, upper respiratory tract infections, skin diseases, intestinal worms, diarrhoea, pneumonia and eye infections. Inaccessibility to clean drinking water is the main cause of water borne diseases while dirty environment causes diseases like malaria which is a major killer of the district's under-fives (GOK, 1994, GOK, 1997). High poverty levels hinder the use of preventive

measures such as use of mosquito nets to reduce the disease incidence. The infant mortality rate is 96 per 1000 live births (GOK, 1997)

The average malnutrition level in the district is 30% but with a rising trend. This is even higher in the low potential areas of the district like Kathonzweni and is attributed to the recurrent food deficit, low income and hence low purchasing power for food

3.3.1.5 Development Projects

Half of the population in the district lives below the absolute poverty line, which is estimated at Ksh 978 per adult equivalent per month in the rural areas (GOK, 1997, GOK, 1998) The government has intervened through the social dimension of development programme (SDDP), which operates under the district development committee and is responsible for the selection of community-projects based on the individual needs of the group. Five major voluntary agencies namely; Action Aid, World Vision, African Medical Research Foundation (AMREF), Catholic Secretariat and African Inland Church are involved in development projects that include school sponsorship, environmental protection, agriculture, and health services. The three locations in which World Vision is assisting are located in the lower potential area of the division and the majority of the people are nutritionally vulnerable.

3.3.2 Research Methods

3.3.2.1 Study Design

This was a comparative cross-sectional survey, which was descriptive and analytical in nature. It was carried out between August and September 2000. Households within the World Vision project area in Kathonzweni division and with children aged between 6-59 months were compared with those outside the project area but within the division

Observation, interviews and informal key informant interviews were some of the methods employed in the data collection

3.3.2.2 Study Population

The study population consisted of children aged 6-59 months and their respective households in World Vision project area (Kimundi and Yinthungu sub-locations) and in non-project area (Thavu and Yeekanga sub-locations). Hereinafter, these groups are identified as project and non-project areas respectively.

3.3.2.3 Sampling Frame

It consisted of all households in the study area with children aged 6-59 months with their mothers/caretakers as the respondents. From the list of households developed by registering all the households with children 6-59 months in the sub-locations, 160 households from the project area and 160 households in the non-project area were randomly selected giving a sample of 320 households

3.3.2.4 Sample Size Determination

According to the Kenya Demographic Health Survey conducted in 1998, the proportion of children with chronic malnutrition (stunting) in Kenya is approximately 30% (CBS, 1999). This assumption and a confidence interval (CI) of 95% were taken into account for sample size determination

The following statistical formula for comparative studies was used (Fisher *et al*, 1991)

$$n = \frac{2Z^2(pq)}{d^2}$$

Where:

n= The desired sample size for each group

Z= The standard normal deviate, set at 1.96 which corresponds to 95% confidence level

p= The proportion in the total target population expected to be malnourished =0.3

q = 1-p :proportion of well nourished children in the study community = 0.7

d= 0.1 :The approximate test difference in child care practices and nutritional status between the two groups of household which is significant at alpha level of 0.05

Therefore

$$n= 2 \times 1.96^2 \times 0.3 \times 0.7/0.1^2 = 160 \text{ households}$$

3.3.2.5 Sampling Procedure

The sampling procedure is as presented in Figure 3.1. Multi stage sampling was used as described in the following paragraphs

The study was carried out in Makueni Area Development Programme (ADP), which covers part of Kathonzweni division and had been purposively selected from the 27 ADPs of World Vision Kenya. In the Makueni ADP, simple random selection of the three community projects (Mavindini, Kithuki and Kanzokea), which covers two locations, was done in which Kanzokea project was selected. Purposive sampling of the project sub locations was then done. Kimundi and a part of Yinthungu sub-location were selected

Random sampling of the non-project area with characteristics similar to the project area was done. From the four locations without the project, two of them that had the highest number of sub-locations were selected. In each of the selected location, a sub-location was randomly selected of which Yeekanga and Thavu sub-locations were selected. A register of each set of households with children aged 6-59 months was developed and used as the sampling frame. Each household constituted a unit of analysis and had an equal probability of being included in the study. From the sampling frame, 160 households with children aged 6-59 months for

each of the study area were systematically selected This was achieved by first calculating the proportionate sample size for every village From the list, every household with an even number was selected until the intended sample size was achieved For dietary intake, a sub-sample of 30 children from each area was selected by systematic sampling This was achieved by selecting every first and last household where a questionnaire was administered per day for dietary assessment until the required sample size was achieved

Figure 3.1: Flow chart showing the sampling procedure


```
                        ┌─────────────────┐
                        │ WVK. Area       │
                        │ Development     │
                        │ programmes (27) │
                        └─────────────────┘
                        Purposive selection

                    Makueni ADP (Kathonzweni Division)
                        Purposive   selection

        community project locations              Non project locations

                                              simple random  sampling

   Kithuki (3)*        Mavindini (2)*   Kitise (2)*  Mbovo (2)*

                                                  Kanthuni (3)*  Kathonzweni (4)*

        Simple random sampling

                                                         simple  random  sampling
                                                         of sublocations

   Kanzokea    Kithuki      Mavindini

                                                      Yeekanga          Thavu
   Purposive  selection of sub-locations


Yinthungu   Kimundi

   simple random
   sampling

(73) 32 HHs*     (187) 128 HHs*                    80 HHs       80 HHs
 (Dietary recall)                                   (Dietary recall)
 Systematic                                         Systematic
 Sampling                                           Sampling
15HHs              15HHs                            15HHs        15HHs
```

KEY

WVK - World Vision Kenya

ADP - Area Development Programme (consists of several community projects)

HHs - Households

() - Number of households in the area

()* Number of sub locations

*   - Unequal sample size because the project area covers only a small part of Yinthungu sub-location as it was originally in Kimundi sub-location.

3.3.3 Study Tools

3.3.3.1 Questionnaire

A structured questionnaire (Appendix 6) was used in the study to collect information on

> ❖ Socio-demographic and socio- economic characteristics of the study
>
> households (demography, parental education, income sources)

A form in the structured questionnaire (Appendix 6) was used to record information on,

> ❖ Anthropometric measurements (weight, height and MUAC)

This questionnaire was administered to the mothers /caretakers of children in the selected households.

3.3.3.2 Equipments

The following equipments were used

> ❖ A Salter spring weighing scale that could take a maximum of 25 kg and with
>
> a precision of 0.1 kg
>
> ❖ Wooden height/length measuring boards with a precision of 0.1cm

3.3.4 Training of Field Assistants and Pretesting

Two field assistants and a guide who were volunteers in the project, were from the study area and had secondary level of education were recruited having met the required qualities. The field assistants were trained for two days on questionnaire interpretation, method of interaction, and anthropometry data collection techniques They were also trained on the basic field ethics This training continued through the pre-testing period making the period of training into five days. The assistants were also closely monitored in the early stages of the actual data collection

Pre-testing of the study tools was carried out in Kanzokea, a village that neighbours the study villages. A total of 21 households were pre-tested on The results of the pilot study were then used to adjust the original questionnaire. An average of fifteen households were visited per

day since the assistants worked separately on some days while on others they were accompanied by the principal investigator This was in accordance with the days allocated for data collection in the Gantt chart

3.3.5 Data Collection

3.3.5.1 Entry into the Community

Data was collected between mid- August and September 2000. Before the start of the actual data collection, the researcher obtained permission to carry out the study from the Ministry of Education. Thereafter the researcher visited the offices of the Makueni district commissioner and medical officer of health, who both gave permission for the study to be carried out

Through the Makueni ADP manager and Kanzokea community project motivator, the purpose of the study was made clear to the Kanzokea project functional committee as well as the assistant chiefs of the areas concerned

3.3.5.3 Anthropometric Measurements

The anthropometric measurements for the 320 sampled children were taken and their corresponding deviation scores (Z-scores) calculated with reference to the National Centre for Health Statistics (NCHS) population, using cut-off points recommended by the World Health Organization (WHO, 1983).

The procedures followed in measuring weight and height are as described by World Health Organization (1983) and United Nations (UN, 1986) Before taking the weight of each child, scales were adjusted by bringing the scale pointer back to zero mark Each child was weighed with minimum clothing The weight was recorded to the nearest 0.1 kg A measuring board

with an accuracy of 0 1 cm was used to take the children's height For those below two years, supine length was measured while for those above two years vertical height was taken

The children were made to stand barefooted on the flat board with their hands hanging loosely at both sides ensuring both feet were parallel and with the heels, buttocks, shoulders and back of head touching the upright scale Then the child's head was held comfortably erect with the lower border of the orbit of the eye in the same horizontal plane as the external canal of the ear The headpiece of the measuring device was then lowered gently, making contact with the top of the head The child's height was then read to the nearest 0 1cm Two readings for each child were made and the average recorded

For those below two years, the child was made to lie on the board positioning the head firmly against the fixed headboard with the eyes looking vertically at right angle Firm gentle pressure was applied to extend the knees and to make the feet flexed at right angles to the lower legs. The upright sliding foot-piece was moved to make firm contact with heels and the length was recorded to the nearest 0 1cm At least two measurements were also made and an average value was recorded

For Middle Upper Arm Circumference (MUAC), an arm circumference non-stretch tape graduated in centimetres and marked in appropriate colours (green, yellow and red) was used The midpoint of the child's left upper arm was determined by first locating the tip of the child's shoulder with the finger- tips The child's left arm was bent at the elbow and then the tape was placed at zero on the tip of the shoulder and pulled straight down past the tip of the elbow. To determine the midpoint, the tape was bent up to the middle length of the distance from the tip of the shoulder to the tip of the elbow

The arm was gently straightened and the tape was wrapped around the arm at the midpoint mark with the window on the slotted tape facing the reader. The tape was pulled at both ends at the same time to get a feel of the arm and to ensure the right tension. The tape was then secured by placing the index finger and thumb of the right hand directly next to the function between the tape and the slot. Once satisfied with the position of the tape, the window was placed over the numbers aligning the arrows against the numbers. The arm circumference measurement was then read twice to the nearest 0.1cm and recorded in the form after which, the tape was removed from the child's arm. The acceptable degree of error was ±1 mm.

3.3.6 Data Entry, Cleaning and Analysis

The data was transformed into codes that had been developed during questionnaire preparation, entered and analysed at the Crop Science Computer room, Upper Kabete Campus, University of Nairobi, using SPSS version 8 (Statistical Package for Social Scientists) computer package. Thereafter, frequencies of all the variables were generated and used in checking for outliers. To ensure that all the information had been correctly entered frequencies for non-continuous data and the mean values for continuous data were obtained before carrying out statistical analysis.

Comparison of the two study groups was done by administering chi-square and t-test at p-value less than 0.05 level of significance. Odds ratio and Pearson's correlation were applied where appropriate (Norman and Streine, 1986). Confidence intervals were determined as applicable so as to indicate the precision of the study estimates as population values. The Epi-Nut module in Epi-Info programme was used to convert raw anthropometric data (weight and height) into nutritional indicators (Weight-for-Age {WAZ}, Height-for-Age {HAZ}, and

Weight-for-Height (WHZ)) and compare them with the National Centre for Health Statistics (NCHS) reference figures.

Two questionnaires were excluded from further analysis since they were flagged off during conversion and counterchecking from the raw data indicated the measurements as correctly entered in the computer. Therefore, the analysis for nutritional status was done on 318 children.

3.3.7 Data Quality Control

This was achieved through pre-testing of the questionnaire. Counter checking of the filled questionnaires was done every day by the researcher to check for completeness and clarity of entries.

To reduce inter and intra observer errors, readings of anthropometric measurements had to be done twice. After entering the data, frequencies of all the variables were done to ensure that all information had been correctly entered.

The flagged nutritional indicators were removed from further analysis in nutritional status.

3.3.8 Limitations

Since this is one of the areas that was curved out of Machakos district just about ten years ago, the infrastructure is still very poor and transport from one place to another was a problem. The households, especially those in the non-project area were scattered and coupled with the fact that the respondents were hesitant to give information at the beginning of the interview consumed a lot of time. Other households were not willing to give information if there was no immediate assistance forthcoming while others thought that the investigators had ill motives.

3.4 RESULTS

3.4.1 General Nutrition Status

The prevalence of malnutrition by different indices of nutritional status based on height for age, weight for age, and weight for height are shown in Figure 3.2 and Tables 3.1. They are represented using nutritional indicators stunting, underweight and wasting respectively

Figure 3.2: Prevalence of malnutrition among children in the project and non-project area
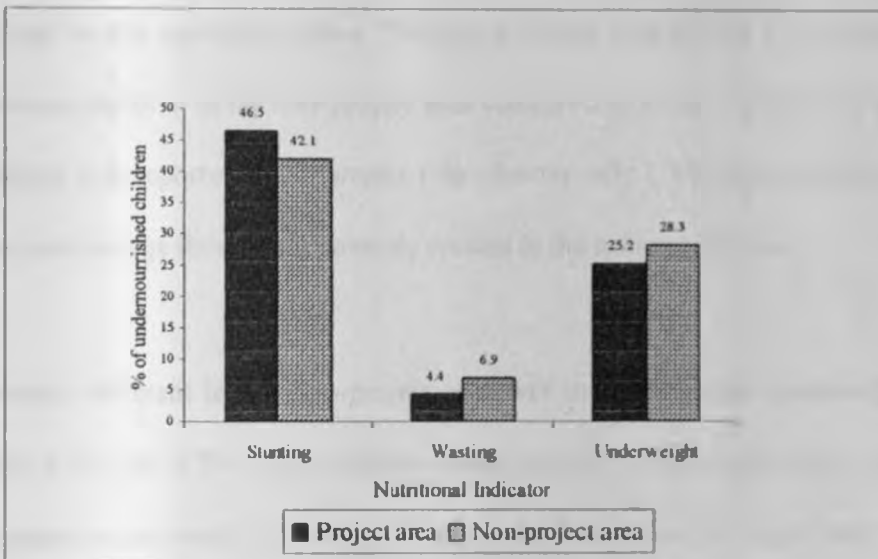
The prevalence of chronic malnutrition manifested as stunting was higher in the project area compared to the non-project area (Table 3.1) but chi square test showed that the difference was not significant (p=0.500, OR= 0.859, CI= 0.552-1.336) The risk of being chronically malnourished was about 0.2 times lower in the non-project area compared to the project area In each of the study areas, 17.6 % of the children were severely stunted

Table 3.1: Prevalence of malnutrition in project and non-project areas

	Project Area N=159		Non-Project Area N=159		P-value	Odds Ratio	Confidence Intervals
	Normal >-2sd	Global malnutrition <-2sd	Normal >-2sd	Global malnutrition <-2sd			
Wasting (WFH)	152 (95.6)	7 (4.4)	148 (93)	11 (7)	0.332	1.614	0.609-4.274
Stunting (HFA)	85 (53.5)	74 (46.5)	92 (57.9)	67 (42.1)	0.500	0.859	0.552-1.336
Underweight (WFA)	119 (74.8)	40 (25.2)	114 (71.7)	45 (28.3)	0.527	1.174	0.714-1.929

In parentheses- percentages

In the project area, it was observed that the percentage of children who showed signs of acute malnutrition (wasting) was lower though not significantly (p= 0 332, OR= 1 614, CI= 0 609-4.274) than in the non-project area The risk of being wasted was 1 6 times more likely to occur among children in the non-project area compared to those in the project area No severe malnutrition was reported in the project area whereas only 1 3 % of the children were

A higher percentage though not severely wasted in the non-project area

significantly different in the non-project area was underweight as compared to the project area with 4.4% and 5.7% of the children being severely underweight in the project and non-project areas respectively. The risk of being underweight was 1 7 times more likely to occur in the non-project area compared to the project area (p= 0.527, OR= 1.174, CI= 0 714 - 1.929).

Using MUAC, results show that 7.8% of the children were below –2 standard deviation from the reference values by age specific cut-off points (Appendix 9) However, using a fixed cut-off point of 12.5 cm, 4 1% of the children were wasted with a higher but not statistically significant proportion in the non-project area (5%) compared to the project area (3 1%)

3.4.2 Nutritional Status by Age and Sex

A higher but statistically insignificant proportion of males under five years old were underweight in the non-project area (32 5%) compared to the project area (27 2%) (Table 3 2). However, this was the vice versa for females where a higher proportion was underweight in the project area compared to the non-project area

A higher proportion of both boys and girls in the project area were stunted compared to the non-project area, although there was no statistical significance On the other hand, a higher proportion of children in the non-project area (5 1%) were wasted than in the project area (3 7%).

Table 3.2: Prevalence of malnutrition by sex and age by study group

Sex Wasting	Project Area		Non-Project Area		
	N	Global Malnutrition (<-2sd)	N	Global Malnutrition (<-2sd)	P-value
Male	81	3 (3.7%)	83	7 (8.4%)	0.206
Female	78	4 (5.1%)	76	4 (5.3)	0.970
Stunting					
Male	81	42 (51.9%)	83	38 (45.8%)	0.437
Female	78	32 (41%)	76	29 (38.2%)	0.716
Underweight					
Male	81	22 (27.2%)	83	27 (32.5%)	0.453
Female	78	18 (23.1%)	76	18 (23.7%)	0.929
Age					
Wasting					Significance
6-12 months	19	0 (0)	16	0 (0)	NS
13-24 months	46	2 (4.3)	51	6 (11.8)	NS
>24 months	94	5 (5.3)	92	5 (5.4)	NS
Stunting					
6-12 months	19	6 (31.6%)	16	4 (25%)	NS
13-24 months	46	25 (54.3%)	51	30 (58.8%)	NS
>24 months	94	43 (45.7%)	92	33 (35.9%)	NS
Underweight					
6-12 months	19	1 (5.3%)	16	1 (6.3%)	NS
13-24 months	46	10 (21.7%)	51	20 (39.2%)	NS
>24 months	94	29 (30.9%)	92	24 (26.1%)	NS

Chi square tests. Significance at 0.05 level

At the first year of life, stunting levels are characteristically low in both the project and non-project areas (Table 3.2). The levels rise drastically to well over a half in both the project area (54.3%) and non-project area (58.8%) between the age of 13-24 months. At the age of 13-24 months, the prevalence of wasting is higher in the non-project area (11.8%) than in the project area (4.3%). Underweight levels rise from the second year of life in both areas

3.4.3 Prevalence of malnutrition with age at which breastfeeding stopped

The prevalence of wasting was found to be higher among children who had breastfed for less than 12 months in both areas (Table 3 3) This decreased with a longer time of breastfeeding in both the project and non-project area A high but not significantly different proportion of children (41 6% and 50% in the project and non-project area respectively) who breastfed for less than 12 months was found to be underweight (<-2sd) A rise in the prevalence of underweight after 24 months was observed in both areas

Nearly half (41.7%) of the children in the project area and a half (50%) in the non-project area of those who breastfed for less than 12 months were severely stunted This prevalence decreased in both areas as the duration of breastfeeding increased except in the non-project area where a rise in moderate stunting for children breastfeeding for more than 24 months was observed. The prevalence of malnutrition in both areas in relation to breastfeeding time was however, not significantly different

Table 3.3: Prevalence of malnutrition in relation to breastfeeding duration

Variable	Project area N=103		Non-project area N=93		
Wasting	n	Malnourished	n	Malnourished	Significance
<12 months	12	1 (8.3)	6	1 (16.7)	NS
13-18 months	45	2 (4.4)	35	2 (5.7)	NS
19-24 months	23	1 (4.3)	31	1 (3.2)	NS
> 24 months	23	1 (4.3)	21	1 (4.2)	NS
Underweight					
<12 months	12	5 (41.7)	6	3 (50)	NS
13-18 months	45	14 (31.1)	35	7 (20)	NS
19-24 months	23	5 (21.7)	31	7 (22.6)	NS
> 24 months	23	6 (26.1)	21	6 (28.6)	NS
Stunting					
<12 months	12	9 (75)	6	3 (50)	NS
13-18 months	45	22 (48.9)	35	14 (40)	NS
19-24 months	23	8 (34.8)	31	11 (35.5)	NS
> 24 months	23	6 (26.1)	21	8 (38.1)	NS

Chi-square tests. Significance at P<0.05 level. Percentages (in parentheses) calculated within the particular breastfeeding duration.

3.4.4 Prevalence of malnutrition with reasons given for stopping breastfeeding

A higher prevalence of stunting was observed among children who stopped breastfeeding because their mother got pregnant, that is 52.8% in the project and 48% in the non-project area but the difference in the two areas was not significant (Figure 3.3 a). The higher prevalence of stunting in the project area was also found with all the other given reasons.

Slightly more than a quarter of the children who stopped breastfeeding because their mothers became pregnant in both the project (29.6%) and non-project (28%) area were underweight (Figure 3.3 b). The risk of being stunted for those children who stopped breastfeeding so that their mothers could go back to work was three times more in the non-project area (p=0.429, OR=3.000, CI 0.19-47.96) compared to the project area while the risk for being underweight was two times more (p=2.000, OR=2.000, CI 0.15-26.73)

Figure 3.3a: Prevalence of stunting with reference to reasons given for stopping breastfeeding by area
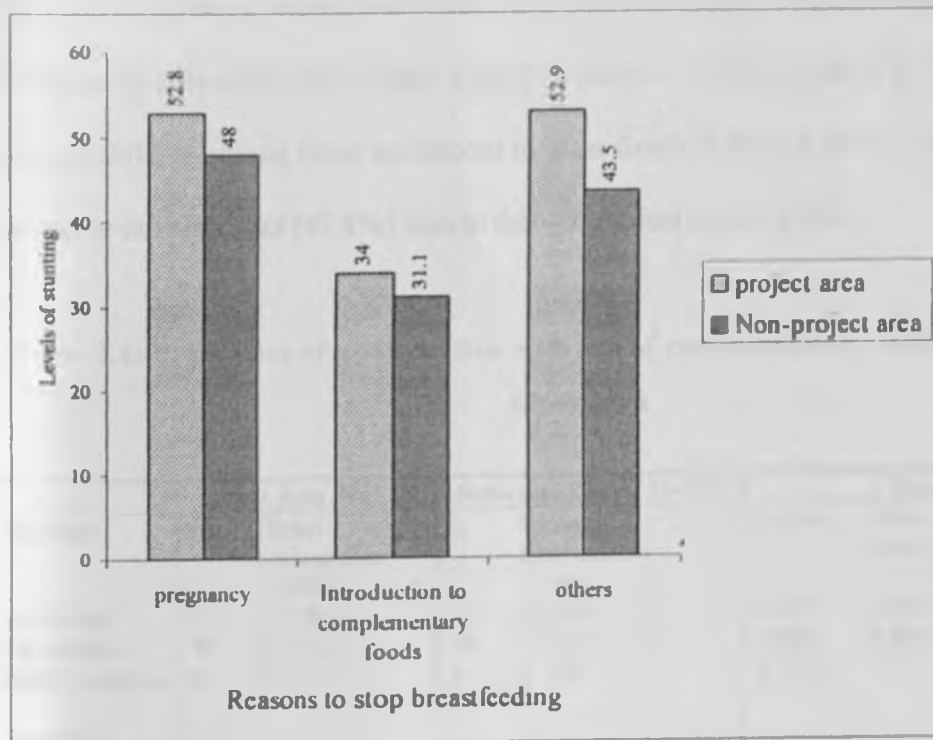
Others include child sickness or refusal, mother's death or resumption to official duty.

Figure 3.3b: Prevalence of underweight with reference to reasons given for stopping breastfeeding by area
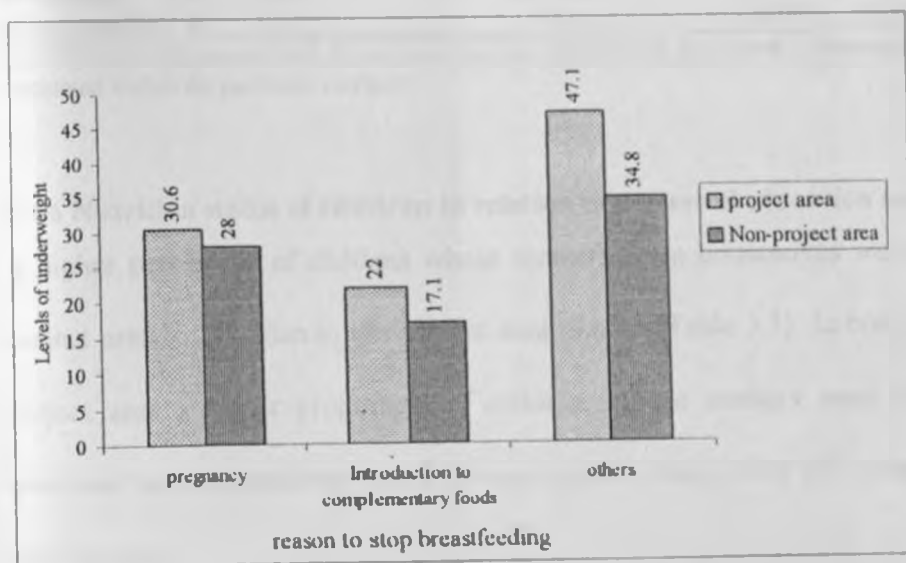
Others include child sickness or refusal, mother's death or resumption to official duty.

3.4.5 Prevalence of malnutrition with age of child at complementary food introduction

For the children who received other foods apart from breast milk within the first 3 months of life, the risk of being wasted was twice more likely to occur in the non-project area compared to the project area (p=0.259, OR= 2.43, CI= 0.498- 11.823) (Table 3.4). The proportion of stunted children among those introduced to other foods at the age of four to six months in the project area was higher (47.8%) than in the non-project area (33.3%)

Table 3.4: Prevalence of malnutrition with age of complementary food introduction by study area

Wasting	Project Area N=159		Non-project Area N=159		Chi-square tests		
	n	Global Malnutrition <-2sd	n	Global Malnutrition <-2sd	P value	Odds Ratio	Confidence Intervals
<3 months	59	2 (3.4)	102	8 (7.8)	0.259	2.426	0.40-11.8
4-6 months	92	3 (3.3)	51	3 (5.9)	0.454	1.854	0.36-9.54
After 6 months	8	2 (25)	6	0 (0)	0.186	-ᵃ	-
Stunting							
<3 months	59	26 (44.1)	102	47 (46.1)	0.805	1.085	0.57-2.07
4-6 months	92	44 (47.8)	51	17(33.3)	0.093	0.545	0.271.11
After 6 months	8	4 (50)	6	3 (50)	1.000	1.000	0.12-8.31
Underweight							
<3 months	59	12 (20.3)	102	31 (30.4)	0.165	1.710	0.80-3.66
4-6 months	92	23 (25)	51	12 (23.5)	0.845	0.923	0.41-2.06
After 6 months	8	5 (62.5)	6	2 (33.3)	0.280	0.300	0.03-2.76

ᵃ Could not be determined since the value in the non-project area is constant ᵇ Percentages (in parentheses) calculated within the particular category

3.4.6 Nutrition status of children in relation to maternal education and occupation

A higher percentage of children whose mothers were housewives were wasted in the non-project area (6.2%) than in the project area (4.6%) (Table 3.5) In both the project and non-project area a higher proportion of children, whose mothers were housewives or casual labourers were stunted than those whose mothers were either self- employed or in salaried employment.

Wasting levels were higher in both areas for those children whose mothers had either attended informal education or had not attended school. Stunting levels were higher among children whose mothers had gone up to secondary education in the non-project area (50 6%) compared to those in the project area (41 5%) The levels of malnutrition were however not significantly different in the two areas in relation to both the mothers education and occupation

Table 3.5: Distribution of children by levels of malnutrition in children according to education and occupation status of mothers

Maternal characteristics	Nutrition indicators											
	Project Area						Non-project Area					
Occupation	Wasting		Stunting		Underweight		Wasting		Stunting		Underweight	
	n	%ᵃ	n	%ᵃ	n	%ᵃ	n	%ᵃ	n	%ᵃ	n	%ᵃ
Housewife	6	4 6	65	49 6	35	26.7	8	6.2	56	43.4	38	29.5
Casual labourer	0	0	4	26 7	3	20	2	10.5	6	31.6	4	21
Self/salaried employed	1	9 1	2	18 2	2	18 2	0	0	2	22 2	1	11.1
Education attained												
Primary	2	3 8	28	52 8	21	39.6	2	5	14	35	5	12.5
Secondary	1	1.5	27	41.5	10	15.4	6	7 8	39	50 6	28	36.4
Post secondary	1	4 8	9	42.9	2	9 5	0	0	6	27.3	4	18 2
Informal/none	3	17 6	10	58 8	7	41 2	2	14 3	6	42 9	6	42 9

ᵃ Percentages calculated within the particular category

3.4.7 Other factors related to the nutritional status of the study children

In order to assess the other factors responsible for the nutritional outcome of this study an inter-variable correlation analysis was done (Table 3 6). The Pearson's correlation matrix shows that the relationship between independent variables and nutritional status indicators do not automatically imply causal relationship

Table 3.6: Pearson correlation coefficients for some variables with specific nutritional indicators for children in the project and non-project areas

Characteristics	Project area			Non-project area		
	Stunting	Wasting	Underweight	Stunting	Wasting	Underweight
Stunting	1.000	-0.089	0.645**	1.000	-0.020	0.711**
Wasting	-0.189*	1.000	0.608**	-0.020	1.000	0.675**
Underweight	0.645**	0.608**	1.000	0.711**	0.675**	1.000
Child age	0.044	-0.356**	-0.189*	-0.032	-0.281**	-0.211**
Childbirth order	0.159*	-0.057	-0.156*	-0.131	-0.034	-0.069
Protein amount	-0.120	0.016	-0.111	-0.165	-0.082	-0.168
Caloric amount	-0.101	0.016	-0.144	-0.217	0.092	-0.120

**- Significant at 0.01 level (2-tailed test)   *- Significant at 0.05 level (2-tailed test)

A positive and linear relationship was found to exist between stunting and underweight and wasting and underweight. This relationship was significant at 0.01 level using a two-tailed test. This could imply that nutritional problems among study children were closely linked in terms of the causes and frequency. The fact that stunting and underweight related positively shows that age is an important factor for weight gain.

In both groups, there was a negative and significant relationship between the children's age and their nutritional status based on the level of underweight. This implies that age is a factor in weight gain and the tendency of a child to eat a variety from different sources increases with age thus reducing the risk of malnutrition. Similar observation was made in relation to wasting and child's age. This could be explained by the fact that, in the early months of life the child is at increased risk of getting insufficient food or breast milk whereas with age increase the child can eat a variety of foods thus reducing the risk of being wasted.

A significant positive relationship between childbirth order and stunting in the project area was observed. This could be explained by the fact that the childbirth order increases then the

possibility of having more people sharing from the same pot also increases. This then increases the risk of malnutrition especially if the food available is little

3.5 SUMMARY

The results of this study show that the prevalence of malnutrition in the community among the under five year old children is high and clearly confirm that malnutrition is still a wide spread health problem. This is precipitated by many factors such as breastfeeding practices, complementary feeding practices, health seeking practices, birth spacing, education levels and the general socio-economic status.

The key findings are:

❖ Chronic malnutrition among children is very high. It is higher than the provincial prevalence reported in 1998.

❖ Wasting levels were high among children whose mothers had no formal education.

❖ There was high prevalence of stunting among children who stopped breastfeeding because their mothers got pregnant.

❖ For those children who were breastfed for a period of over 12 months, the prevalence of stunting was low.

3.6 DISCUSSION

In general, prevalence of stunting was high but the prevalence of wasting was low in both areas as is usually found in non-emergency situations (Jooste *et al.*, 1997). The stunting levels of children in both groups (Section 5.3.2) imply similar past nutritional experience in both groups of children. Stunting levels observed were higher than the levels reported in the 1998 demographic health survey for Eastern Province (36.8%) in both groups (CBS 1999)

and almost similar with those estimated by WHO for developing countries (43%) (Zoakah *et al.*, 2000) Stunting is generally associated with low socio-economic status (Jooste *et al.*, 1997), which is the case in both areas. This is confirmed by findings reported in chapter four on housing conditions, education levels and employment in both areas

The observation that the prevalence of stunting in the first year of life is low is similar to findings of a survey conducted in the year 2000 in Tharaka district (Applied Nutrition Programme (ANP), 2000). This could be attributed to poor weaning and complementary feeding practices leading to an inadequate energy and protein intake. Similar results of increase in stunting with age have been reported in Nigeria, Samburu and Nyambene district (Zoakah *et al.*, 2000, Kielmann *et al.*, 1988, Meme, 1996).

Prevalence of severe wasting was higher in the non-project area (1.3%) than the 1998 provincial figures of 0.9% for severe wasting (CBS, 1999) High prevalence of wasting between the ages of 12-29 months compares with the provincial prevalence reported in the 1998 demographic health survey. This may be explained by the fact that most mothers wean their children at around this age. Prevalence of underweight was also found to be higher in both areas than the national average of 22.2%. The high prevalence of underweight and stunting is also similar with findings observed in a survey for drought prone districts of Kenya (Kogi-Makau *et al.*, 2000). This implies that the situation in this area is worse off than that of the average area in Kenya This could be explained by the recurring drought situations in the district, which result in food shortages and thus inadequate dietary intake over a long period

The positive significant relationship between childbirth order and prevalence of stunting could be explained by the fact that the family pot is shared among a large number of people in the household, thus inadequate dietary intake by children for a prolonged period and eventually the manifestation of chronic malnutrition The negative significant relationship between wasting and child age indicates that cases of wasting are more prevalent with younger children This could be explained by the fact that as a child grows older, he/she has access to different foods than a young infant who depends on only what is provided by the mother/caretaker Meme (1996) made the same observations

No significant relationship was found between caloric and protein intake and nutritional status of the children This could suggest that the 24hr recall is not sufficient to predict the nutritional status for the children in the area Similar findings have been reported by Amand *et al.*, (1995) in an Australian Aborigine community and Abate (1998) in an Ethiopian slum area.

The observation of high prevalence of malnutrition in children who breastfed for less than 12 months in both areas could be attributed to the fact that although breastfeeding stopped, the child did not get enough complementary foods and may have been previously exposed to infections which could have resulted in reduced dietary intake leading to malnutrition High prevalence of stunting of children who stopped breastfeeding due to their mother becoming pregnant was reported while severe cases of underweight and stunting were reported on children who were introduced to complementary foods after the age of six months in both areas. This could be attributed to inadequate dietary intake as well as reduced attention of the children with the arrival of a new baby

The findings of this study then lead to the conclusion that, the nutritional status of children in the project area is not significantly different with those in non-project area. This then leads to the rejection of the alternative hypothesis (H_1) that, "nutritional status in the project area is better than in the non-project area" and acceptance of the null hypothesis (H_0) that "there is no difference in nutritional status in the two areas"

3.7 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

On the social economic and demographic characteristics, it is concluded that,

1. Maternal education and occupation affects the nutritional status of children

2. Age is an important factor in nutrition

On the nutritional situation, it is concluded that;

1. Chronic malnutrition among children is still a problem as reflected by the high prevalence of stunting

2. Prevalence of stunting and wasting reduces if the children are exclusively breastfed for the first six months and continues breastfeeding during the second year of life

Recommendations

A combined effort by the government, Non-governmental organizations and the community at large is of ultimate importance in reducing the effects of drought and low economic status on the nutritional situation in this area. It is recommended that

1. Mothers are encouraged to exclusively breastfeed for at least four months and continue to breastfeed for up to two years, as it is highly likely that this would reduce the levels of malnutrition among children and also act as a natural family planning method.

2. Nutrition surveillance be done continually and information about the nutritional status of the population gathered regularly to help in proper targeting for other future projects.

REFERENCES

Abate, G. (1998). "Child care practices in households with malnourished children and those with well nourished children in a slum area of Addis Ababa Ethiopia " MSc Thesis, University of Nairobi Pp 1-6, 37-51.

Amand, J. L., Smith, A., Bryce, S., Kerin O' Dea, Rutishanser, I. H. E. and Mathews, J.D (1995) . Measuring dietary intake in remote Australian communities *Ecology of Food and Nutrition journal.* 1995, **34** 13-30

ANP (2000) Food and nutrition security survey in Maragua and Gikingo locations of Tharaka district, Eastern Province, Kenya Applied Nutrition Programme, Department of Food Science Technology and Nutrition, University of Nairobi Pp17-45.

Central Bureau of Statistics, (2001). 1999 Population and housing census Vol 1. Ministry of Finance and Economic Planning, Nairobi, Kenya Pp i-56

Central Bureau of Statistics. Kenya (1999). Kenya demographic and health survey, 1998 National Council for Population and Development, Ministry of Planning and National Development, Nairobi Kenya Macro International Inc Calverton, Maryland USA Pp 9-27,115-124.

Fisher, A.A., Laing, J.A. and Townsend, J.W. (1991) Handbook for family planning operations research, 2nd ed Population Council New York, USA Pp 40-46

GOK (1994). Makueni district development plan 1994 – 1996 Office of the Vice President and Ministry of Planning and National Development Nairobi Pp 1-17.

GOK (1997). Makueni district development plan 1997 – 2001 Office of the Vice President and Ministry of Planning and National Development Nairobi Pp 3-43.

GOK (1998). First report on poverty in Kenya Vol 2 Poverty and social indicators Ministry of Planning and National Development Pp 4-11, 105

Jansen, A and Bailey, K O. (1972) The early detection of childhood malnutrition in South Pacific Geneva, Switzerland Pp 1-2

Jellife D.B. (1966) The assessment of nutritional status of the community WHO Monograph series No 53,WHO, Geneva Pp 50-78

Jooste P.L, M.L. Langenhoven, J.A. Kriek, E. Kunneke, M. Nyaphusi, B. Sharp. (1997). Nutritional status of rural children in the Lesotho highlands *East African Medical Journal.* 1997; 74 (11): 680-688

Kielmann, A.A., A.S. Ehrlich, A.A.J. Jansen, N. Kielmann, D.M. Kinyingi, G.W. Maina. G.K. Maritim, J.N. Mutuga and D.N. Njama (1988) Assessment of the nutritional impact of the Wamba food security programme Unit of Applied Human Nutrition, Department of Food Science, Technology and Nutrition, University of Nairobi. Pp 31-36.

Kogi-Makau,W., Muroki, N. M. and Omwega, A. (2000). A rapid food and nutritional assessment in six drought prone districts in Kenya, socio -economic characteristics of households and nutritional status of children ANP/ANAPH, Department of Food Science, Technology and Nutrition, University of Nairobi Pp 63-65

Meme, M. R (1996). "Nutrient intake and nutritional status of primary school children in a school with and without a feeding programme in Nyambene District, Kenya " MSc Thesis, University of Nairobi Pp 48-71

Norman, G. R. and Streine, D. L. (1986) PDQ Statistics BC Decker Inc Philadelphia, Pennsylvania Pp 27-45.

Omwega A. M. (2000). Nutrition and nutrition assessment. *East African Medical Journal.* 2000, 77 (3) 121-122.

Prechulek, H., J. M. Aldana and N. Hasan. (1999). Feeding practices and malnutrition in children in rural Bangladesh *Food and Nutrition Bulletin* 1999, 20 (4) 396-400

Smith L.C. and Haddad L. (2000). Explaining child malnutrition in developing countries. A cross-country analysis. Research Report (III) International Food Policy Research Institute. Washington DC. Pp 1-4

UNICEF (1992). The situation analysis of children and women in Kenya, Nairobi. Ministry of planning and national development and UNICEF, Kenya Country Office. Pp 1-4,57-92

UNICEF (1997). The care initiative, Assessment, analysis and action to improve care for nutrition. UNICEF, New York. Pp 2-32

UNICEF (1998). The situation analysis of children and women in Kenya, Nairobi. Ministry of planning and national development and UNICEF, Kenya Country Office. Pp 11-26,121-140,159-195.

UNITED NATIONS (1986). How to weigh and measure children; Assessing the nutritional status of children in household surveys. Dept of technical cooperation for development and statistical office. Newyork, USA. Pp 6-65

WHO (1983). Measuring change in nutritional status. Guidelines for assessing the nutritional impact of supplementary feeding programmes for vulnerable groups. Geneva. P 12-14.

WHO (1995). Physical Status: The use and interpretation of anthropometry. Technical report series 854. Geneva. Pp 161-255, 439-440

WHO/BASICS/UNICEF (1999). Nutrition essentials, A guide for health managers. Pp 1-21.

Zoakah, A.I., L.O. Idoko, M.O. Okoronkwo and O.A. Adeleke. (2000). Prevalence of malnutrition using Z-scores and absolute values in children under five years of age in Utan village, Jos, Plateau state, Nigeria. *East African Medical Journal.* 2000, 77 (3): 123-126

Appendix 1: CONCEPTUAL FRAMEWORK of NUTRITION (UNICEF 1992)

Manifestation

Maternal and under 5yrs child death

Malnutrition

Immediate causes

Inadequate dietary intake ⟷ diseases

Household food

Reproduction processes

Inadequate maternal and child health care

Limited access to basic services

Underlying Causes

Knowledge, technology, organizational structures, income and its control

Political and Ideological superstructure
Traditional beliefs and practices

Basic Causes

NATIONAL RESOURCE BASE

Appendix 2: Sex-Age distribution of children of the visited households by area

Area	Sex	Age group in years									
		0-5		6-14		15-64		+65		total	
		n	%	n	%	n	%	n	%	n	%
Project area	1	162	30.9	137	26.1	210	40.1	15	2.9	524	47.7
	2	131	22.8	159	27.7	268	46.6	17	3	575	52.3
	Total	293	26.7	296	26.9	478	43.5	32	2.9	1099	-
Non- project area	1	166	31.7	146	27.9	201	38.4	11	2.1	524	48.8
	2	148	27	131	23.9	256	46.6	14	2.6	549	51.2
	total	314	29.3	277	25.8	457	42.6	25	2.3	1073	-
Grand total		607	27.9	573	26.4	935	43.0	57	2.6	2172	-

Legend
1=male
2=female

Appendix 3: Prevalence of stunting among children under-five years in the project and non-project area by age

Age in months	Normal						Moderate						Severe					
	Males			Females			Males			Females			Males			Females		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
6-11	20	12	60	12	11	91.7	20	6	30	12	1	8.3	20	2	10	12	0	0
12-17	26	10	38.5	24	11	45.8	26	8	30.8	24	9	37.5	26	8	30.8	24	4	16.7
18-23	19	4	21	23	14	60.9	19	9	47.4	23	5	21.7	19	6	31.6	23	4	17.4
24-29	18	11	61.1	25	18	72	18	3	16.7	25	2	8	18	4	22.2	25	5	20
30-35	21	11	52.4	16	9	56.3	21	7	33.3	16	4	25	21	3	14.3	16	3	18.8
36-41	19	12	63.2	20	9	45	19	4	21	20	7	35	19	3	15.8	20	4	20
42-47	13	7	53.8	12	8	66.7	13	3	23.1	12	3	25	13	3	23.1	12	1	8.3
48-53	17	9	52.9	14	8	57.1	17	5	29.4	14	5	35.7	17	3	17.6	14	1	7.1
54-59	11	8	72.7	8	5	62.5	11	2	18.2	8	2	25	11	1	9.1	8	1	12.5
Total	164	84	51.2	154	93	60.4	164	47	28.7	154	38	24.7	164	33	20.1	154	23	14.9

Appendix 4: Prevalence of underweight among children under-five years in the project and non-project area by age

Age in months	Normal						Moderate						Severe					
	Males			Females			Males			Females			Males			Females		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
6-11	20	18	90	12	12	100	20	2	10	12	0	0	20	0	0	12	0	0
12-17	26	15	57.7	24	21	87.5	26	10	38.5	24	3	12.5	26	1	3.9	24	0	0
18-23	19	10	52.6	23	18	78.3	19	6	31.6	23	4	17.4	19	3	15.8	23	1	4.3
24-29	18	12	66.7	25	19	76	18	3	16.7	25	5	20	18	3	16.7	25	1	4
30-35	21	14	66.7	16	13	81.3	21	6	28.6	16	2	12.5	21	1	4.8	16	1	6.25
36-41	19	16	84.2	20	11	55	19	2	10.5	20	9	45	19	1	5.3	20	0	0
42-47	13	8	61.5	12	12	100	13	4	30.8	12	0	0	13	1	7.7	12	0	0
48-53	17	13	76.5	14	8	57.1	17	4	23.5	14	3	21.4	17	0	0	14	3	21.4
54-59	11	9	81.8	8	4	50	11	2	18.2	8	4	50	11	0	0	8	0	0
Total	164	115	70.1	154	118	76.6	164	39	23.8	154	30	19.5	164	10	6.1	154	6	3.9

Appendix 5: Prevalence of wasting among children under-five years in the project and non-project area by age

Age in months	Normal						Moderate						Severe					
	Males			Females			Males			Females			Males			Females		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
6-11	20	20	100	12	12	100	20	0	0	12	0	0	20	0	0	12	0	0
12-17	26	22	84.6	24	23	95.8	26	3	11.5	24	1	4.2	26	1	3.8	24	0	0
18-23	19	17	89.5	23	22	95.7	19	1	5.3	23	1	4.3	19	1	5.3	23	0	0
24-29	18	16	88.9	25	24	96	18	2	11.1	25	1	4	18	0	0	25	0	0
30-35	21	21	100	16	16	100	21	0	0	16	0	0	21	0	0	16	0	0
36-41	19	18	94.7	20	19	95	19	1	5.3	20	1	5	19	0	0	20	0	0
42-47	13	12	92.3	12	12	100	13	1	7.7	12	0	0	13	0	0	12	0	0
48-53	17	17	100	14	10	71.4	17	0	0	14	4	28.6	17	0	0	14	0	0
54-59	11	11	100	8	8	100	11	0	0	8	0	0	11	0	0	8	0	0
Total	164	154	93.9	154	146	94.8	164	8	4.9	154	8	5.2	164	2	1.2	154	0	0

Appendix 6: Household Questionnaire

CHILD CARE PRACTICES AND NUTRITION SURVEY

MAKUENI DISTRICT

SEPTEMBER 2000

Identification

1   Location_____Sublocation_____Village_____H/H No_____

Name of Interviewer_____Date of interview:_____/_____/200

Respondents name:_____   sex:____R/ship to H/H head_____

Name of H/H head:_____sex:____ (1=male 2=female)

Marital status of HHH_____ 1=married 2= single 3= separated/divorced 4= windowed

2 Information for all household members

S.No	Name	Sex (1=male 2= female)	Age (Year)	Religion -codes-	Education -codes-	Occupation -codes-	Brings money to household 1=yes 2=no
1 Father							
2 Mother							
3							
4							
5							
6							

Education
1=completed 1-4 of primary
2=completed 5-8 of primary
3= attending primary
4= Attended secondary school
5= Post secondary
6= Adult/Informal education
7= Preschool child
8= Not attended school
9= Not completed primary
10= Not completed secondary

Religion
1= Christian
2= Muslim
3= Others, specify

Regular activities/occupation
99=preschool children
1= Housework and Farming
2= herding
3= Farming
4= Food/Cash for work
5= Salaried employed
6= Artisan/Jua kali
7= Student
8= Casual labourer
9= Business/self employed

3. What are your sources of income? (Circle the stated sources)
      1=Employed   5= Farming crops and livestock (mixed farming)
      2= Livestock farming   6= Casual labour
      3= Business   7= Aid from relatives
      4= Crop farming   8= Others (specify)_____

Type of Housing

4   Record type of main house roofing

1=Grass thatched 2= Reeds 3= Makuti 4= Corrugated iron sheets 5= Tiles

5   Record type of floor:

      1=mud/soil 2=wooden 3= cemented 4= others_____(specify)

Access to water, sanitation and hygiene

6   What are the main sources of water for this household? (Circle all mentioned)

    (a) In the dry season

1.	River	5	dams
2.	Tap	6	springs (natural)
3.	shallow wells	7	Rainwater
4.	wells	8	Borehole

    (b) In the wet season

1	River	5	dams
2	Tap	6	springs (natural)
3.	Shallow wells	7	Rainwater
4.	Wells	8	Borehole

7. How long does it take to and from the main water source? Time_____ Km_____

1.	0-15min	1	0-2 km
2.	16-30 min	2	2-4 km
3.	31-60 min	3.	4-6 km
4.	61-120 min	4	6-8 Km
5.	More than two hours	5	More than 8 Km

8. How much water (in litres) did the household collect in the last 48 hours (2 days) _____litres

9. Who usually fetches the water? (1) wife   (2) Husband   (3) Son   (4) Daughter Others (specify male or female)_____

10. Do you do anything to the water before drinking it?

    1=yes   2= no

11 If yes, what?

    1 boil   (2) filter   (3) use herbs (4) sedimentation   (5) others _____

12. How do you store drinking water? In _____ containers

    1.   Plastic

    2.   Clay pot

    3.   Metallic   Others (specify)_____

13. Do you have a latrine in this homestead? 1= yes   2= no

14 (If yes) Indicate what type of latrine (enumerator to observe)

    1= Enclosure   2= Pit   3= VIP   Others (specify)

15. Where do you dispose your refuse?

1= composite pit 2= cow's shed   3= bury   4= burn   Others (specify)

Health Information

16. Is the child fully immunized for age?

    1= yes   2= no   3=child below 9 months

17 During the last 14 days, did your child suffer from any disease?

    1= yes   2= no

18 If yes, which illness?

1= diarrhoea 2=Fever 3=Running nose 4= Cough 5= Vomiting   Others (specify)

19. Where was the child treated?

    1= home 2= traditional doctor 3= hospital   other (specify)

20. How far is the existing health facility from the household? Hours____ Distance ___

1= 0-30 min	1= 0-2Km
2= 31-60 min	2= 2-4 Km

3= 61-90 min	3= 4-6 Km
4= 91-120 min	4= 6-8 Km
5= More than 2 hrs	5= More than 8Km

21. Do you withhold any food during illness?

    1=yes   2=no

22. (If yes) what food do you withhold?

    1. _____
    2. _____
    3. _____

Child feeding

23. Are you breastfeeding the index child now?

    1=yes   2= no

NB if yes, go to question 26

24. How long did you breastfeed the child?

    1. Less than 12 months

    2. 12-18 months

    3. 19-24 months

    4. More than 24 months

25. Why did you stop breastfeeding?

    1. To resume work

    2. Next pregnancy

    3. Child refused

    4. Mother sick

    5. To wean   Others (specify)

26. Have you started giving your child any other food apart from breast milk?

    1= yes   2= no

27. At what age did you start giving her something else apart from breast milk?

    1= 1-3 months   2= at 4-6 months   3= after six months

28. What are the main foods that you first gave to your child?

Household number_____ Name of child_____

Type of food	Name of food	Method of feeding –codes–
Liquid food		
Semi solid food		

Spoon= 1   Hand feeding=2   Feeding bottle=3   Others (specify) _____

29 Household food intakes: 24Hr Recall

Name of Child_____ Serial number_____ H/H No_____

Meal time	Dish	Name of ingredients	Amount of ingredient in family meal	Amount of food served to child (a)	Amount of food left over (b)	Amount of food consumed by the child (a-b)
Breakfast						
Snacks						
Lunch						
Supper						

Childcare Activities (circle the main one)

30. Who takes care of the child when the mother is away from home?

1. Father   5. Maid

2. Sibling   6. Neighbours

3. Grandmother   7 Normally goes with mother

4. Friends   8 Others (specify)

31. Who usually prepares the meal for the child?

1 Mother   4 Siblings

2 Grandmother   5 Father

3 Maid   6 Others (specify)

32 Who usually feed the child?

1 Mother   4 Siblings

2 Grandmother   5 Father

3 Maid   6 Others (specify)

33. Anthropometry of all children aged 6-59 months in a household (confirm age from the card)

Household Number_____ Date of Weighing_____

Sno.	Child Birth order	Child's name	sex	Date of birth	Age in months	Weight (0.1kg) (1st)	Weight (0.1kg) (2nd)	Height (0.1cm) (1st)	Height (0.1cm (2nd)	MUAC (0.1mm) (1st)	MUAC (0.1mm (2nd)

Appendix 7: Food Composition Table (Calories and Protein)

Food	Conversion	KCAL/gm	PROT/gm
Porridge	0.55	3.18	0.56
Githeri (maize& beans)	1	1.48	0.07
Ugali	0.55	1.1	0.01
Sugar	1	3.75	0
Tomato stew	0.65	0.7	0.01
Potato stew	0.68	0.75	0.02
Maize	0.75	3.88	0.05
Milk	1	0.73	0.38
Rice	0.9	3.57	0.06
Cabbage	0.34	0.24	0.02
Kales	0.18	0.54	0.04
Egg	1=50gm	1.5	0.13
Meat stew	1.04	1.8	0.2
Paw paw	485gm	0.4	0.005
Bean stew	0.75	3.47	0.18
Tea	-	-	-
Loaf	1 slice	2.61	0.08
Avocado	1 small	1.28	0.014
Chapati	-	3.4	0.08
Green grams	0.9	3.25	0.25
Margarine	-	7.49	0
Tomato	1 small	0.3	0.022

1Level teaspoon- 5mls
1Level Tablespoon- 15mls
1 Cup-250mls
Tomato-50gms
Avocado small-380gm
1 slice- 25gms

Source: Kenya National Food Composition Tables (1993)
        Nutrition Almanac Tables (1996)

Appendix 8: Recommended Daily Allowances (Calories and Protein)

Age (in months)	Energy (Kcal)	Protein (g)	Consumer units (CU)
6-9	810	14	0 3
9-12	950	14	0 3
13-24	1150	13 5	0 4
25-36	1350	15.5	0 5
37-60	1550	17.5	0.5

Reference Adult: 2960Kcal

Source: FAO/WHO/UNU (1985)

Appendix 9: MUAC- Age specific cut-off points.

Age in Months	Cut-off (cm)
6-9	12.0
10-13	12.5
14-28	13
29-50	13.5
51-59	14

Source: WHO (1995)

Appendix 10: Map showing location of Makueni District

Makueni District