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**MOTHER'S KNOWLEDGE AND PRACTICE OF HOME CARE
MANAGEMENT OF DIARRHOEA AND RISK FACTORS IN
UNDER 5 YEARS IN NAKURU, KENYA**

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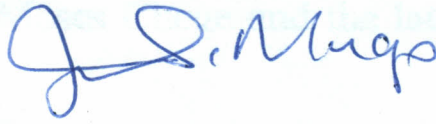


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DECLARATION

This research Thesis is my own work and has not been presented for a degree in any other university.

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
CAH	Child and Adolescent Health and Development
CDD	Control of Diarrhoea Diseases
CHW	Community Health Workers
ESAR	Eastern and Southern African Region
ESARO	Eastern and Southern African Regional Office
EPI	Expanded Programme on Immunization
HF	Health Facility
HH/C IMCI	Household and Community Component of IMCI
HIV	Human Immunodeficiency Virus
HW	Health Worker
IMCI	Integrated Management of Childhood Illness
ITDGP	Intermediate Technology Development Group
I.V	Intravenous Infusion
Km²	Square Kilometre
MCH	Maternal, Child Health and Family Planning
MOH	Ministry of Health
MOMS	Ministry of Medical Services
MDGs	Millennium Development Goals
OPD	Out Patient Department
ORS	Oral Rehydration Solutions
ORT	Oral Rehydration Therapy
PGH	Provincial General Hospital
SSS	Sugar Salt Solution

ABBREVIATIONS / ACRONYMS

UNICEF	United Nations Children Education Fund
VHW	Village Health Worker
WHO	World Health Organization
NHSSP	National Health Sector Strategic Plan

DEFINITION OF TERMS AS USED IN THIS STUDY

- Diarrhoea:** Three or more watery stools in 24 hours.
- Dehydration:** An excessive loss of body fluid through diarrhoea and or vomiting.
- Endemic:** This is considered when there is a continuous occurrence of a disease in the community.
- Epidemic:** A disease in a community in excess of the expected number within a short period of time.
- Pandemic:** This occurs when an epidemic disease occurs in two or more countries.
- Oral Rehydration Salts (ORS):** A homemade fluid/solution prepared by using a specifically prepared mixture of electrolytes in a sachet dissolved in half or one litre of clean water.
- Rehydration:** Measures taken to replace the excessive fluid lost from the body.
- Salt Sugar Solution (SSS):** A home made rehydration fluid prepared by using a pinch of salt using three fingers and one teaspoon of sugar into a cup of clean water.

ABSTRACT

Diarrhoea causes 1.8 million deaths each year worldwide and 90% of the deaths occur in children under 5 years. In less developed countries, a child has 6 to 8 episodes of diarrhoea per year. Kenya is one-amoung 15 countries in Africa and Asia that account for 75% of childhood diarrhoea deaths in children under 5 years. Kenya has an average of 4-5 episodes per child per year. At Nakuru general hospital, out of 1070 childhood diarrhoea admissions, there were 61 deaths in 2007. Policies such as Control of Diarrhoeal Diseases (CDD) 1993, IMCI 1997, IMCI/Household Component 2000, Hand Washing Policy 2009 and Revised CDD 2010 were formulated to provide guidelines on the control and management of childhood diarrhoea yet diarrhoea disease continues to be a major cause of disease burden. Various programmes such as maternal child health (MCH), expanded programme on immunization (EPI), control of diarrhoea diseases (CDD) and integrated management of childhood illnesses (IMCI) were introduced in order to improve the quality of care and reduce morbidity and mortality and improve child survival. Studies have shown that mothers can give ORS at home, reduce hospital visits and therefore cut down on the treatment cost for diarrhoea disease. In Nakuru municipality in 2007, Baharini location diarrhoea was the second commonest cause of morbidity after pneumonia. Mothers were not able to provide appropriate treatment regimes leading to deterioration of the condition and delay in treatment. This is a barrier to achievement of MDG No. 4 on child survival and achievement of Kenya's Vision 2030 of economic growth. This study was conducted in this peri-urban cosmopolitan area. The aim of the study was to assess the knowledge of mothers on signs of dehydration and complications of diarrhoea, determine the management regimes used by mothers during diarrhoea and identify household risk factors for diarrhoea transmission in children under 5 years of age in Baharini location, Nakuru municipality. Data was collected using pre-tested questionnaires and an observation checklist. Four hundred mothers of children under 5 years of age were interviewed. The respondents in the study were identified using simple random sampling where households/house blocks were selected using a table of digits. Data was analyzed using Chi-square test. The results showed that at the time of the study, there had been 41.5% diarrhoea episodes in the previous 6 months. Eleven point five percent (11.5%) of the respondents knew early signs of dehydration. Although 17.25% of the respondents knew that ORS was used to treat diarrhoea, only 7.75 % used ORS. Chi-Square test = 21.48 P value > 0.05 and the differences were considered significant. Eighteen point two percent (18.25%) of the respondents had adequate skill for preparing ORS. Carbohydrate foods were offered to children by 66% of the respondents but only 2% offered protein foods. It was observed that 51.75% of the households had poorly disposed domestic refuse although 73.25% of the respondents knew proper method of refuse disposal. Chi-square test = 34.44 and P value > 0.05, the differences were considered significant. Excreta was poorly disposed by 36.75% of the households. The study concluded that majority of the mothers had inadequate knowledge on signs of dehydration and complications of diarrhoea. Most mothers used inappropriate treatment regimes to manage diarrhoea. The methods used to dispose refuse and excreta in the household were high risk factors for diarrhoea transmission. The study recommended that the clinicians should communicate appropriate information and skills to mothers on identification of early signs of dehydration and complications of diarrhoea and appropriate diarrhoea management regimes. The Ministry of Medical services should ensure that ORS sachets are available and accessible to mothers in the location. The Ministry of water should consider developing policies that promote chlorination of drinking water at the household level. The department of public health should ensure that proper standards of sanitation in refuse and excreta disposal are maintained to reduce risk of diarrhoea transmission. The department should also consider methods of increasing excreta facilities in some of the estates such as Manyani and Lakeview.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Diarrhoea causes 1.8 million deaths each year globally and 90% of these deaths occur in children under 5 years (Nightingale, 2009; Richardson, 2010). Diarrhoea was responsible for 16% of deaths in children under 5 years in Sub-Saharan Africa (Walker, 2007). Kenya is one of the 15 countries in Africa and Asia, which constitutes 75% of childhood diarrhoea mortality globally. Childhood diarrhoea was the cause of 29% morbidity in children age 6–11 months (GOK, 2003). In Nairobi slums, childhood diarrhoea morbidity was found to be 27% per child per year (Kahura, 2006) At Nakuru general hospital admissions due to childhood diarrhoea were 1070 and out of these there were 61 deaths (Mburu, 2007). Since 2004 diarrhoea disease had shown signs of decline however, reports show that it has been stagnant for the last 5 years (Nightingale, 2009).

Diarrhoea disease can be acute or chronic and it affects all age groups and both sexes. Diarrhoea is considered to be acute when a person has 3 or more watery stools in 24 hours and when it lasts for a period of less than 14 days. Diarrhoea is considered chronic or persistent when it lasts for more than 14 days. The term dysentery is used when blood is seen in faeces. Diarrhoea disease epidemics and pandemics have occurred throughout history and they have been associated with poor sanitary conditions and overcrowding. Various International and National policies have been formulated to provide guidance on control and management of diarrhoea diseases. These includes the Control of Diarrhoea Diseases of 1993 (CDD), the Integrated Management of Childhood Illnesses of 1997 (IMCI), the IMCI /Household and Community Component of 1999/2000, the Millennium Development Goals of 2000 (MDG's), the Kenya's Vision 2030 of year 2003, the Hand Washing Policy of 2009 and the Revised CDD Policy of 2010.

The Government and other organizations (UNICEF, 1995; UNICEF, ESARO, 1999; G.O.K, 2007; Mills, 2009; G.O.K, 2010; MOH, 2010; WHO) have had various programmes for control and management of childhood diarrhoea. These include the Maternal Child Health and Family Planning (MCH/FP), Expanded Programme on Immunization (EPI), C.D.D., I.M.C.I, I.M.C.I/Household and Community Component, the Hand Washing Programme and the Revised CDD Programmes. Childhood diarrhoea can be caused by infective micro-organisms and non infective factors (Datta, 1998; Nordberg, 2007). The infective organisms include viruses such as *Rotavirus*, bacteria such as *Escherichia Coli*, parasites such as *Giardia Lamblia*, fungus such as *Monilia* and intestinal worms such as *Whip Worm (Trichuris)* (Stanfield, 2005; Nordberg, 2007;).

Weaning diarrhoea occurs at age 6 to 18 months when the complementary foods are introduced. This contributes to malnutrition, which makes the child more susceptible to other infections (Stanfield, 2005; Nordberg, 2007). Some of the children develop diarrhoea through the feeding bottle. The bottle used for feeding is difficult to clean and it may be contaminated by diarrhoea causing micro-organisms through houseflies and dirty hands (Stanfield, 2005; Nordberg 2009).

A child suffering from other diseases such as measles or malaria may develop diarrhoea. The *Measle Virus* damages the epithelial lining of the gastro-intestinal tract resulting in diarrhoea (Stanfield, 2005). Diarrhoea may occur to children due to non infective problems. Disorders of the intestinal enzymes such as the absence of lactase during malnutrition results in diarrhoea. Diarrhoea also occurs in children on oral antibiotics such as ampicillin especially if treatment is prolonged. Further, childhood diarrhoea may occur due to intersusception and sometimes the aetiology may be unknown (Datta, 1998; Stanfield, 2005; WHO, 2005;).

These infective and non-infective factors may contribute to diarrhoea occurrence in Baharini location. Sometimes, microscopic testing of the stool to confirm the causative organisms is not done. The aetiological agents of diarrhoea are excreted in faeces of an infected person and the port of entry of the organisms is oral. Diarrhoea is a communicable disease and is transmitted through the commonly known "5Fs". These are Fluids, Fields, Flies, Fingers and Food (Nordberg, 2007; Wood, 2008). The sanitation, overcrowding and hygiene practices in Baharini location are high risk for diarrhoea transmission.

Diarrhoea in children results in sudden loss of large amounts of fluid and electrolytes resulting in dehydration, shock and death. Management of diarrhoea involves prevention of dehydration, rehydration, proper food intake, treating the cause and communicating appropriate health information to the mother/caregiver (Stanfield, 2005; WHO, 2005; Nordberg, 2007; Guandalini, 2009). Childhood diarrhoea interventions have aimed at case management, improvement of health facility, improving household practices, modifying the environmental sanitation and improved methods of refuse and excreta disposal. Despite these interventions diarrhoea has continued to be a major cause of morbidity and mortality in Nakuru. This study intended to assess mother's level of knowledge on complications and signs of diarrhoea, to determine the regimes used by mothers to treat diarrhoea and to identify household risk factors for childhood diarrhoea.

1.2 Problem Statement

In Baharini location, Nakuru, childhood diarrhoea has continued to be the second cause of death in children under 5 years of age despite activities to promote use of ORS in treatment of childhood diarrhoea (Mburu, 2007). Mothers are not able to provide appropriate rehydration and children suffering from childhood diarrhoea are brought to hospital in severe dehydration and

with complications of diarrhoea. This results in hospitalization for a period of 3-5 days although childhood diarrhoea disease could be easily treated at the out patient department and in the community. The 1993 CDD policy and the IMCI/Household/Community Component Policy (2000) provided guidelines on home care management of childhood diarrhoea. Mothers and caretakers of children suffering from childhood diarrhoea are provided with information on home care. The care involves preparation and use of ORS to prevent and correct dehydration, the use of other appropriate home made fluids and methods of preventing diarrhoea. The global IMCI/Household/Community Component Policy considered improvement of 12 essential elements for control of childhood diseases in children under 5 years. The Eastern Southern African Region (ESARO) countries including Kenya added 4 other essential household elements (UNICEF, ESARO, 1999). There was concern on the extent of implementation of the household component of the IMCI in Baharini location, Nakuru. It was considered necessary to assess the level of implementation of six of the elements in relation to childhood diarrhoea. These are exclusive breastfeeding for 4-6 months, child food intake and proper child weaning, food intake during childhood diarrhoea and fluids offered to children during diarrhoea. Other elements include household practices on disposal of excreta, domestic refuse, hand washing and home treatment used to treat children with diarrhoea and diarrhoea disease signs recognized by mothers and those that cause enough concern to mothers resulting in seeking health care from health workers.

1.3 Research Questions

- What is the level of knowledge of mothers on signs of dehydration and complications of childhood diarrhoea?
- How do mothers manage children under 5 years of age when they suffer from childhood diarrhoea?

- Are children under 5 years of age exposed to risk factors for childhood diarrhoea at the household level?

1.4 Hypothesis

- Mothers of children under 5 years lack knowledge on signs of dehydration and complication of childhood diarrhoea.
- The management regime used by mothers to treat children under 5 years suffering from childhood diarrhoea is inadequate.
- Children under 5 years of age develop diarrhoea because of exposure to household risk factors.

1.5 Study Objectives

1.5.1 General Objective

The study was to determine mother's knowledge and practice on home care management of diarrhoea and to identify the household risk factors in children under 5 years of age in Nakuru municipality, Kenya.

1.5.2 Specific Objectives

- To assess mother's level of knowledge on signs of dehydration and complications of childhood diarrhoea in children under 5 years of age in Baharini location.
- To determine the management regime used by mothers to treat children under 5 years suffering from diarrhoea in Baharini location.
- To identify household risk factors that enhance diarrhoea occurrence in children under 5 years of age

1.6 Variables

Independent:

This is a quantifiable attribute, which can be manipulated. The following are the independent variables in the study.

- Signs of dehydration.
- Complications of diarrhoea.
- Diarrhoea management regime.
- Risk factor for childhood diarrhoea.

Dependent:

The following are the dependent variables.

- Mother's level of knowledge
- Inadequate management regime and
- Practice on home care management of childhood diarrhoea in children under 5 years of age.

1.7 Limitations

A clinical study would have been more appropriate but this was not possible because of limitation of resources available to carry out such a study in terms of time, which was limited to 6 months, personnel and availability of finances. The researcher had to rely on information given by the mothers during interview. Nakuru has a multi-ethnic population, therefore language was a barrier.

1.8 Justification and Significance of the Study

Diarrhoea has been the second cause of childhood morbidity and mortality in Nakuru. Table 1.1 below shows records of diarrhoea occurrence among patients treated at Provincial General Hospital, Nakuru.

Table 1.1 Records of Diarrhoea Occurrence Among Patients Treated at Provincial General Hospital Nakuru

Year	Average New Cases per month	Under 5 years Diarrhoea Admission	Under 5 years Diarrhoea Deaths
2005	91	1009	96
2006	110	912	71
2007	144	1070	61

Records for patients treated for diarrhoea at two district hospitals near Nakuru were reviewed. The hospitals were Naivasha and Gilgil. These hospitals are located at a distance of about 100 kilometers and 30 kilometers along the Naivasha-Nakuru main road. Table 1.2 below shows the records of diarrhoea

Table 1.2 Records of Diarrhoea Occurrence Among Patients Treated at Naivasha and Gilgil Hospitals.

Year	Hospital	Average new cases per month	Under 5 years Diarrhoea Admissions	Under 5 years Diarrhoea deaths
2005	Naivasha	676	No records	No records
2006	Naivasha	666	287	32
2007	Naivasha	503	Records incomplete	Records incomplete
2005	Gilgil	314	Records incomplete	Records incomplete
2006	Gilgil	218	Records incomplete	Records incomplete
2007	Gilgil	286	Records incomplete	Records incomplete

During childhood diarrhoea there is rapid loss of water and electrolytes, which results in rapid dehydration, shock and death. Immediate replacement of lost fluid and electrolytes could prevent

dehydration. In year 2007, it was observed that mothers in Nakuru municipality had inadequate knowledge about diarrhoea and lacked skill for identifying early signs of dehydration.

Despite this it was also observed that mothers brought children under 5 years suffering from diarrhoea in critical condition. This resulted in development of complications and increased childhood diarrhoea morbidity and mortality. There was need to determine mother's knowledge and practice on ORS. There was also need to determine other treatment regimes used by mothers on children under 5 years suffering from diarrhoea. ORS was introduced in early 1980's and recommended by WHO as an effective fluid for treating childhood diarrhoea in order to improve child survival. Health workers taught mothers on importance of giving ORS and other appropriate home made fluids during childhood diarrhoea. Mothers were also given a demonstration on preparation and administration of ORS at the oral dehydration therapy centre at PGH Nakuru and also at other health centres in Nakuru municipality.

Mothers attending the health facilities in Nakuru municipality were taught methods of preventing diarrhoea. This included proper methods of food handling, personal hygiene, disposal of refuse and excreta. Further it was observed that there was frequent occurrence of diarrhoea among children under 5 years of age in Baharini location, Nakuru. Diarrhoea was the second cause of morbidity after pneumonia. This resulted in increased diarrhoea morbidity and mortality in children. Therefore, it was considered necessary to identify household risk factors that contributed to diarrhoea occurrence among children under 5 years in Nakuru municipality.

Children under 5 years will benefit from study findings by reduction of diarrhoea morbidity and mortality therefore improve child survival. The findings will assist health workers to apply more relevant approaches in homecare management of childhood diarrhoea. Diarrhoea disease in

children leads to malnutrition, which affects growth and development of the child affecting long-term potential for the child's future productivity.

Mothers of children suffering from diarrhoea are diverted from other household work such as, care for other family members. This contributed to poor health in other members of the family. This affected the family members performance and finances.

The working mothers were not able to perform at their places of work. This affected the amount of money available for the family to use at a time when the family needed more finances because of diarrhoea disease. Family members and relatives also spend time away from work to provide care and support when the child has diarrhoea. The family will save money spent for treatment of diarrhoea and use it for other needs and for investment.

The employer will gain on reduced period of time that mothers are absent from work due to childhood diarrhoea. The information will be used to implement more relevant interventions on management of childhood diarrhoea. This will result in reduction in childhood diarrhoea disease burden in Baharini location, Nakuru municipality.

CHAPTER TWO

LITERATURE REVIEW

2.1 Childhood Diarrhoea Trends

Research on childhood diarrhoea has been conducted on various aspects of the disease. Research studies show that annual childhood diarrhoea mortality globally has been 1.8 million for the last 5 years (Nightingale, 2009). Thirty years ago, diarrhoea mortality in children under 5 years was 4.6 million in developing countries (Snyder, 1982). Childhood diarrhoea had shown some slow decline in the last 2 decades but the onset of HIV/AIDS has reversed this trend in some countries especially the developing countries. Diarrhoea causes 90% of deaths in children under 5 years (Richardson, 2010). It was observed that in developing countries each child under 5 years of age had 6-8 episodes of diarrhoea per year while a similar child in developed countries like USA had 2.2 diarrhoea episodes (Guandalini, 2009). Diarrhoea was responsible for 16% of deaths in children under 5 years in Sub-Saharan Africa (Walker, 2007). Kenya is one of the 15 countries in Africa and Asia, which constitutes 75% of childhood diarrhoea globally. Diarrhoea mortality was attributed to the fact that effective interventions have not been accessible to certain populations in the society. Interventions can be in accessible due to factors such as lack of knowledge, cultural beliefs of the mother, lack of user fee, distance to the health facility and negative attitude of the health care giver. A study done to determine childhood diarrhoea morbidity in Nairobi slums found it to be 27% and case fatality was found to be 21% (Kahura, 2006; HFS, 2006). Childhood diarrhoea morbidity and mortality has persisted because household risk factors that favour transmission, such as poor hand hygiene, inappropriate disposal of domestic refuse and excreta disposal create a favourable environment for diarrhoea disease transmission especially in low income estates which are overcrowded (Wood, 2008). In the year 2007, at Nakuru general hospital admissions due to diarrhoea in children under 5 years were 1070 and out of these, there were 61 deaths (Mburu, 2007).

2.2 Causes of Diarrhoea in Children under 5 years

2.2.1 Micro-organisms

Studies conducted to identify causes of childhood diarrhoea found the *Rotavirus* as the most common cause of acute severe diarrhoea in developed and developing countries. A retrospective study was done in Nairobi, Kenya, to determine the prevalence of stool viruses in children

presenting with acute diarrhoea at Gertrude's Garden Children's Hospital. The *Rotavirus* and *Adenovirus* were identified. Diarrhoea was found to be more frequent in all the cases (Forbes, 2004). Three cross-sectional studies were done in Libya, Kenya and Cuba to assess the expanding global distribution of *Rotavirus Serotype G9*. Results showed that the *Rotavirus Serotype G9* was detected for the first time in the 3 countries (Cunliffe, 2001). The viruses that cause childhood diarrhoea include the *Rotavirus*, *Enterovirus*, *Adenovirus*, *Calicivirus* and *Norovirus*.

The *Rotavirus* causes more than 500,000 deaths in children under 5 years annually (Datta, 1998; Richardson, 2010;). The *Rotavirus* and *Enterovirus* penetrate the cells of the small intestines but they do not destroy the cells. They multiple in the cells of the small intestines and sometimes invade the blood stream. This results in local and systemic infection. After recovery from infection, the child may continue to excrete the virus in faeces for a period of 1-2 weeks (Guandalini, 2010). The *Rotavirus* can survive in dirty hands for many hours and in the environment for many days (Hay, 2003). Watery diarrhoea occurs leading to dehydration and mild fever. Microscopy examination of the faeces may reveal few or no cells. The child does not require antibiotic treatment but rehydration therapy is essential (Stanfield, 2005).

Infection by the *Rotavirus* confers immunity. Repeated attack results in less severe infection (Hay, 2003). The *Rotarix* vaccine was introduced in 2006 and provides 85% protection against the *Rotavirus* and any other diarrhoea (Guandalini, 2010). The *Rotarix* vaccine is available in Nakuru private clinics but not at Hekima, Langalanga and Bondeni health centers. The cost of about Ksh. 2000/- has limited its use among the low-income population. One oral dose is given before age 6 months. The *Rotavirus* is transmitted through the faecal oral route.

The bacteria that cause childhood diarrhoea include *Salmonella*, *Shigella*, *Escherichia coli*, *Vibrio cholerae* and *Campylobacter*. A study was done in Mombasa during the dry month in March in children aged 0 to 36 months who were suffering from acute diarrhoea. The stools were examined for enterotoxigenic *Escherichia coli* and results showed that the rate of enterotoxigenic *Escherichia coli* (ETEC) increased as the child's age increased (Waiyaki, 1986). Bacteria may cause diarrhoea alone or as mixed infections. In Kiambu, Kenya, 1420 stool specimens were collected from children age 0 to 60 months. The stools were examined to assess whether there were mixed infections of bacteria, parasites and the *Rotavirus*. The results showed that some of the stools had mixed infections. The organisms involved included *Campylobacter*, *Giardia lamblia*, *Rotavirus* and *Escherichia coli* (Chunge, 1989). *Campylobacter jejuni* causes blood stained diarrhoea and it lives in the intestines of domestic animals and birds as a commensal (Nordberg, 2007).

Escherichia coli is the second commonest cause of childhood diarrhoea. The *Escherichia coli* affects the upper part of the small intestines. It penetrates the cells where it multiplies and destroys the cells. The bacteria produce enterotoxins, which induce the cells to excrete fluid and electrolytes from the intestines. It causes local and systemic infection and causes diarrhoea, which may have microscopy pus cells and red blood cells. The child suffering from bacterial diarrhoea develops fever and dehydration rapidly. The child requires treatment with antibiotics and rehydration (Datta, 1998; Stanfield, 2005; Guandalini, 2010). These bacteria are transmitted through the faecal oral route. Children in Baharini location are likely to develop childhood diarrhoea caused by bacteria because of improper hand hygiene and poor sanitation.

Diarrhoea may be caused by parasites such as *Giardia lamblia*, *Entamoeba histolytica*, *Cryptosporidium* and *Microsporidia*. Studies done on protozoa that cause childhood diarrhoea

identified *Cryptosporidium* oocysts and *Giardia lamblia* (Jimwa, 1989; Chunge, 1992). The protozoa cause uncontrollable diarrhoea especially in immuno-suppressed patients (Nordberg, 2007). *Giardia lamblia* is a flagellated protozoa, which affects the small intestine. Infection occurs when the *Giardia lamblia* cyst is ingested. The acid of the stomach activates the cyst and a trophozoite is released which adheres to the mucosa wall of the small intestine and multiplies. Infection with *Giardia lamblia* causes bloodstained diarrhoea, mal-absorption of lactose and weight loss. Microscopy examination of the faeces will show the cysts. The cysts are excreted in faeces and are infectious for upto 3 months in cold water. The cysts are susceptible to heat but are resistant to chlorine used in water treatment. It requires treatment with antibiotics such as metronidazole and rehydration. Children with lowered immunity due to malnutrition and HIV are susceptible. Asymptomatic carriers are common (Stanfield, 2005; Guandalini, 2010). *Giardia lamblia* is common in many parts of the world although it is more in developing countries where water may be contaminated by faecal material. There was limited information on its prevalence in Baharini location (Nordberg, 2007).

Intestinal worms such as *Trichuris trichuria* (whipworm) and *Strongyloides* may cause childhood diarrhoea. *Trichuris trichuria* are 4cm long and live in the large intestines attached to the mucosa. The eggs are excreted in faeces and are embryonated in the soil before they become infective. This can take 8-50 days if the condition of the soil remains favourable. The embryonated eggs are transmitted to man through food such as fruits and vegetables or dirty hands, which are contaminated with mature eggs. The ingested eggs hatch in the duodenum and release larvae. The larvae migrate to the large intestine and attach themselves to the mucosa, where they can live for many years. Mild infection may be asymptomatic but heavy infection results in abdominal infection, bloody diarrhoea, weight loss, rectal prolapse and eosinophilia. Microscopy examination of the faeces shows the presences of eggs. The patient is treated with mebendazole

and rehydration (Stanfield, 2005; Nordberg, 2007). The rectal prolapse is treated by gently pushing it back into position. Then the child's buttocks are strapped together for 2-3 days. The child should remain in bed with feet elevated for 2-3 days. *Trichuria* is endemic in areas with improper sanitation such as Baharini.

Weaning diarrhoea occurs at age 6 to 18 months when the complementary foods are introduced. The new foods may be contaminated by diarrhoea causing micro-organisms, they may be inappropriate, indigestible or poorly cooked. These factors may contribute to malnutrition, which makes the child more susceptible to infection. Weaning diarrhoea can be avoided when mothers select appropriate weaning foods and when the foods are introduced gradually. Sometimes the feeding bottle is introduced during the weaning period. The bottle used for feeding is difficult to clean and may be contaminated by diarrhoea causing micro-organisms through the houseflies and dirty hands. Bottle-feeding should be discouraged since most mothers may not be able to clean it thoroughly and it contributes to diarrhoea transmission (Stanfield, 2005; Nordberg, 2007).

Diarrhoea may be caused by fungus such as *Monilia*, and *Candida albicans*. Acute diarrhoea may occur because of immune-suppression caused by HIV infection or malnutrition. Therapy will include rehydration and appropriate antifungal treatment (Datta, 1998; Stanfield, 2005). Parenteral diarrhoea occurs because of infection by other diseases such as malaria, measles and otitis media. Parental diarrhoea requires treatment of other diseases such as malaria and measles. During measles infection there is reduced food intake. There is also inflammation of the gastrointestinal tract, the body proteins are broken down and the measles virus interferes with the ability of the body to fight infection. The child suffering from measles therefore develops diarrhoea and dehydration. Treatment involves management of secondary infection, rehydration and other symptoms such as fever (Datta 1998; Stanfield, 2005; Nordberg, 2007). The attenuated

measles vaccine is provided as part of the EPI vaccines at Hekima, Langalanga and Bondeni health centres.

Diarrhoea may occur in children due to other factors such as disorders of the intestinal enzymes, intersusception, prolonged use of antibiotics and sometimes the aetiology may be unknown (Datta, 1998; Stanfield, 2005). Disorders of intestinal enzymes may interfere with digestion of carbohydrates, proteins and fats resulting in diarrhoea, which contains undigested food. For example children suffering from malnutrition develop absence of lactase, which breaks lactose into glucose and galactose. The treatment should include rehydration, nutrition therapy and other secondary infections (Stanfield, 2005).

Diarrhoea also occurs in children on oral antibiotics such as ampicillin and especially if treatment is prolonged. The antibiotic destroys the normal flora. The treatment is mainly rehydration and other symptomatic symptoms (Datta, 1998; Stanfield, 2005). Ampicillin is not currently in use but other antibiotic drugs may probably contribute to diarrhoea.

The diarrhoea causing micro-organisms exit from the human body in the faeces. Poor disposal of infected faeces results in contamination of food, water and soil. Man is the main reservoir for diarrhoea causing micro-organisms (Wood, 2008). The above causes may contribute to diarrhoea occurrence in Baharini location, Nakuru. There is limited information on research concerning causes of diarrhoea in Nakuru. Microscopic testing of the stool to confirm the causative organism is not done sometimes. The important issue is child rehydration to replace the lost fluids and electrolytes and implementation of other aspects of diarrhoea management.

2.2.2 Diarrhoea Pathophysiology

Gastro-intestinal dysfunction may result in osmotic diarrhoea, secretory diarrhoea, increased intestinal motility, decreased nutrient absorption or mucosal disturbance diarrhoea (Stanfield, 2000). Infection by diarrhoea causing micro-organisms such as *Vibrio cholerae* and *Escherichia coli* result in production of enterotoxins. The enterotoxins cause the intestinal cells to excrete electrolytes and water and also reduce absorption resulting in secretory diarrhoea. Infection of the intestinal tract by bacteria such as *Salmonella* and *Shigella*, and by parasites such as *Amoeba histolytica* results in inflammation of the mucosa. This result in reduced absorption and increase in intestinal motility. The diarrhoea which occurs contains blood, mucous and white blood cells. Infection of the intestinal tract by *Rotavirus* and *Giardia lamblia* causes a reduction in absorption capacity of the intestines resulting in diarrhoea. Any infection of the gastro-intestinal tract causes irritation of the tract resulting in increased motility of the tract. This causes a reduction of the period of time the food takes to pass through the intestinal tract resulting in diarrhoea (Stanfield, 2005).

2.2.3. Environmental Factors That Contribute to Diarrhoea

Studies to determine environmental factors that contribute to childhood diarrhoea showed that various factors such as climate, water source, overcrowding and contact with animals significantly contributed to the faecal-oral transmission of diarrhoea (Chunge, 1992). Diarrhoea is transmitted through the commonly known 5 F's. These are Food, Fluids, Fingers, Flies and Fields (Favin, 2004; Nordberg, 2007). In households where domestic animals and birds live close to humans, there is high risk of diarrhoea transmission. Small children who crawl and pick items from the floor and put in their mouths can easily ingest diarrhoea-causing micro-organisms from soil contaminated by animal/birds droppings. A study was done in Nicaragua and Peru on hand washing practices, methods of handling drinking water and methods of excreta disposal (Favin,

2004). The results showed that proper hand washing, proper handling of drinking water and proper disposal of faeces resulted in reduction of diarrhoea occurrence.

2.2.4. Diarrhoea Transmission

The etiologic agents of diarrhoea are excreted in faeces of an infected person and the port of entry of the organisms is faecal oral (Nordberg, 2007). Diarrhoea is a communicable disease. Improper disposal of faeces result in faecal contamination of food, water and hands which is a risk for diarrhoea (Nordberg, 2007). Improper disposal of faeces result in soil pollution and contamination of water. Food may be contaminated through water that contains diarrhoea-causing micro-organisms. Hands are contaminated because of improper washing after defaecating.

The houseflies feed on rotten materials, faeces and human food. Houseflies transfer the diarrhoea-causing micro-organism from faeces to food by physical and mechanical means. The housefly vomits on food to soften it before eating. It may also defaecate on food. The faeces and vomits of the housefly contain diarrhoea-causing micro-organisms (Nordberg, 2007). The housefly is a common insect in some of the low-income estates in Baharini location. This is because of improper disposal of domestic refuse, excreta and the presences of domestic animals and birds. Therefore, food which appears good and appetizing may be contaminated by diarrhoea causing micro-organisms. Water, which appears clear and sparkling, may also be contaminated by diarrhoea causing micro-organisms.

Some diseases transmitted through the faecal-oral route may also be transmitted through other routes. The *Poliovirus* is excreted in faeces and can also be transmitted through droplet infections

(Nordberg, 2007). In Baharini location, Nakuru, childhood diarrhoea is transmitted through contaminated food, water, hands and utensils because of improper sanitation.

2.3 Policies on Diarrhoea in Children under 5 years of Age

Various policies have been formulated to provide guidance on control and management of diarrhoea diseases. The first global policy on control and management of diarrhoeal diseases was formulated in 1993, which had a 5 years plan (M.O.H, 2010). This was after the introduction of the vertical programme on control of diarrhoeal diseases by WHO and UNICEF. The objectives of the policy were to reduce childhood diarrhoea morbidity and mortality through reduction of childhood diarrhoea hospitalization through establishment of oral rehydration therapy centres (ORT) in the health facilities. The second objective was to train health workers on improved diarrhoea case management through clinical assessment, classification of degree of dehydration and management of diarrhoea according to the degree of dehydration such as treatment plan A, B and C. The third objective had emphasis on mothers/caretakers homecare management of diarrhoea and this considered training of mothers on preparation, giving of ORS and use of fluids available at home in order to prevent and correct dehydration. Lastly, the policy considered counseling mothers/caretakers on diarrhoea prevention through exclusive breast feeding, continued nutritious food intake, proper hygiene, good sanitation and counseling on when to return the child to the health worker (MOH, 2010). The control and management of diarrhoeal disease policy was implemented through the CDD programme.

In 1997, the CDD programme was integrated into the IMCI programme. The IMCI global policy was introduced in 1995 by WHO and UNICEF. The IMCI programme was introduced in order to improve the management of childhood illnesses at the first health facility level. It was observed that the major causes of childhood deaths were due to acute respiratory infections, diarrhoea,

malaria, measles and malnutrition. At that time 70% of deaths in children under 5 years in developing countries, were caused by the 5 diseases. It was also realized that the signs of these diseases overlapped. The health clinician at the first health facility level did not have adequate equipment for diagnosis and had limited variety of drugs for treatment of the childhood illnesses. The programme considered the improvement of case management through staff training and the improvement of the health facility through provision of appropriate supplies

The IMCI programme was reviewed in Santo Domingo Mexico, in 1997 and it was observed that there was need to consider the household/community component of the IMCI in order to further reduce childhood morbidity and mortality. UNICEF with other agencies such as WHO, World Bank and USAID formulated 12 global essential household practices, which were likely to promote child survival, growth and development. These included practices such as exclusive breastfeeding, appropriate complementary feeding, vitamin A and iron supplement and modifying the environment to promote psycho-social child development. The developing countries were expected to consider the 12 essential practices and implement them through the IMCI household/community component. The Eastern Southern African region (ESARO) countries including Kenya met in Nairobi in 1999 and added 4 more essential household practices. These included the involvement of fathers in the care of children, prevention of child abuse, home accidents, HIV and AIDS. The policy with the 16 essential elements of household/community practices was introduced in Kenya in 2000 and in Nakuru in 2003 (Health Section, UNICEF, ESARO, 1999).

There was concern on the extent of implementation of the household component of the IMCI in Baharini location, Nakuru. It was considered necessary to assess the level of implementation of the six elements of the household practices of the IMCI in relation to childhood diarrhoea. These

include exclusive breastfeeding for 4-6 months, child food intake and proper child weaning, food intake during childhood diarrhoea and fluids offered to children during diarrhoea. The other elements were household practices on disposal of excreta, domestic refuse and hand washing, home. Lastly, this study considered treatment used to treat children with diarrhoea and diarrhoea disease signs which are recognized by mothers and that cause enough concern to mothers for them to seek health care from health workers.

The Cairo summit meeting held by UN member states formulated the eight Millennium Development Goals (MDGs) (Mills, 2000). The aim of the MDGs was to enhance human development in order to eradicate poverty and provide targets that can be measured. The MDG number 4 is concerned with promotion of child survival and reduction of childhood mortality. The diarrhoeal disease in children under 5 years in Baharini Location, Nakuru is a barrier to the achievement of the Millennium Development Goal number 4.

Hand washing is important in prevention of diarrhoea. The hand washing policy was formulated in 2009 by WHO, UNICEF, USAID and Division of Child Health, Kenya. The aim of the policy is to promote hand washing with soap and water as a method of preventing diarrhoea. Organizations such as WHO, UNICEF AND USAID were involved in preparation of hand washing charts. The charts are used by health workers to teach and promote hand washing as a method of preventing diarrhoea.

In Kenya review of control of diarrhoeal diseases programme found that childhood diarrhoea case fatality was 21%. The survey found that only 55% of the health staff were able to do correct assessment and classification for case management in childhood diarrhoea. The use of ORS had reduced to 10% (HFS, 2006). This resulted in National formulation of the second control of

diarrhoeal diseases, policy guidelines 2010. Organizations involved in the policy formulation included WHO, UNICEF, USAID, PATH, JICA, MOMS and Ministry of Public Health and Sanitation (Kenya).

The aim of the policy is to reduce diarrhoea morbidity and mortality in children under 5 years. Firstly, the policy considers the training of clinicians and community health workers on improved diarrhoea case management. Secondly it considers empowering mothers/caretakers on home care management of diarrhoea in children under 5 years through encouraging exclusive breastfeeding, use of low osmolarity ORS and the use of other appropriate home made fluids. It also considers the use of zinc and appropriate antibiotics when necessary. Further, it considers methods of preventing diarrhoea through advocacy at different levels in society and the use of health education methods that integrates culturally acceptable approaches.

The CDD policy guidelines, (2010) will be implemented through the IMCI programme in Kenya. This will promote achievement of the aims of MDG's and Kenya's Vision 2030 goals (MPHES, 2010). Vision 2030 is Kenya's vehicle for transition from a developing country to an industrialized country by the year 2030. The vision has 3 pillars; these are economic, social and political. The economic pillar is concerned with economic growth of 10% Gross Domestic Product (GDP) in all regions of the country by the year 2030 (G.O.K, 2007). The presence of an endemic disease in an area such as childhood diarrhoea in Nakuru reduces the economic growth by 1% each year (Bloom, 2002).

2.3.1 Programmes to Control Diarrhoea in Children under 5 years

The Government and non-Governmental organizations have had various interventions with an aim to reduce childhood diarrhoea morbidity and mortality. These includes maternal child health

(MCH), expanded programme on immunization (EPI), control of diarrhoeal diseases (CDD), establishment of oral rehydration therapy centres (ORT) and the latest has been the integrated management of childhood illnesses (IMCI) (WHO, 1999).

The maternal and child health (MCH/FP) Programme was recommended by WHO/UNICEF globally and was introduced in Kenya in early 1970's. The programme used the supermarket approach in providing services. This approach gave an opportunity to the mother to bring the sick child under 5 years with diarrhoea to a health facility, the mother would receive antenatal services and also immunization for her other younger child under the same roof the same day. This approach promoted use of health services in children under 5 years of age. This approach in provision of care resulted in change of training of nurses. The nurse training was changed from single courses like enrolled nurse to combined course such as the enrolled community health nurse. This ensured that the nurse providing care at the health center and other health facilities was competent to meet the maternal and child health care needs of the supermarket approach. Majority of health workers in Kenya who provide health care at the MCH clinic are nurses.

In the 1970's and early 1980's hospital records and research revealed that majority of the paediatric hospital beds were occupied by children suffering from diarrhoea (Kinoti, 1985; Woods, 2008). The control of diarrhoea disease (CDD) programme was recommended by WHO globally and introduced in Kenya in late 1980's. The CDD programme aims at reducing hospitalization for children suffering from diarrhoea. Mothers are taught how to prevent dehydration and to manage diarrhoea at home. Training of doctors, nurses and clinical officers were conducted to ensure that the CDD programme was established. Each of the 3 health centres that provide health services in Baharini location established an Oral Rehydration Therapy centre (ORT) for management of children with diarrhoea.

The Integrated management of childhood illnesses (IMCI) programme was introduced in the middle of 1990s. It was observed that the major causes of childhood morbidity and mortality were pneumonia, diarrhoea, measles, malaria and malnutrition. Many of the children who presented at the first level health facility had overlapping signs and symptoms of these childhood diseases. The health workers at the health centre and other health facility relied on history, clinical signs and symptoms in order to manage childhood illnesses in children under 5 years. The IMCI tool was therefore developed to assist the health workers manage the sick child using the syndromic approach. The IMCI has three components, these include the training of health workers on case management of childhood illnesses, the improvement of health facilities in order to provide quality care and the improvement of household/community practices in order to ensure child survival, growth and development.

The first two components of the IMCI tool were introduced by WHO/UNICEF globally in 1995. The third component was introduced in 1999/2000. The third component includes household practices such as breastfeeding, complementary feeding, immunization, personal hygiene, disposal of faeces, identification of disease signs and home treatment of childhood illnesses. This component was introduced in order to involve the household/community in prevention and management of childhood illnesses in children under 5 years. The IMCI programme was introduced in Kenya about 2002 and Nakuru in year 2003. Despite these programmes diarrhoea has continued to be a major cause of morbidity and mortality in children under 5 years in Baharini location, Nakuru.

2.4 Diarrhoea Interventions in Children under 5 years

Research on childhood diarrhoea interventions has been conducted on case management, diarrhoea prevention, training of health workers and on caretakers/mothers. Before the

introduction of the integrated management of childhood illnesses, (IMCI) research studies were conducted in Kenya, Gambia, Uganda, Bangladesh and Tanzania (Kelly, 1998). Childhood diarrhoea is one of the five diseases included in the IMCI. Health workers participated in the IMCI study to determine the sensitivity of the tool in management of childhood illnesses in Siaya District, Kenya (Kelly, 1998). The results revealed that there was need to refine the IMCI tool in order to improve its sensitivity. Assessment of the sensitivity of a tool is an important aspect of diarrhoea intervention. This assists health workers who use such a tool to be able to detect children who suffer from the disease (Wright, 2001).

In Gambia the study involved field assistants and physicians who participated in the IMCI study (Kelly, 1998). The field assistants were trained to use the IMCI tool to determine specificity of the IMCI tool. Determining the specificity of a tool is significant in order to assist health workers using the tool to be able to identify children who do not suffer from the disease (Wright, 2001). Findings revealed that specificity in diagnosing dehydration in childhood diarrhoea was high (Kelly, 1998).

The revised IMCI tool was used in a study in Uganda, which involved medical assistants (Kelly, 1998). The study established that the IMCI tool was important in management of childhood illnesses at the first health facility level. A tool which can be used to manage disease at the first health facility level is important because the community health workers may not have laboratory equipment to assist in making diagnosis. They rely more on history, signs and limited laboratory tests to make diagnosis (Kelly, 1998).

A study was conducted in Bangladesh, to determine the validity of the IMCI content (Kelly, 1998). A tool is considered to be valid and not biased when it is able to give a non-biased

assessment of the clinical estimates (Wood, 2008). Two pediatricians examined the children using the IMCI standard format to determine whether a disease exists or not (Nordberg, 2007). The study concluded that sensitivity for infants and for children was satisfactory. The availability of an efficient and simple screening tool which can be used by health worker at the first health facility level was a great achievement in health care management of children under 5 years (Kelly, 1998).

A study in Tanzania, Arusha was done to test the training of health workers at the first health facility level using the IMCI tool. The health workers involved in the study included medical assistants, rural medical aides and maternal child health aides (Kelly, 1998). The IMCI approach was used to train the health workers. Health workers were evaluated to determine the effectiveness of the IMCI tool in assisting the health workers to manage children with childhood illnesses. The difference between the rate of correct child assessment for IMCI signs by the medical assistance and for maternal child health aides was small (Odhacha, 1998). This resulted in the implementation of the IMCI programme by WHO and UNICEF (Wright, 2001).

Another study was conducted in Kenya to determine the level of performance of health workers trained on use of IMCI approach in assessment and management of the sick child (Odhacha, 1998). The health workers were evaluated after training and later at 3 months after training. The children involved in the study were age 2 months to 59 months. At the end of the 3-week training, the health workers were evaluated when assessing children. The findings showed that the health workers had high-level performance when assessing mild and moderately sick children. The performance level was low for the severely sick children (Odhacha, 1998; Kelly, 2001). Health workers managing sick children would require supervision and regular re-training to ensure competence in technical skills are maintained in clinical practice.

Another study was conducted to evaluate community based health workers (Kelly, 2001). The level of performance was evaluated among community based health workers in the management of multiple childhood illnesses in Siaya district, Kenya (Kelly, 2001). Community based health workers were selected by their own communities, they were trained for a total of 5 weeks on management of acute respiratory infections, diarrhoea, malaria and on the referral system for the severely sick child. The tool used was a modified form of the IMCI tool prepared by the WHO and UNICEF. There was a separate tool for children age under 2 months and those age 2 to 59 months. The study showed that there were some deficiencies in management of the sick child by the community based health workers. The tool was considered to be too complex for the community based health workers and it was modified two times during the study. The community based health workers also lacked confidence in assessing the severely sick child. Training of community based health workers to manage and refer the sick children at the community level may require patience, commitment and support from the professional health workers and the community in order to achieve competence. Their success is likely to have an impact in the community since they are opinion leaders and they can influence the community.

The IMCI tool is useful in management of the 5 major causes of childhood illnesses. These are pneumonia, malaria, measles, diarrhoea and malnutrition. The tool was prepared to be used by all health workers handling sick children. The signs and symptoms of the first four diseases overlap. This syndromic management of childhood illnesses is considered efficient and cheap in terms of staff training and supervision (Kelly, 1998; Wright, 2001). Proper assessment of the child with diarrhoea at the community level would assist in prompt treatment and therefore reduce childhood diarrhoea morbidity and mortality.

2.5 Diarrhoea Prevention in Children under 5 years of age

Diarrhoea in children under 5 years can be prevented through various approaches. These include exclusive breast feeding, proper child weaning, adequate and safe water supply and appropriate methods of disposal of refuse and excreta.

2.5.1 Breastfeeding

Mothers should be prepared for breastfeeding during the antenatal period. The new baby should be properly attached to the breast nipple as soon as he is born. The birth attendant should assist the mother to help the baby attach to the nipple and ensure proper positioning of the baby and the mother. The baby should be allowed to suckle without interruption until the baby comes off the breast on his own. The mother should be taught how to break up the wind in between the breastfeeding session to prevent the baby from vomiting. The mother should breastfeed from alternate breasts to ensure proper functioning of each breast. Each mother should be taught on proper breast care to avoid breast problem such as cracks, sores, engorgement and mastitis. Exclusive breastfeeding should be continued for 6 months, the complementary feeds or supplementary feeds (for mothers who are HIV negative) should be introduced gradually (Frazer, 2003; Wood, 2008). Mothers should be encouraged to have nutritious foods and fluids and to practice breast-feeding on demand. Breastfeeding should continue for a period of 2 years.

The breast milk protects the breast feed child from developing diarrhoea (Frazer, 2003; Wood, 2008). The breast milk contains IgA factor, which coats the intestinal mucosa and protects the child from attack by diarrhoea causing micro-organisms. The breast milk also contains the *Lactobacillus*, which dominates the gastro-intestinal tract and reduces chances of growth of the diarrhoea causing microorganisms. Further, the breast milk promotes maturity of the gastro-

intestinal tract, therefore reducing chances of diarrhoea causing micro-organisms from damaging it.

2.5.2 Child Weaning

Each food item should be introduced to the child gradually. The child should be offered a mixed food that provides energy such as millet/maize porridge, a protein such as mashed skinned beans or egg and a vitamin food such as fresh lemon juice (Stanfield, 2005; WHO, 2005; Wood, 2008). Adding an oil or fat reduces the food bulk and provides adequate energy required by the child. The food offered should be soft and semi liquid so that the child can swallow easily. It should be well cooked to make it easily digested. The child should be offered 4 to 5 meals, a day since small meals are easily digested (Stanfield, 2005; WHO, 2005; Wood, 2008).

Proper child weaning prevents childhood diarrhoea (Wood, 2008). Early child weaning before age of 4 months results in poor food absorption and leads to diarrhoea and malnutrition. The choice of weaning foods chosen by the mother/caretaker may contribute to the child developing diarrhoea. The method of child weaning chosen by the mother/caretaker may also contribute to childhood diarrhoea and malnutrition. Sometimes mothers use feeding bottles to offer children liquids such as milk and porridge. Feeding bottles are difficult to clean and contribute to childhood diarrhoea transmission (Stanfield, 2005; WHO, 2005; Wood, 2008). Mothers should be counseled to use cup or cup and spoon which are easier to clean.

The study sought to identify the types of foods offered to children under 5 years during diarrhoea in Baharini location, Nakuru. Inappropriate choice of foods and inadequate child feeding results in malnutrition. Malnutrition makes diarrhoea more severe, more prolonged and more frequent (Stanfield, 2005; WHO, 2005; Nordberg, 2007).

2.5.3 Hygiene

Proper hand washing should be practiced in food preparation, serving and eating to avoid food contamination. Proper hand washing involves using soap and clean running water. Proper hand washing should also be done after defaecating to prevent diarrhoea transmission through contaminated hands (Nordberg, 2007; Wood, 2008). Hygiene behaviour research was conducted in Cusco, Peru and Chinandega, Nicaragua (Favin, 2004). Behaviour change counselling within families was carried out for a period of 1 year and research results revealed that most of the hygiene behaviours which were promoted showed a marked improvement. The hygiene behaviour involved proper hand washing at specific periods and safe handling of food. Success in household behaviour change was attributed to individualized counseling and improved access to hygiene products (Favin, 2004). This study intended to find out whether the mothers in Baharini location knew that proper personal hygiene could prevent diarrhoea. The Rotavirus can remain in hands for many hours and contaminate food, water and utensils.

All cooked food and fruits should be properly handled to protect them from contamination. All food/milk should be cooked to boiling point to ensure any micro-organisms are destroyed. Food/milk should be served when hot. Any left over food/milk should be stored covered or in a fly proof cupboard to avoid contamination. Mothers/home helpers who are involved in handling food/milk should not be suffering from diseases such as pulmonary tuberculosis, dysentery or sores on their hands (Nordberg, 2007; Wood, 2008). All fruits should be washed with clean water while the skin is intact before offering them to children. Dirty utensils should be washed immediately after use. If washing is not possible, the utensils should be submerged into clean water. All clean utensils should be protected from contamination. The clean utensils should be placed on a rack above the ground level to dry and then stored in a fly proof cupboard to ensure that houseflies do not contaminate them (Nordberg, 2007; Wood, 2008). The house and the

compound should be kept clean at all times in order to avoid growth and multiplication of the houseflies.

2.5.4 Refuse Disposal

Each household produces dry and wet domestic refuse through its day-to-day activities. All domestic refuse should be properly disposed to prevent diarrhoea transmission. Proper disposal of dry domestic refuse such as papers, tins and plastic bottles involves putting such refuse in a clean bin, which has a well fitting cover. Proper disposal of wet domestic refuse such as vegetables, fruit peelings and left over foods involve wrapping the refuse in old paper and then putting them in a bin which has a well fitting cover. This prevents the houseflies breeding in the refuse. The refuse should be taken by the local municipality and disposed to designated sites far from human habitation. Domestic refuse should be disposed by using the appropriate method of disposal. These include burning, incineration, burying, controlled tipping and recycling (Wilkinson, 2006; Wood, 2008).

All animals such as cattle and birds such as chicken should be kept away from the family house at a distance of 30 metres on the leeward side of the house. The cattle and chicken dens should be properly maintained to avoid diarrhoea-causing micro-organisms being transmitted from animals/birds to man. In some households, chicken are kept in houses or near houses for safety (Nordberg, 2007). Children may come into contact with chicken droppings. This may result in transmission of diarrhoea causing micro-organisms such as *Campylobacter Jejuni*, to the child. This study intended to identify the methods used by the households to dispose domestic refuse and whether these methods were a risk factor for diarrhoea transmission in Baharini location, Nakuru.

2.5.5. Excreta Disposal

Every household should have a facility for excreta disposal. The types of excreta facilities considered appropriate include the flush toilet and the ventilation improved latrine. The flush toilet requires a small water tank, a pan in which faeces are deposited and sewage pipes which connect to the sewage water works. Faeces containing diarrhoea-causing micro-organisms such as *Salmonella Typhi* should be decontaminated before disposing then into the flush pan. The flush toilet should have a pan cover and requires a continuous supply of water. When the toilet is flushed, the faeces are washed out and flow through pipes to the sewage works. Soft toilet paper should be used for wiping children to ensure that excreta and the paper flow easily through the sewage pipes without any blockage. The treatment at the excreta disposal sewage works involves allowing the sewage to be exposed to open air, the solids to settle to the bottom and natural bacterial process to take place. The solids are then allowed to dry and form manure while the liquid is directed to a river (Wilkinson, 2006; Wood, 2008;). The flush toilets are common in most of the households in Baharini location. Inadequate supply of water during the months of January to March affects their maintenance. Overcrowding in some of the estates such as Flamingo and lack of covers further has negative effects on their maintenance and therefore becomes a risk for diarrhoea transmission. About 10% of households in Kenya have flush toilets (G.O.K, 2009).

The other method of excreta disposal is the latrine. The latrine involves digging a hole in the ground and then a concrete slab to cover the hole. The slab should have an overlap to prevent it from falling. The small house above the latrine hole should be well ventilated, have good lighting during the day and at night, a roof for protection from extreme weather conditions and a door for privacy. The ventilation improved pit latrine should have a flytrap. Each latrine should have a light cover for the hole, which can be easily removed and then returned even by children. The hole should be covered at all times. It should be built on the leeward side of the house to avoid

bad smell reaching the house (Wood, 2008; Basavanthappa, 2008). A new pit should be built before the old one becomes full. Some of the houses in Baharini location (Manyani and Lakeview estates) had pit latrines. Some of the latrines were not well built and they lacked covers. In some cases one excreta facility was used by more than one household. The recent census, found that 74% of households in Kenya use the pit latrines (G.OK, 2009). The study intended to identify methods used by households for disposal of excreta and whether these were a risk for diarrhoea transmission.

In Nigeria, a study was conducted to determine the implications of disposal of child's faeces and control of childhood diarrhoea (Jinadu, 2004). The results revealed that mothers of children under 5 years did not dispose the child's faeces properly. Some mothers consider the child's faeces safe and may not dispose it properly (Nordberg, 2007). Proper disposal of the child's faeces reduced diarrhoea occurrence significantly (Favin, 2004). Mothers should be encouraged to dispose child's faeces properly. Proper disposal of faeces will protect fields (soil) from contamination by diarrhoea causing micro-organisms and reduce diarrhoea occurrence.

Another research was carried out to determine effect of control of houseflies by use of insecticide spray in an urban setting (Brian, 2004). There was significant reduction in diarrhoea occurrence at the period of peak housefly season although the approach of using insecticide to spray houseflies was found to be expensive. Proper disposal of refuse and excreta will reduce or eliminate housefly population. The houseflies feed and then breed in rotten materials such as food, vegetables, fruits and on faeces. Houseflies transfer diarrhoea-causing micro-organisms from the rotten materials and faeces to food, water and utensils by physical and mechanical means (Nordberg, 2007).

2.5.6 *Safe water supply*

Childhood diarrhoea can be prevented by use of safe and adequate water supply. Water can be made safe by protecting all water sources from contamination. Proper disposal of faeces by human beings will keep water sources safe from contamination. Animals and domestic birds should be prevented from accessing water sources to avoid contamination. Contaminated soil pollutes water sources such as river, spring or well. A study was carried out to determine the more effective and sustainable interventions for control of childhood diarrhoea in developing countries (Waddington, 2009). Results showed that interventions on improvement of quality of water and hand washing with soap at key periods such as before handling food and after defecating were the most effective in reducing childhood diarrhoea. Each household should have adequate safe water supply through water pipes. Access to safe piped water in Kenya is at the ratio of 3:10 (G.O.K, 2009).

Water treatment can be practiced at the household level by chlorination or boiling. Water is made safe for drinking by protecting it from contamination for example rain water can be collected from clean roofs into well prepared containers for drinking. Water from other sources such as river or well can be treated at household level by using solutions such as (*water guard*) chlorine 1 drop in 1 litre of water. This method can be used to improve water quality in the household (Wood, 2008). Water can also be treated through the large-scale water treatment works by chlorination then directed to households through water pipes. Improved quality of water reduced childhood diarrhoea in Peru and Nicaragua (Favin, 2004). Most households in Baharini location receive their water from Ministry of water, which is treated by chlorination although during the dry months, there is water rationing. Some households harvested water during the rainy season (Wood, 2008; Bassavanthappa, 2008). Only 10% of Kenyans harvest rain water (G.O.K, 2009). Households should be encouraged to harvest rainwater to supplement the water supply.

A research study was conducted in a slum in Nairobi, Kenya (Graf, 2008). The findings revealed that there was a decrease in risk for childhood diarrhoea when safe drinking water was available to households. Natural purification of water can be done using the three-pot system (Wood, 2008). Water can be stored in a large pot and left standing for 3 days. Most of the micro-organisms in the water die. The water particles settle to the bottom of the pot. The clean water in the pot is poured out and used for cooking while the water at the bottom is used for washing.

A randomized control trial was conducted in Njoro, Nakuru, Kenya (Liwari, 2009). Families were trained to filter water from river Njoro using Biosand filter. Results revealed that children in the intervention families had less diarrhoea days than the control group. In Sub-Saharan Africa, 42% of the population have poor water supply (Wilkinson, 2006). It is easier to protect water from contamination than to treat it once it has become contaminated (Wood, 2008). Proper disposal of excreta prevents water from being contaminated by faeces which contain diarrhoea-causing micro-organisms. This study intended to assess the level of knowledge among mothers as to whether contaminated water is a risk for diarrhoea transmission in Baharini location.

2.6 Diarrhoea Case Management in Children under 5 years

Management of childhood diarrhoea considers six essential aspects. These include prevention of dehydration, rehydration in order to replace the lost fluid and electrolytes, replacement of lost zinc, proper food intake, treatment of the specific cause of diarrhoea and communicating appropriate health information to the mother/care giver. It also, considers providing a return appointment in 1-2 days if the child does not recover (WHO, 2005; Stanfield, 2005, Nordberg, 2007; Guandalini, 2009).

These aspects of management are critical for mothers/caretakers of children under 5 years in Baharini location in order to reduce childhood diarrhoea morbidity and mortality. This

information has been shared by health workers (Wood, 2008). The mothers in Baharini location use the ORT centres, which are established at Langalanga health centre, Hekima and Bondeni dispensaries and at Nakuru general hospital.

A healthy boy age 1 year may weigh 10 kilograms and will require an oral fluid intake of 1000 mls per day. The fluid turnover per kilogram body weight in a healthy child is 5 times more than that of a healthy adult. Fluid turnover is measured by checking fluid intake and fluid output. When diarrhoea occurs in a child, large amounts of fluids are lost rapidly leading to rapid dehydration. The diarrhoea stool also contains large amounts of electrolytes. These are sodium, potassium, chloride, bicarbonates and zinc. When extra fluids and electrolytes are lost the body compensates these losses by causing the kidneys to retain fluids and electrolytes. This results in reduced urine output. When the fluid and electrolytes loss is severe, the body further compensates by taking fluid from other compartments such as extra cellular fluid. This results in clinical signs of dehydration such as dry mouth, sunken fontanelle and sunken eyes. Further fluid loss results in signs of shock and cellular damage such as cardiac arrest, convulsions and acidotic respiration (deep respiration). If the fluids and electrolytes are not replaced, this results in death (Hay, 2003; Stanfield, 2005).

Dehydration is the main cause of death in childhood diarrhoea. It is therefore essential for health workers and mothers/care givers to recognize it early. By the time clinical signs of dehydration appears, the child has already developed 5% dehydration (Stanfield, 2005). The clinical assessment of a child with diarrhoea begins by excluding other diseases that can cause diarrhoea such as malaria, measles and pneumonia. The degree of dehydration should be classified according to the signs and symptoms which corresponds with the fluid lost (WHO, 2005) Each child who presents with diarrhoea has a thorough history taken from the mother and disease signs

identified. A physical examination is done to determine signs of dehydration and other disease signs. The signs and symptoms of dehydration in children under 5 years includes eager to drink (although in severe dehydration, the child who is unable to drink), excess thirst and sunken eyes. The child becomes irritable, restless, lethargic (unconscious) and when the skin is pinched, it takes 2 seconds to go back.

Diarrhoea rapidly causes dehydration in children because of their size (Nordberg, 2007). Dehydration is graded as severe, some dehydration or no dehydration. A child is considered to have severe dehydration when he is unconscious and has sunken eyes (WHO, 2005). A child is considered to have some dehydration when he has 2 or more signs of dehydration such as sunken eyes and is drinking eagerly. The child with diarrhoea and no dehydration may not have any of the above signs and symptoms (Stanfield, 2005; WHO, 2005).

The child suffering from diarrhoea and with no dehydration is managed using treatment plan A (WHO, 2005; G.OK, 2010). The mother is encouraged to breastfeed more often and if the child is already on complementary foods, to continue giving fresh nutritious foods. She should give home made extra fluids such as soup, unsweetened fresh juice or water until diarrhoea stops. If the child is below 2 years, she should give $\frac{1}{4}$ to $\frac{1}{2}$ cup of ORS after each bout of diarrhoea. The mother is shown how to prepare ORS at home and give ORS sips from a cup. One sachet of ORS is dissolved in half litre of cold boiled water. The mother is given a follow up appointment after 1-2 days.

The child suffering from diarrhoea and with some dehydration is managed using treatment plan B (WHO, 2005). The child is managed at the oral rehydration therapy centre in the out patient department for 4 hours and then re-assessed. The amount of ORS the child should be offered is

calculated according to his weight. Each kilogram body weight is multiplied by 75 in order to determine the amount of ORS to be given in 24 hours. In some cases in which the weight is unknown, the child's age is used. The child under 6 kg is offered 200-400 mls of ORS while the one above 12 kg is given 900 – 1400 mls in 24 hours. The child is assessed after 4 hours to determine the hydration status, if there is improvement, the child is discharged on ORS and oral zinc therapy for 7-10 days. The mother is counselled to continue with extra home made fluids and breastfeeding. The child should continue with complementary food intake of 5-6 meals of freshly prepared nutritious food per day. The mother is counselled for follow up appointment after 1-2 days (Stanfield, 2005; Wood, 2005).

The child in severe dehydration may be lethargic and unable to drink or drinks poorly. The child suffering from diarrhoea with severe dehydration should be managed using treatment plan C. The child should be started on intravenous infusion (I.V.) of Hartman's solution and ORS when he is able to drink. The amount of I.V. infusion is determined by calculating the weight in kilogram or by the child's age. The infant of less than 12 months is given 30 mls per kilogram body weight for the first hour and then 70 mls per kilogram body weight in the next 5 hours. The child above 12 months should be given 30 mls per kilogram body weight of intravenous Hartman's solution for the first ½ hour and 70 mls per kilogram body weight for the next 2 ½ hours. If the child is able to drink orally, 5 mls of ORS per kilogram body weight per hour is given in 3-4 hours to the child under 1 year. The same ORS formular is used for children above 1 year in 1-2 hours. If the child does not respond to rehydration therapy when re-assessed after 3-6 hours, he is admitted to the paediatric ward. The child on I.V. therapy should be observed closely because over hydration can lead to cardiac arrest. In Nakuru, children under 2 years with severe dehydration are admitted with their mothers for a period of 3-5 days (Mburu, 2007). This allows the mother to continue

breastfeeding, but it disrupts other activities of the mother/family (Stanfield, 2005; WHO, 2005; Nordberg, 2007).

The ORS was discovered in early 1975's by a doctor in India. The ORS was found to be a life saving approach in replacement of fluids and electrolytes. In childhood diarrhoea dehydration, ORS is effective irrespective of the cause of diarrhoea (Nordberg, 2007). WHO and UNICEF adapted the ORT in mid 1970's and in Kenya in early 1980's for treatment of childhood diarrhoea. Although ORS is effective, easy to prepare and use in management of childhood diarrhoea, studies done have shown limited use of ORS (Wright, 2001).

Oral rehydration solution is considered in rehydration during childhood diarrhoea because even when the gastro-intestinal tract cells are affected, absorption continues. The presences of glucose enhance absorption of sodium in the intestine (Stanfield, 2005). Some foods such as rice and cereal based porridge also promote absorption of sodium.

In year 2002, the WHO modified the ingredients of the standard ORS to the current osmolarity reduced ORS. The current ORS contains 75 mmol/litre of glucose, 75 mEq/l litre of sodium, 20 mEq/litre of potassium, 65 mEq/litre of chloride and 10 mmol/litre of citrate. The reduced-osmolarity ORS is considered to have some advantages compared with the original WHO Standard 1975 ORS. It reduces the stool volume, reduces vomiting and reduces the need for intravenous therapy. The use of ORS reduces the treatment cost of childhood diarrhoea (Kinoti, 1985; Stanfield, 2005; WHO, 2005; Nordberg, 2007).

A study was done in Nigeria to determine knowledge, attitude and practice among doctors on ORS (Okeke, 1996). Result showed that doctors knew and believed that ORS was effective in

treating childhood diarrhoea. However, the doctors had inadequate skill on preparation of ORS and sometimes-inappropriate drugs were prescribed to treat diarrhoea. It has been observed that between year 2000 and 2008, the use of ORS in treatment of diarrhoea in children under 5 years in Africa has shown slow progress (UNICEF, 2009). A study was conducted in Uganda among health workers and mothers of children under 5 years of age (Konde-Lule, 1992). The study showed that there was limited use of ORS, there was wide spread use of herbs in treating childhood diarrhoea and some foods were omitted during diarrhoea. Another study was done in Nepal to determine mother's role in management of childhood diarrhoea (Anzari, 2009). The findings revealed that there was limited use of ORS by mothers in treating childhood diarrhoea. Some mothers reduced fluid, foods and breastfeeding during childhood diarrhoea. Diarrhoea was treated with herbs and mothers believed that diarrhoea could be managed through magic. This lead to delay in seeking treatment. The study concluded that it was important to consider cultural beliefs when planning educational strategies and use of locally available foods. Inappropriate fluid replacement during childhood diarrhoea leads to increased morbidity and mortality (Stanfield, 2005; WHO, 2005; Nordberg, 2007).

A studies was done in Nairobi, Kenya to determine the type of drugs prescribed by assistant pharmacists to treat childhood diarrhoea showed that anti-diarrhoea drugs were prescribed more often than ORS (Goel, 1996). A controlled study was conducted in Kenya and Indonesia to identify the type of drugs prescribed by pharmacists to treat childhood diarrhoea (Ross -Degnan, 1996). The study also revealed that anti-diarrhoea drugs were prescribed more compared to the ORS. Antiperistaltic drugs such as lomotil reduce bowel movement and give a false impression of improvement (Datta, 1998; Nordberg, 2007). This may lead to hypovolaemic shock and electrolyte imbalance therefore making the child's condition worse. Other antidiarrhoea drugs used include kaolin, which makes the stool more solid (Datta, 1998). The solid stool gives a false

impression of recovery and does not provide any benefit to the child. These drugs interfere with proper treatment or rehydration

Twelve studies were conducted to determine effectiveness of zinc in treatment of acute childhood diarrhoea (Harvey, 2005). Combination of zinc and ORS in treatment of childhood diarrhoea was found to reduce diarrhoea severity, duration and diarrhoea episodes in the child. A control study was conducted to determine the efficacy of zinc in management of childhood diarrhoea (Harvey, 2005; Aggarwal, 2007). Findings revealed that addition of zinc to ORS in the treatment of the child with diarrhoea reduced diarrhoea mortality and length of hospital stay which is attributed to childhood diarrhoea. Zinc reduces the severity, duration of the diarrhoea episode and also reduces chances of recurrent diarrhoea for the next 2-3 months (Nordberg, 2007). Zinc is essential for epithelial cell membrane structure and function. Large quantities of zinc are lost during diarrhoea (WHO, 2005). Research on the need to add zinc to ORS was found to be useful in reducing childhood diarrhoea morbidity and mortality. This leads to WHO and UNICEF recommending addition of zinc to ORS in the year 2006. Oral zinc supplements for 7-10 days have been recommended during childhood diarrhoea in order to improve the health and development of the child and is given in health facilities in Nakuru (WHO, 2005).

A study was to determine effectiveness of vitamin A in treatment of children suffering from measles infection who had developed diarrhoea as a complication (Ogaro, 1993). Findings showed that diarrhoea resolved faster and it became less severe. Vitamin A is a fat-soluble vitamin which provides the eye retina with visual purple and keeps the skin healthy (Wood, 2008). Deficiency in vitamin A results in night blindness, stunted growth and susceptibility to infections (Datta, 1998). The mother of a child suffering from diarrhoea should be encouraged to give the child foods rich in vitamin A such as fish and dark green vegetables. A dose of vitamin

A is given to the child every six months until age 5 years, it is given to all children attending the child welfare clinic (Wood, 2008).

The child suffering from diarrhoea should be offered mashed food which is easily digested. The food should be prepared fresh and care taken after preparation to avoid food contamination. The child should be offered 5-6 nutritious meals each day (Stanfield, 2005; WHO, 2005). Oil is added to the meal in order to provide adequate energy to the child. The food should contain protein such as beans or egg for growth and repair of damaged cells. The meal should also contain minerals and vitamins. The frequent meals should be continued for 2-4 weeks after recovery from diarrhoea to prevent malnutrition and meet the child's daily requirement for growth (Stanfield, 2005; Wood, 2008; G.O.K, 2010). The long-term effects of childhood malnutrition includes reduction of capacity in potential for education and production (WHO, 2010).

Certain fluids and foods are omitted during childhood diarrhoea. These include soft drinks, sweetened bottled fruit juice, tea, coffee and herbal drinks. The foods that can be omitted during childhood diarrhoea include bulky foods, vegetables and whole grain cereals because these are not easily digested. Foods, which have sugar, are also omitted because they can make diarrhoea worse (Stanfield, 2005; WHO, 2005). Studies done in Uganda and Nepal found that mothers omitted certain foods and fluids during diarrhoea (Konde-Lule, 1992; Anzari, 2009)

Malnutrition occurs within 2 days of diarrhoea unless the child is offered nutritious food. In children with severe malnutrition, it is difficult to determine the dehydration status. These children should be offered the Resomal (Rehydration Solution for severely malnourished children) (Stanfield, 2005; WHO, 2005). Resomal has a low level sodium and high level of

potassium compared to the WHO – ORS formular. This makes it more appropriate for the severely malnourished child. Resomal is given orally or by nasal gastric tube. The amount given is 5 mls per kilogram body weight every ½ hour for 2 hours. This is followed by Resomal 5-10 mls per kilogram body weight each hour for 4-10 hours. Malnutrition results in lack of enzyme lactose in the intestinal lumen. This affects the digestion of lactase resulting in childhood diarrhoea (Stanfield, 2005). Proper food intake during childhood diarrhoea will result in reduction of diarrhoea morbidity and mortality in Baharini location.

Fever is a common complication of diarrhoea in children under 5 years. It occurs because of inflammation of the gastro-intestinal tract, dehydration and other infections such as measles or malaria. Fever can be treated by use of oral antipyretics such as panadols and reduction of child's clothing. Tepid sponging should not be encouraged since it is contra-indicated in pneumonia which is common in children under 5 years of age (Stanfield, 2005; WHO, 2005).

2.6.1 Immunization

Diarrhoea can be prevented through immunization. A clinical trial was conducted in Latin America on human *Rotavirus* vaccine (Guandalini, 2009; Richardson, 2010). *Rotarix* vaccine was found to provide 85% efficacy against the *Rotavirus* and 42% protection against other micro-organisms that cause severe childhood diarrhoea (Richardson, 2010). This resulted in *Rotavirus* vaccine being included with other EPI vaccines in some countries (WHO, UNICEF, 2006). *Rotarix* vaccine is available in Kenya since 2006 although the cost limits its use. One oral dose is given to the child under six months of age. Complete immunization of the child with all the EPI vaccines such as measles vaccine reduces chances of infection with other diseases, which contribute to diarrhoea in children under 5 years. Mothers should be encouraged to ensure children receive all vaccines (Stanfield, 2005; Wood, 2008).

2.6.2 Home Care

Childhood diarrhoea morbidity and mortality can be reduced if mothers are able to identify early signs of dehydration and take appropriate action immediately. When mothers are able to recognize early signs of dehydration such as drinking eagerly, thirst and restlessness they are likely to take appropriate action (Stanfield, 2005; WHO, 2005; Nordberg, 2008). The study intended to find out the level of knowledge concerning signs of dehydration and whether mothers of children under 5 years in Baharini location were able to recognize such signs and the action the mothers took.

Since early in the last century, mothers were considered to be responsible for the health of the members of the family and especially the children. Health education measures aimed at training mothers to start some form of home treatment and then seek health care from the health workers. In the last 3 ½ decades, health education on home care treatment for diarrhoea disease has emphasized on use of different fluids to prevent dehydration and to treat dehydration. In the 1970's and early 1980's home made salt sugar solution (SSS) was emphasized. This was later found to be inappropriate and health workers counseled mothers to stop using it. Mothers were later taught how to prepare and give ORS to the child when diarrhoea occurs. Mothers were also counseled to use other available homemade fluids such as soup, to continue breast-feeding and to give other nutritious foods (Stanfields, 2005; WHO, 2005; Nordberg, 2007).

This study intended to identify household management regimes used by mothers during childhood diarrhoea in children under 5 years in Baharini location. The information would be used by health workers, community health workers and mothers/caretakers in implementation of appropriate interventions to reduce childhood diarrhoea morbidity and mortality and to ensure child survival in Baharini location, Nakuru.

2.7 Health Seeking Behaviour Among Mothers of Children Under 5 Years Suffering From Diarrhoea.

Various factors affect the use of health care services. A study was conducted in Nairobi slums on health seeking behaviour (Negussie, 2005). The results showed that caretakers sought health care services for childhood diarrhoea more frequently compared to respiratory problems (Negussie, 2005). Study in Nepal showed that the grandparents of children under 5 years influenced the mothers to give limited fluids during diarrhoea (Anzari, 2009). The mother's believed that diarrhoea could be managed through magic. This resulted in delay in seeking health care services (Anzari, 2009).

A study conducted among schooled Maasai women showed that they believed that diarrhoea was caused by a series of quasi bio-medical factors (Patel, 1988). The use of inappropriate home remedies results in delay in seeking health care service and increases the risk of prolonged morbidity and mortality. The low social status of women prevents them from being able to make decision on when to seek health care services. Women do not control resources within the family setting. This affects their health care seeking behaviour because they cannot decide to use family resources for health care (Wood, 2008).

This chapter has reviewed issues relating to diarrhoea in children under 5 years. The current global annual mortality for the last 5 years is 1.8 million but 30 years ago it was 4.6 million. There are various global and national policies for control and management of diarrhoea. These includes the control of diarrhoea diseases (CDD), the hand washing, IMCI/Household and community component, Millennium Development Goals (MDG's), the Kenya Vision 2030 and the Revised CDD Policy 2010

Various programmes are concerned with control and management of diarrhoea in children under 5 years. These include the MCH/FP, EPI, CDD, IMCI and IMCI/Household and community component. These programmes have been implemented globally especially in developing countries and in Kenya.

Diarrhoea in children under 5 years can be caused by infective micro-organisms and non-infective factors. The infective micro-organisms includes viruses, bacteria, fungi and parasites. The none infective factors include disorders of the intestinal enzymes, intersusceptions, faulty weaning and unknown aetiology. Various research studies have been done on causes/factors that result in diarrhoea.

Certain environmental factors contribute to diarrhoea transmission. These include climatic changes such as during the dry weather due to reduced water supply, poor refuse and improper excreta disposal. Research studies have been conducted on environmental factors that contribute to diarrhoea transmission. Diarrhoea is transmitted through the commonly known 5 Fs. These are Fluids, Foods, Fingers, Fields and Flies.

Childhood diarrhoea can be prevented through various methods. Exclusive breast-feeding reduces childhood diarrhoea in the infant. Proper child weaning and proper hygiene practices prevents diarrhoea in children under 5 years of age. Proper disposal of refuse and excreta breaks the diarrhoea transmission cycle and reduces diarrhoea occurrence. Research studies have been done on safe water supply and safe excreta disposal. The findings revealed a reduction in diarrhoea when appropriate interventions have been applied.

The major cause of deaths in children under 5 years suffering from diarrhoea is dehydration. Dehydration occurs as a result of rapid loss of body fluids and electrolytes (potassium, sodium, bicarbonate and zinc). Proper assessment, classification and management of the child is important in order to ensure child survival, growth and development. Proper replacement of the lost fluids and electrolytes are essential in the immediate management of the child suffering from diarrhoea. WHO (2005) and UNICEF (2008) have recommended use of ORS and other appropriate home remedies for management of childhood diarrhoea. Various studies have been carried out on the remedies used for childhood diarrhoea management. Findings have shown limited use of the recommended remedies such as the ORS (Wright, 2001).

This study also intended to determine the regimes used by mothers during diarrhoea in children under 5 years. Further, the study intended to identify household risk factors for diarrhoea in children under 5 years of age in Baharini location, Nakuru. This study was concerned with assessing six out of the sixteen household practices of the IMCI which are recommended by WHO, UNICEF and the Eastern and Southern African Region (ESARO). These include breastfeeding, child food intake, proper child weaning, hand washing, household practices on disposal of excreta and domestic refuse. This study also intended to determine the types of treatment used by mothers to treat children with diarrhoea and to determine diarrhoea disease signs which are recognized by mothers and that cause enough concern to mothers for them to seek health care from health workers.

The IMCI policy (1999/2000) recommended implementation of household practices in order to improve control and management of childhood illnesses such as diarrhoea. There was need to assess the effect of implementation of the IMCI household practices in relation to diarrhoea in children under 5 years in Baharini location, Nakuru. The information was necessary in order to

CHAPTER THREE

MATERIALS AND METHODS:

3.1 The Study Area.

Nakuru is the fourth largest urban centre in Kenya. It is the capital of Rift Valley province. It lies at about 1850 metres above sea level, $00^{\circ} 17, s$ (South) of the Equator and $36^{\circ} 04; e$ (East) of the Greenwich Meridian. Nakuru derives its name from Maasai language which means a place of dust. It was established by the British during the colonial era. It was given a township status in 1904 and it matured into a municipality in 1952.

The economic foundation for Nakuru is agriculture, manufacturing and tourism. The main crops include maize, beans, wheat, barley and coffee. These provide raw materials for the manufacturing industries. Daily farming is an important activity and provides milk to various processing plants such as New Kenya Co-operative Creameries. Nakuru is home to outstanding universities such as Egerton, Kenyatta and Kabarak. It is also home to private schools such as Greensteds and Melvin Jones. Lake Nakuru which lies to the Southern part of the town is part of Nakuru National Park. The park has many flamingoes and wild animals. The Menengai crater, a dormant volcano is 8 kilometres North of the Nakuru business centre. It is the second largest volcanic crater in the world, whose distance from the rim down is 483 metres.

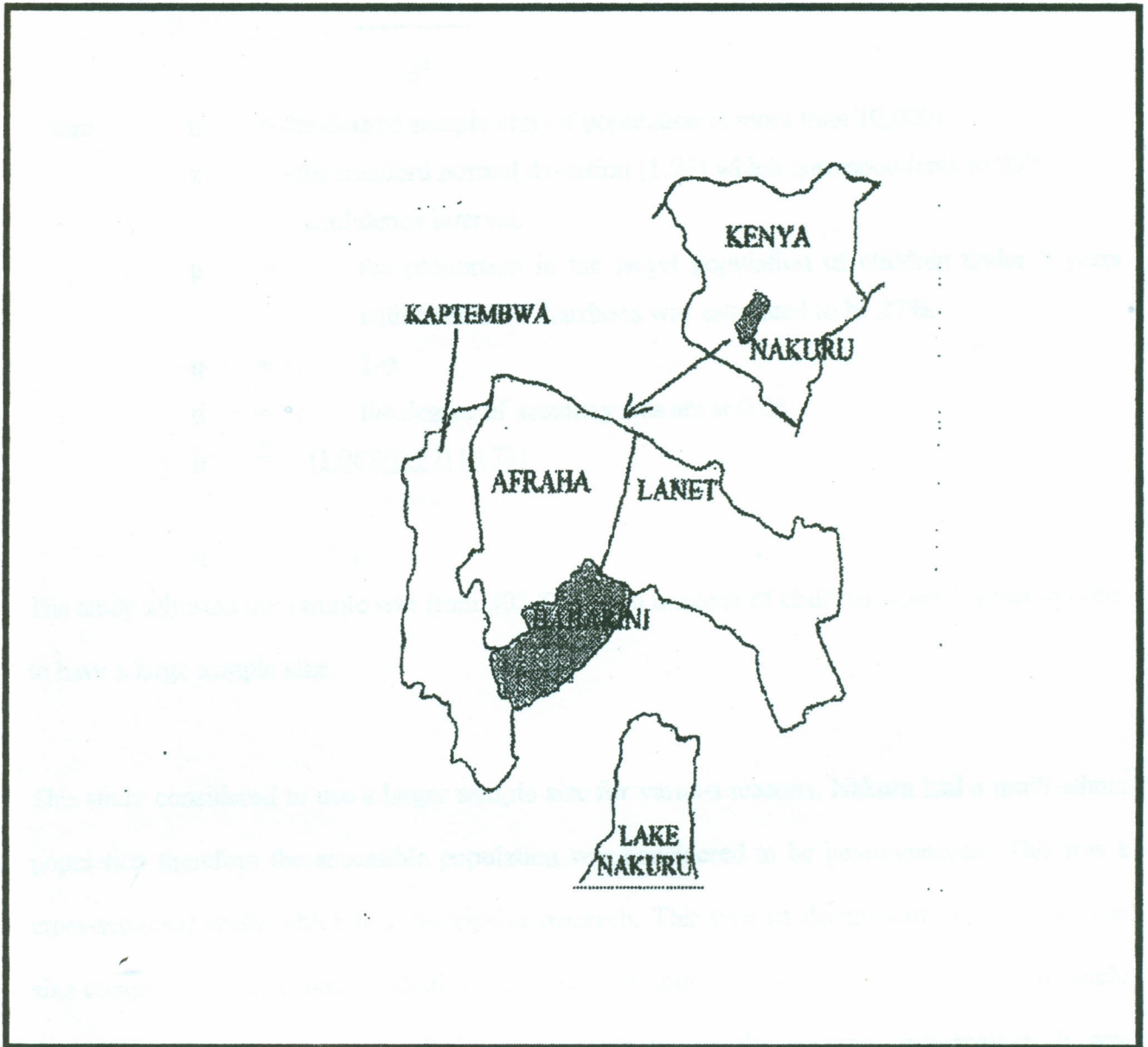
In the centre of the town is the Rift Valley sports club. The club hosts various sports such as cricket throughout the year. Nakuru town also hosts the annual rugby for East Africa. In 1926, the Leakey's discovered Hyrax Hill prehistoric site which is situated about 5 kilometres from the centre of the town. According to the 1999 census, Nakuru had the third largest urban population in Kenya. Nakuru is made up of people from all parts of Kenya and many parts of the world.

Nakuru is one of six multi-ethnic municipalities in Kenya namely Nairobi, Mombasa, Kisumu, Naivasha, Thika and Eldoret. The researcher in this study was a student who used the “distant learning” mode of study because it was not possible to take a study leave. The student, therefore, identified Nakuru municipality as the area of study.

Nakuru Municipality has four locations namely Afraha, Baharini, Kaptembwa and Lanet. The study area was Baharini location, which has 12 residential estates. Baharini had 11,744 households and is 3.9 square kilometres. The common cause of morbidity and mortality affecting children under 5 years in Baharini includes pneumonia, diarrhoea, malaria, measles and malnutrition (Mburu, 2007). Figure 3.1 below is a map of Nakuru municipality showing the study location.



Figure 3.1 A map of Nakuru Municipality showing the Study Location



3.2 Sampling Method

The study population was composed of mothers of children under 5 years who lived in Baharini location. Baharini had a total population of 48,624 (G.O.K; 1999). Children under 5 years of age were 11,568 (G.O.K; 1999). The study considered nine estates namely Flamingo (Flamingo I and II), Langa langa (Langa langa I and II), Manyani, Lakeview, Pangani, Racecourse and Ziwani.

3.3 Sample Size Determination

$$\text{Formula } n = \frac{z^2 pq}{d^2} \quad (\text{Fisher's 1998})$$

- Where
- n = the desired sample size (if population is more than 10,000)
 - z = the standard normal deviation (1.96) which corresponds to 95% confidence interval.
 - p = the proportion in the target population of children under 5 years with childhood diarrhoea was estimated to be 27%.
 - q = 1-p
 - d = the degree of accuracy was set at 0.05
 - n = $\frac{(1.96)^2(0.27)(0.73)}{(0.05)^2}$
 - n = 302.87

The study adjusted the sample size from 302.87 to 400 mothers of children under 5 years in order to have a large sample size.

This study considered to use a larger sample size for various reasons. Nakuru had a multi-ethnic population therefore the accessible population was considered to be heterogeneous. This was a cross-sectional study which is a descriptive research. This type of design requires large sample size compared to experimental studies. The data was collected using a questionnaire. The study depended on the co-operation of the respondents to get the required information. It was anticipated that some respondents may choose not to participate in the study (Mugenda, 2004; Basavanthappa, 2008). The study used the population census of 1999 and therefore it was considered that the population size had increased in size (G.O.K, 1999).

3.3.1. The probability proportional to size sampling technique

The probability proportional to size sampling technique for the study sample was done. This study considered to use this method in order to ensure that the ratio of mothers of children under 5 years in each of the selected estates was reflected in the study sample (Mugenda, 2003).

Table 3.1 The Probability Proportional to Size Sampling Technique for the Study Sample.

	<i>Name of estate</i>	<i>No. of children < 5 years</i>	<i>No. of mothers to be sampled per estate.</i>
1	Racecourse	1242	$\frac{400 \times 1242}{7635} = 65$
2	Flamingo 2	262	= 14
3	Langalanga 2	523	= 27
4	Pangani	1178	= 62
5	Lakeview	1139	= 60
6	Langalanga 1	360	= 19
7	Flamingo 1	537	= 28
8	Ziwani	231	= 12
9	Manyani	2163	= 113
	TOTAL	7635	400

The researcher obtained maps for each estate which showed each house / plot number and used the maps prepared by Ehrensperger (2005). Each house/plot in the sampled estates were assigned a digit number. The first house/plot was identified by blindly pointing at a digit number on the table of random numbers. The house/plot assigned the selected number was included in the

sample. The researcher considered four digits of the identified number starting from the left side. The researcher then moved down the column on the table of random numbers until the required number of houses/plot was achieved. The numbers, which were not within the range of the selected number, were ignored. A table of random numbers (digit numbers) was therefore used to identify households in which mothers were to be interviewed in each sampled estate until the expected number of mothers per estate was achieved. The number of mothers interviewed per estate was proportional to the population size of the estate.

3.3.2 Inclusion Criteria

Mothers of children under 5 years who had lived in Baharini location for a period of 1 year and who gave oral consent to be involved in the study were included in the study

3.3.3 Exclusion Criteria

Mothers of children who were age 5 years and above and those who declined to give consent to participate in the study were excluded.

3.4 Ethical Considerations

Permission to conduct the research was sought from the ethical review committee, Kenyatta University, Ministry of Science and Technology, Ministry of Health, Division of Child Health, Municipal Council of Nakuru, Public Health Department and area chiefs for Lanet and Baharini location. Participation was voluntary through informed consent. There was no loss of benefit or harm for those who chose not to participate in the study at any stage. Those who wished to withdraw in the course of the interview were allowed to do so. All data and information collected was kept confidential. There were no names on the questionnaire.

3.5. Data Processing

3.5.1 Data Collection and Research Instruments

Data was collected using structured questionnaires, which was prepared in English. An interview schedule were administered to mothers of children under 5 years of age. The sanitation of the house, compound and excreta disposal facility was observed using a checklist. English and Kiswahili were used during the interview schedule.

3.5.2 Data Processing and Analysis

Each household was visited by 2 interviewers. One of the interviewers would listen and observe to ensure that all questions in the questionnaire were administered to the respondent. When the interview schedule was completed, the interviewer would examine the questionnaire to ensure that all the data has been included in the questionnaire before leaving the household. At the end of each day of data collection all questionnaires were examined to check whether there were any errors or omissions. If any errors or omissions were detected, the researcher would visit the households the following day in order to correct the error and/or include the missing data. All questionnaires were filed in different files according to the specific estate. The researcher developed a codebook. Each question in the questionnaire was changed into a statement but the meaning of the statement was retained. The statement was converted into a variable and given a numerical number. Each of the possible answers in the questionnaire was changed to value and each value was given a unique numerical number. The collected data was analysed by tabulating the scores. The data was classified according to common characteristics. Data was analysed using computer package for social sciences. Chi-Square test was used to test the relationship between variables in the study. Data was presented using descriptive statistics such as percentage, range, tables and pie graph.

CHAPTER FOUR

RESULTS

4.1 Social Demographic Characteristics of the Respondents

The respondents involved in the study had children within age 0 to 59 months and their mean age was 27 years. About eighty seven point five percent (87.5%) of the respondents were married while 10.25% were single and 2.25% were widows. These findings suggest that most of the children in Baharini location are brought up by both parents.

The study found that 92.25% of the respondents, had acquired formal education from primary school and above. Fifty five point five percent (55.5%) of the respondents were in the informal sector. This included business and farming. Eighty point two percent (80.25%) of the respondents lived in houses whose walls were smooth and cemented with iron sheet roofs (permanent). Safe water for household use can be harvested from houses whose roofs are built with iron sheets or clay tiles. Inadequate safe water supply contributes to childhood diarrhoea occurrence Table 4.1 below shows the social demographic characteristics of the respondents.

Table 4.1 Social Demographic Characteristics of the Respondents.

Age of the child included in the study	Frequency	Percentage
2 – 59 months	374	93.5
0 - < 2 months	26	6.5
Mean age of the mother	400	27 Years
Marital status	Frequency	Percentage
Married	350	87.5
Widow	41	10.25
Single	9	2.25
Educational level		
Formal education	369	92.25
None	31	7.75
Occupation of the head of household		
Informal employment	222	55.5
Formal employment	178	44.5
Type of house		
Permanent	321	80.25
Semi- permanent	79	19.75

4.1.1 Cross Tabulation on Highest level of education and estate the respondent lived in.

A cross tabulation between level of highest education and the estate the respondents lived in was done. Results suggests that respondents who had achieved primary education lived more in the low income estate than in the moderate income estates. Respondents who had achieved secondary and post secondary education were more in the moderate income estates.

Table 4.2 Highest Level of Education Cross tabulation with Moderate Income and Low Income Estates

Estate		Highest Level of Education					Total
		None	Primary	Secondary	Post Secondary	Other	
Moderate Income	Flamingo 2	0	4	10	4	0	18
	Race Course	5	15	42	22	1	85
	Pangani	3	14	20	10	0	47
	Langa Langa 2	0	4	15	3	1	23
Low Income	Langa Langa 1	4	19	19	6	1	49
	Manyani	2	46	49	10	0	107
	Ziwani	3	9	2	0	0	14
	Lake View	1	36	16	3	1	57
Total		18	147	173	58	4	400

4.2 Knowledge on Complications and Signs of Dehydration.

4.2.1 Early Signs of Dehydration

Eighty eight point five percent (88.5%) of the respondents did not know the early signs of dehydration. Few of the respondents, 11.5% knew early signs of dehydration. Below is table 4.3 that shows respondents level of knowledge on early signs of dehydration.

Table 4.3 Early Signs of Dehydration

Early signs of dehydration	Frequency	Percentage	Rank
Did not know	354	88.5	1
Knew	46	11.5	2
Total	400	100	

4.2.2. Complications of Diarrhoea.

Fifty five point five percent (55.5%) of the respondents considered dehydration as the effect/complication of childhood diarrhoea. When the early signs of dehydration are not recognized, the child deteriorates to severe signs. This results in occurrence of diarrhoea complications such as severe dehydration, malnutrition and fever. Table 4.4 below shows the level of knowledge of the respondents concerning complications of diarrhoea.

Table 4.4 Complications of Diarrhoea in Children under 5 Years

Complication	Frequency	Percentage	Rank
Dehydration	222	55.5	1
Failure to thrive	73	18.25	2
Malnutrition	53	13.25	3
Do not know	39	9.75	4
Other diseases such as lethargy, fever	13	3.25	5
Total	400	100	

4.2.3. Knowledge on Methods used to Treat Fever During Diarrhoea

Sixty-one point five percent (61.5%) of the respondents, considered use of antipyretics such as panadol to treat fever. The use of antipyretics to reduce fever is considered appropriate. There were various remedies considered by the respondents for treating fever such as tepid sponging (24.0%). Some of these remedies are considered inappropriate

Table 4. 5 Knowledge on Methods used to Treat Fever During Diarrhoea

<i>Method</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
Drugs such as panadols	246	61.5	1
Tepid sponging	96	24.0	2
Others such as exposure	56	14.0	3
Herbs	2	0.5	4
Total	400	100.00	

4.2.4. Methods Used to Reduce Fever During Diarrhoea

Fifty seven point seven percent (57.75%) of the respondents gave antipyretic drugs such as panadols to the child to treat fever during diarrhoea. The health workers and the mass media have been active in providing information on use of antipyretics to reduce fever. Figure 4.1 below shows the methods respondents used to reduce childhood fever

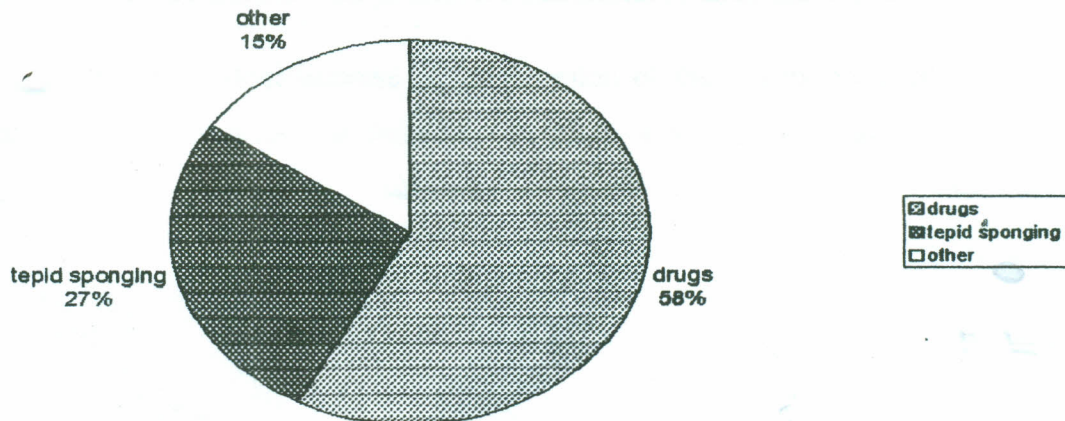


Figure 4.1 Methods Used to Treat Fever During Diarrhoea

4.2.5 Reason for Blood Occurring in Stool

Fourty point seven percent (40.75%) of the respondents, did not know why the child's faeces should have blood during diarrhoea. It has been observed that about a quarter of the children suffering from diarrhoea develop dysentery or bloody diarrhoea. Infection with micro-organisms such as *Shigella* or *Campylobacter* also cause dysentery. Dysentery occurs early in childhood diarrhoea. Blood in diarrhoea results in an increase in diarrhoea mortality. Table 4.6 below shows the respondent's level of knowledge on the reason for blood in stools.

Table 46 Reason for Blood in Child's Stool During Diarrhoea

<i>Response</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
Did not know	163	40.75	1
Wrong	90	22.5	2
Needed improvement	83	20.75	3
Correct	64	16.0	4
Total	400	100	

Blood may appear in stool because of the invasion of the gastro-intestinal tract by diarrhoea causing micro-organisms such as *Shigella*. The micro-organisms penetrate the cells, multiply and destroy the cells causing local infection and dysentery

4.3 Knowledge on Regimes Used for Treating Childhood Diarrhoea in Children Under 5 Years of Age.

4.3.1. Knowledge on Methods Used to Treat Diarrhoea at Home

Eighty one percent (81%) of the respondents knew that fluids were used for treating diarrhoea. About 80% of the respondents gave the correct reason for giving fluids during childhood diarrhoea. Twelve point seven percent (12.75%) of the respondents considered use of anti-diarrhoea drugs to treat diarrhoea. The anti diarrhoea drugs include antiperistaltic drugs such as lomotil and stool hardeners such as kaolin. These drugs reduce the intestinal motility and harden the stool. When intestinal motility is reduced the fluids and electrolytes are retained in the intestinal tract. This may give an impression that diarrhoea has stopped while the child's condition deteriorates into shock. The micro-organisms causing diarrhoea are also retained in the intestinal tract which may cause more gastro-intestinal inflammation. Table 4.7 shows respondent's level of knowledge on methods used to treat diarrhoea at home.

Table 4.7. Knowledge on Methods Used to Treat Diarrhoea at Home

<i>Treatment</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
Fluids	324	81.0	1
Drugs	51	12.75	2
Others	13	3.25	3
Herbs	12	3.0	4
TOTAL	400	100	

4.3.2. Knowledge on Types of Fluids used to Treat Diarrhoea

Thirty five percent (35.0%) of the respondents, considered plain water for treating diarrhoea at home. Oral rehydration solution (ORS) was considered by 17.25% of the respondents. Thirty four point two percent (34.25%) considered using SSS. Table 4.8 below shows the types of fluids considered by the respondents for treating diarrhoea.

Table 4.8 Types of Fluids Considered for Treating Diarrhoea

<i>Fluid Used</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
Plain water	140	35.0	1
Salt Sugar Solution	137	34.25	2
Oral Rehydration Solution	69	17.25	3
Others such as sour milk, soda	36	9.0	4
Fruit juice (bottled)	11	2.75	5
Tea with milk and sugar	7	1.75	6
Total	400	100.0	

4.3.3 Amount of ORS Given to a Child After a Bout of Diarrhoea.

Eighty three percent (83.0%) of the Respondents had inadequate knowledge on the amount of ORS given after a bout of diarrhoea. Seven point seven five percent (7.75%) of the respondents had adequate knowledge on the amount of ORS given to the child after a bout of diarrhoea..

Table 4.9 Amount of ORS Offered to a Child After a Bout of Diarrhoea.

	<i>Frequency</i>	<i>Percent</i>
Needed improvement	332	7.75
Correct	31	7.75
Did not know	27	6.75
Wrong	10	2.5
Total	400	100.0

4.3.4 Highest Level of Education and Amount of Offered

A cross tabulation was done to compare knowledge on amount of ORS that should be offered to the child after a bout of diarrhoea and the highest level of education. The results suggest there was no significant difference between the highest level of education and knowledge on the amount of ORS a child should be offered after a bout of diarrhoea.

Table 4.10 Highest Level of Education and Amount of ORS Offered

<i>Highest level of education</i>	<i>If a child with diarrhoea is given ORS, how much should be given? (half a cup)</i>				<i>Total</i>
	<i>correct</i>	<i>needs improvement</i>	<i>wrong</i>	<i>don't know</i>	
None	2	14	0	2	18
Primary	13	114	7	13	147
Secondary	10	152	1	10	173
Post secondary	6	49	2	1	58
Other	0	3	0	1	4
Total	31	332	10	27	400

4.3.5 Amount of ORS Offered and Type of Estate Respondent Lived in

Cross tabulation to compare the amount of offered and the type of estate respondent lived in was offered after a bout of diarrhoea and the type of estate (moderate and low income estate) the respondent lived in. The results suggest there was no significant difference.

Table 4.11 Amount of ORS Offered and Type of Estate Respondent Lived in

<i>Estate</i>		<i>If a child with diarrhoea is given ORS, how much should be given? (half a cup)</i>				<i>Total</i>
		<i>correct</i>	<i>needs improvement</i>	<i>wrong</i>	<i>dont know</i>	
Moderate incomes	Flamingo 2	2	14	0	2	18
	Race Course	6	76	1	2	85
	Pangani	2	37	2	6	47
	Langa Langa 2	0	22	0	1	23
Low incomes	Langa Langa 1	11	34	1	3	49
	Manyani	5	96	0	6	107
	Ziwani	2	9	0	3	14
	Lake View	3	44	6	4	57
Total		31	332	10	27	400

4.3.6 Knowledge on Methods Used to Prepare ORS and SSS

Fourty one percent (41.0%) of the respondents, had inadequate skill on preparation of ORS and 30.5% of the respondents, did not know how to prepare the ORS. Only 18.25% of the respondents had adequate skills in preparing ORS.

During diarrhoea, the child losses fluids and electrolytes. These include sodium, potassium, bicarbonate and zinc. The lost fluids and electrolytes should be replaced (rehydration) to avoid dehydration and deterioration of the child's condition. The ORS is the most effective and appropriate treatment for preventing and correcting dehydration unless the child is not able to take the ORS orally. Table 4.13 below shows the respondents' knowledge on methods used to prepare ORS and SSS.

Table 4.12 Knowledge on Methods Used to Prepare ORS and SSS

Preparation		Frequency	Percentage	Score	Rank
Needed improvement	ORS	164	41.0	49.25	1
	SSS	230	57.5		
Did not know	ORS	122	30.5	21.65	2
	SSS	51	12.75		
Wrong	ORS	41	10.25	14.85	3
	SSS	78	19.5		
Correct	ORS	73	18.25	14.30	4
	SSS	41	10.25		

4.3.7 Knowledge on Types of Foods/Fluids Given During Diarrhoea

Fourty percent (40%) of the respondents, considered giving mashed foods during diarrhoea. The foods offered to children were mainly carbohydrates. Food intake is an important aspect of childhood diarrhoea management. During diarrhoea, there is an interference of food intake and food absorption. Some diarrhoea causing micro-organisms such as *Measles Virus* break down the body protein and also reduce the child's immunity level making the child more susceptible to other infections.

Seventy six percent (76%) of the respondents agreed that children under 5 years should be offered 5-6 meals per day. Only two percent (2%) of the respondents considered giving protein foods. This may account for delay in recovery after diarrhoea and the development of malnutrition which is common in children under 5 years of age suffering from diarrhoea. Table

4.13 below shows the level of knowledge on types of food respondents considered giving to children during diarrhoea

Table 4.13 Knowledge on Types of Foods/Fluids Considered by the Respondents During Diarrhoea

Type of food	Frequency	Percentage	Rank
Mashed foods	160	40.0	1
Porridge	123	30.75	2
Others such as sour milk, soda	77	19.25	3
Fruits	36	9.0	4
Vegetables	4	1.0	5
Total	400	100.0	

4.3.8 Foods Offered to the Child During Diarrhoea

Forty-one point five percent (41.5%) of the respondents gave children carbohydrate cereals such as porridge during diarrhoea. Twenty four point five percent (24.5%) gave carbohydrate roots such as potatoes. Mothers who knew that mashed and carbohydrate foods can be given during childhood diarrhoea but were not likely to give mashed foods during diarrhoea had a ratio of 20:12.25. Continued food intake is essential during childhood diarrhoea. The child should be offered freshly prepared food. The food should be given in small amounts frequently. This makes it easy for the food to be digested. The meal should contain protein, carbohydrate and vitamins. Table 4.14 below shows the foods respondents gave to the child during diarrhoea.

Table 4.14 Foods Offered to the Child During Diarrhoea

<i>Type of Food</i>	<i>Frequency</i>	<i>Percent</i>	<i>Rank</i>
Carbohydrate cereals	166	41.5	1
Carbohydrate roots (mashed)	98	24.5	2
Others such as soda	68	17.0	3
Fruits	60	15.0	4
Animal protein	4	1.0	5
Plant protein	4	1.0	5
Total	400	100.0	

4.3.9 Foods/Fluid Avoided During Diarrhoea

Fifty-five point seven percent (55.75%) of the respondents avoided various foods such as beans, maize, porridge and other foods cooked in fat or oil. Table 4.15 below shows the types of foods/fluids avoided by the respondents during diarrhoea.

Table 4.15 Food/Fluids Avoided During Diarrhoea

<i>Avoided food/fluids</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
Beans, maize and fatty foods.	223	55.75	1
Milk	134	33.5	2
Mashed potatoes	28	7.0	3
Vegetables	10	2.5	4
Water	5	1.25	5
TOTAL	400	100	

Some foods were omitted during childhood diarrhoea because the respondents believed that such foods made diarrhoea worse.

4.4 To assess the Household Risk Factors for Diarrhoea in Children Under 5 Years in Baharini Location.

4.4.1. Diarrhoea Occurrence in Children under 5 Years in Baharini Location

In the previous 6 months prior to the study, there were 41.5% episodes of diarrhoea among the respondents. Records at PGH Nakuru for year 2007 (Mburu) revealed that diarrhoea was the second cause of morbidity after malaria. There were 144 new cases of diarrhoea per month. Childhood diarrhoea admissions were 1070 and out of these, there were 61 deaths in children under five years of age. Table 4.16 below shows the occurrence of diarrhoea among children under 5 years in Baharini location.

Table 4.16 Childhood Diarrhoea Occurrence in Baharini location

<i>Occurrence</i>	<i>Frequency</i>	<i>Percentage</i>
Did not have diarrhoea	234	58.5
Suffered from diarrhoea	166	41.5
Total	400	100

4.4.2 Action Taken by the Respondents When Diarrhoea Occurred

Thirty seven percent (37.0%) of the respondents would take the child to a public health facility if the child had diarrhoea. Thirty percent (30.0%) of the respondents would give Salt Sugar Solution (SSS). Seven point seven percent (7.75%) of the respondents would use ORS to treat childhood diarrhoea. The least number of respondents were 3.7% who would buy medicine at chemists or shop. The condition of a child with diarrhoea deteriorates rapidly because of loss of fluid and electrolytes. Although Baharini is a low-income area, it is not a slum area. Eighty seven point five percent (87.5%) of the respondents are either in formal employment or in business. This may account for their being able to seek health care outside home. The study observed that

56.75% of the respondents considered providing home treatment during diarrhoea. Table 4.17 below shows the action the respondents took when diarrhoea occurred in children under 5 years in Baharini location.

Table 4.17 Action Taken by the Respondents when Diarrhoea Occurred

<i>Action taken</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
Public Health Facility	148	37.0	1
Treat with SSS	120	30.0	2
Others e.g. plain water	61	15.25	3
Treat with ORS	31	7.75	4
Private health facility	25	6.25	5
Buy medicine from chemists/shop	15	3.75	6
Total	400	100	

4.4.3 Knowledge on Signs of Diarrhoea Requiring Seeking Health Facility Care

Thirty nine percent (39%) of the respondents considered diarrhoea as a severe disease sign requiring seeking hospital care. These severe signs become obvious when the child has lost more than 10% of his body weight due to diarrhoea (Stanfield, 2005). These findings may account for the fact that mothers in Baharini location seek health care when the child is in severe dehydration. Mothers consider taking the child to a health facility when they consider the child's condition is severe. The severe signs of diarrhoea include lethargy, sunken eyes, sunken fontanelle, convulsions and when the skin is pinched, it goes back slowly for a period of 2 seconds. The child with severe dehydration but is able to drink orally is treated with ORS at the ORT centre. The child with severe dehydration but is unable to drink is treated by use of a nasogastric feeding tube or intravenous Hartman's solution. These are administered by a professionally trained health worker in a health facility. This increases the cost of treating diarrhoea. Table 4.18 shows level of knowledge on diarrhoea disease signs that require seeking health care outside home.

Table 4.18 Knowledge on Diarrhoea Disease Signs Considered to Require Care outside Home

Diarrhoea disease sign	Frequency	Percentage	Rank
Frequent diarrhoea	156	39.0	1
Others such as fever, pale skin etc	103	25.75	2
Lethargy	71	17.5	3
Vomiting	27	6.75	4
Unable to drink	26	6.5	5
Unconscious	9	2.25	6
Fits	8	2.0	7
Total	400	100	

4.4.4 Factors that Contribute to Transmission of Diarrhoea

Ninty one point five percent (91.5%) of the respondents considered contaminated water or food as factors that contributed to diarrhoea transmission with the highest score of 8.68. Diarrhoea is caused by micro-organisms on other non infective factors. Environmental factors contribute to diarrhoea transmission. This suggests that the respondents had adequate knowledge on contaminated food and water as factors for childhood diarrhoea transmission. However the respondents had inadequate knowledge on diarrhoea transmission factors such as poor refuse disposal and presence of houseflies. Table 4.19 below shows the level of knowledge among the respondents on risk factors for diarrhoea transmission.

Table 4.19 Factors That Contribute to Transmission of Childhood Diarrhoea

Diarrhoea causing factor	Response							Score
	Strongly Agree	%	Agree	%	Neutral	Disagree	Strongly Disagree	
Contaminated water/ food	172	43.0	194	48.5	32	1	1	8.68
Microorganism	148	37.0	83	2.75	167	2	0	7.89
Poor hand hygiene	98	24.5	129	32.25	172	1	0	7.62
Poor refuse disposal	67	16.75	107	26.75	223	2	1	7.19
Presence of houseflies	29	7.25	57	14.25	310	3	1	6.55

4.4.5 Knowledge on Source of Houseflies

Ninty three point two percent (93.25%) of the respondents associated the houseflies with the latrines/toilets. Some of the households owned domestic animals such as goats. A few of the households had cows. Birds such as chicken were common in the estates. The droppings from the animals and birds were not properly disposed. The droppings from domestic animals and birds were not considered as a source of houseflies. Table 4.20 below shows the level of knowledge among the respondents on the source of houseflies.

Table 4.20 Knowledge on Source of Houseflies

Source of Houseflies	Response							Score
	Strongly Agreed	%	Agreed	%	Neutral	Disagreed	Strongly Disagreed	
Poorly kept latrine/ toilet	182	45.5	191	47.5	26	1	0	8.77
Poorly disposed refuse	147	36.75	148	37.0	101	4	0	8.19
Animal/ chicken droppings	53	13.25	34	8.5	309	4	0	7.58
Open waste water drain	105	26.25	113	28.25	177	3	2	6.68

4.5. Knowledge on Methods of Preventing Diarrhoea in Children Under 5 Years

Eighty eight point seventy five percent (88.75%) of the respondents were aware that good personal hygiene is important in the prevention of the spread of diarrhoea in children under 5 years of age. Only 13.5% of the respondents considered breastfeeding as a method that can prevent diarrhoea in children under 5 years of age. Proper personal hygiene can prevent childhood diarrhoea. The breast-feeding mother should bath and change into clean clothes daily. The nursing brassiere should be washed and changed each day to protect the nipple from contamination with diarrhoea causing micro-organisms. The mother should wash hands before handling food, utensils, breastfeeding and offering food to the child. The mother should wash hands after defaecating, after wiping the baby who was defaecating or handling any dirty

materials. Hands should be washed with soap and running water. After the soap and water has been applied, the hands should be rubbed at least 3 times. The hands, soap and the tap should be rinsed during hand washing. The hands should be wiped with a clean cloth/towel. Table 4.21 below shows the level of knowledge among the respondents on methods of preventing diarrhoea.

Table 4.21 Methods of Preventing Diarrhoea in Children under 5 Years

Prevention Method	Response							Score	Rank
	Strongly Agreed	%	Agreed	%	Neutral	Disagreed	Strongly Disagreed		
Good personal hygiene	182	45.5	173	43.25	44	1	0	8.68	1
Proper refuse disposal	179	44.75	146	36.5	75	0	0	8.52	2
Proper weaning	45	11.25	49	12.25	304	2	0	6.69	3
Breast-feeding	23	5.75	31	7.75	343	3	0	6.36	4

4.5.1. Knowledge on Domestic Refuse Disposal

Seventy-three point two percent (73.25%) of the respondents knew that domestic refuse could be disposed by use of covered dustbins. Improper disposal of domestic refuse creates a favourable environment for breeding and multiplication of the houseflies. The houseflies feed and breed in rotten food and fruits. Then the houseflies transmit diarrhoea-causing micro-organisms from rotten domestic refuse to food, water, utensils and hands by physical and mechanical means. The houseflies can be destroyed by effective insecticides. The method of choice for eradicating the houseflies is by proper disposal of domestic refuse and proper food hygiene. Table 4.22 shows the level of knowledge among the respondents on methods of domestic refuse disposal.

Table 4.22 Knowledge on Domestic Refuse Disposal

Disposal of Domestic Refuse	Response							Score
	Strongly Agreed	%	Agreed	%	Neutral	Disagree	Strongly Disagree	
Covered dustbin	143	35.75	150	37.5	105	2	0	81.7
Compost pit	136	34.0	152	38.0	101	6	5	80.4
Open pit	49	12.25	50	12.5	222	40	39	63.45

4.5.2 Practice on Disposal of Domestic Refuse

Forty nine point two percent (49.25%) of the respondents had poorly disposed their domestic refuse by use of uncovered bins and also because refuse was littered near the site of disposal. The study used an observation checklist to assess the state of the household environment at the time of data collection. This poorly disposed refuse contributed to an increase of houseflies at the household environment. Table 4.23 below shows the respondents practice on disposal of refuse.

Table 4.23 Practice on Disposal of Domestic Refuse

Observed Practice	Frequency	Percentage	Rank
Needed improvement	197	49.25	1
Correct	193	48.25	2
Wrong	10	2.5	3
Total	400	100	

4.5.3 Condition of Household Excreta Facility (Latrine/Toilet)

Sixty three point two percent (63.25%) of the respondents had proper disposal of faeces. At the time of data collection, the household excreta facility was observed in order to assess the

sanitation status. Some of the factors that contributed to poor maintenance of flush toilets/latrines were inadequate water supply at the time of data collection during the dry months of February and March. Table 4.24 below shows the condition of the household excreta facility.

Table 4.24 Condition of Toilet/Latrine

<i>Condition of toilet/ latrine</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
Correct	253	63.25	1
Needed improvement	145	36.25	2
Wrong	2	0.5	3
Total	400	100.0	

In some of the estates such as Flamingo, toilet/latrine were shared among different households. This contributed to poor maintenance.

Hypothesis Testing

Hypothesis is a term used by a researcher to explain the anticipated results in a study. Hypothesis can be described as null hypothesis or alternative hypothesis. The null hypothesis states that there is no difference in the variables being tested. The alternative hypothesis states that there is a difference between the variables under test.

Inferential statistics are used to test the study hypothesis. Inferential statistics are a branch of statistics used by a researcher to make a scientific opinion about the research study results. Inferential statistics can be parametric or non-parametric. It is considered that parametric tests such as the t-test and ANOVA test assume that the population follows a certain distribution. These tests are used in experimental research to compare means from two or more samples.

The non-parametric tests such as Chi-square and Manel-Haenzel test are considered that they not to make any assumptions about the distribution of the study scores. These tests are used to compare two categories of study variables. The Chi-square test technique compares the proportion of what is observed with what is expected. If the observed differs greatly from what is expected, the opinion of the researcher is to reject the null hypothesis. The decision to accept or to reject the hypothesis is considered when the researcher uses a pre-determined level of significance. The significance level is mostly set at 0.05 (95%) OR 0.01 (99%). This study used the significance level of 0.05 because it is a descriptive study. Figure 4.2 below shows the Chi-square tests carried out in this study.

Table 4.25 Chi-square Tests

Independent Variable	Knew	Did not Practice	Chi-square Test
Diarrhoea disease	Suffered 166 (41.5%)	Did not suffer 234 (58.5%)	X^2 Value = 27.44 Critical value = 3.84 df = 1 P/value = 0.05
Signs of dehydration	46 (11.5%)	354 (88.5%)	X^2 value = 268.84 Critical value = 3.84 df = 1 P/value = 0.05
Complication of diarrhoea i.e. fever	246 (61.5%)	231 (57.75%)	X^2 value = 0.91 Critical value = 3.84 df = 1 P/value = 0.05
Diarrhoea treatment regime i.e. ORS offered to child	69 (17.3%)	31 (7.8%)	X^2 value = 21.48 Critical value = 3.84 df = 1 P/value = 0.05
Food offered to child	283 (70.75%)	264 (66%)	X^2 value = 1.34 Critical value = 3.84 df = 1 P/value = 0.05
Risk factor for diarrhoea i.e refuse disposal	293 (73.25%)	197 (49.25%)	X^2 value = 31.78 Critical value = 3.84 df = 1 P/value = 0.05

Chi-square test was done to test the relationship between those who suffered from diarrhoea and those who did not. Chi-square value = 27.44 critical value = 3.84 df = 1 P/value = 0.05. Hypothesis, there was a difference between those who suffered diarrhoea and those who did not suffer diarrhoea. Therefore the hypothesis was accepted.

Chi-square was also done to test the relationship between those who knew how to identify early signs of childhood diarrhoea and those who did not. Chi-square value = 268.84, critical value = 3.84, $df = 1$ P/value = 0.05. Hypothesis, there was a difference between those who knew and those who did not know. Hypothesis was accepted.

Further, Chi-square technique was used to test the relationship between knowledge and practice concerning the respondents management of fever during diarrhoea. Chi-square value was = 0.91 critical value = 3.84 $df = 1$ P/value = 0.05. There was a difference between knowledge and practice in treatment of fever during childhood diarrhoea. Hypothesis was therefore accepted.

The study considered to use the Chi-square technique to test the relationship between knowledge and practice concerning the respondents use of ORS as part of diarrhoea treatment regimes used by the respondents. Chi-square value = 21.48 critical value = 3.84 $df = 1$ P/value = 0.05. Hypothesis, there was a difference between knowledge and practice in use of ORS in treatment of dehydration. Hypothesis was therefore accepted.

The study also used the Chi-square technique to test the relationship between those who know that food can be offered during childhood diarrhoea and those who offered food to the child with diarrhoea. Chi-square value = 1.34 critical value = 3.84 $df = 1$ P/value = 0.05. Hypothesis, there was no difference between those who knew that food should be offered and those who offered food. Therefore hypothesis was no accepted.

The study further considered to use Chi-square technique to test the relationship between knowledge and practice concerning risk factors for transmission of diarrhoea at the household level. Chi-square value = 34.44 $df = 1$ P/value = 0.05. There was a difference between knowledge

CHAPTER FIVE

5.1 DISCUSSION

This section will discuss the research results. Diarrhoea is considered to be acute when a person has 3 or more watery stools in 24 hours and when it lasts for a period of less than 14 days. Diarrhoea causes 1.8 million deaths globally and 90% of the deaths occur in children under 5 years (Richardson, 2010). Childhood diarrhoea was responsible for 16% of deaths in children under 5 years in Sub-Saharan Africa (Walker, 2007). In some developing countries, childhood diarrhoea incidence was 6-8 episodes per child per year while in developed countries such as USA it was 2.2 episodes (Guandalini 2009).

Kenya is one of 15 countries in Africa and Asia that contributes to 75% of childhood diarrhoea deaths. In year 2006, it was found that diarrhoea contributed to 27% of morbidity in children under 5 years (Kahura, 2006). The study found that in Nakuru, there were 41.5% childhood diarrhoea episodes among the respondents within 6 months prior to the study. This result differs with findings in developed countries like USA (Guandalini, 2009). In developed countries such as the USA factors such as prevention of overcrowding, improved housing and improved sanitation have resulted in decreased diarrhoea occurrence. In developing countries, low income estates are overcrowded, have poor housing and poor sanitation. This results in increased diarrhoea occurrence among children under 5 years. These findings agree with previous study results that diarrhoea is a common cause of childhood morbidity in developing countries (UNICEF, 2009).

Various policies have been formulated both globally and nationally in order to provide guidance on management and control of diarrhoea in children under 5 years. These include the CDD (1993), IMCI (1997), IMCI/Household and Community Component (2000), MDG's (2000), Kenya Vision 2030 (2005), Hand Washing Policy (2009) and the Revised CDD Policy (2010).

These policies have been adopted globally and nationally. The latest policy was Kenya's Revised CDD (2010) policy which was adopted in May 2010 concerning management of childhood diarrhoea. Kenya is one of 66 countries in which the policy is clear on the use of low osmolarity ORS treatment (UNICEF, 2009). The low osmolarity ORS formula has advantages compared to the original WHO-UNICEF ORS. It reduces the volume of the stool and vomiting by 25% and 30% respectively. It also reduces the need for using intravenous therapy as part of treatment for the child suffering from diarrhoea (Stanfield, 2005).

The Government and non Government organizations have implemented various programmes, which have aimed to control and manage childhood diarrhoea. These include the MCH/FP, the EPI, the CDD, the IMCI, the IMCI/Household and Community Component. The IMCI programme was launched in Nakuru in 2003. Various studies were conducted in different countries, including Kenya, before the implementation of the IMCI programme. In spite of these programmes, diarrhoea continues to be a major cause of morbidity and mortality in children under 5 years of age. However, it was observed that most researchers have given priority to experimental studies rather than descriptive studies which would assist in identifying factors that would contribute to better implementation of household and community interventions in control and management of diarrhoea in children under 5 years of age (Fontaine, 2009).

The aim of this study was to assess the knowledge of mothers on signs of dehydration and complications of diarrhoea in children under 5 years. The study was also to determine the management regimes used by mothers during diarrhoea and to identify household risk factors for diarrhoea transmission in children under 5 years of age in Nakuru.

5.1.1. Signs of Dehydration and Complications of Diarrhoea

The child suffering from diarrhoea rapidly develops dehydration. Eighty eight point five percent (88.5%) of the respondents did not know the early signs of dehydration. These include eager to drink, restlessness and irritability. Inadequate knowledge may have resulted in delay in starting treatment. Inadequate knowledge on identification of early signs of dehydration may contribute to delay in starting home treatment. Prompt management of diarrhoea would prevent and correct dehydration. Early recognition of signs of dehydration and selection of appropriate rehydration fluids reduces the need for hospitalisation (Kinoti, 1985). Delay in treatment results in deterioration of the child's condition and increases diarrhoea morbidity and mortality. These results agree with findings in Kenya, Nepal and Uganda which observed a delay among mothers in starting treatment during childhood diarrhoea (Konde-Lule, 1992; Health Facility Survey, 2006; Anzari, 2009). When the early signs of dehydration are not recognized, the child develops severe signs resulting in diarrhoea complications. Complications of diarrhoea includes dehydration, malnutrition and fever.

Fifty-five point five percent (55.5%) of the respondents considered dehydration as a complication of diarrhoea. Dehydration occurs because of loss of fluids and electrolytes. The electrolytes lost in the watery diarrhoea include potassium, sodium, bicarbonate and zinc. Rapid and appropriate intervention is essential to ensure child survival once complications have developed. The child under 5 years of age with complications of diarrhoea requires hospitalisation in a well-equipped hospital. The cost of hospital management of childhood diarrhoea is twenty times more than when the child suffering from diarrhoea is treated with ORS in the out patient department (Kinoti, 1985; Wood, 2008).

Sixty one point five percent (61.5%) of the respondents considered using antipyretics to reduce fever but only 57.5% used antipyretics. Antipyretics are considered appropriate for treating fever. Fever is a common complication of childhood diarrhoea. It occurs on the second day of diarrhoea. Fever occurs because of inflammation, dehydration or other diseases such as measles.

Fever occurs because of infection by diarrhoea causing micro-organisms such as the *Rotavirus* and *Escherichia coli*. It may also occur because of other infections associated with diarrhoea such as measles and pneumonia. When fever is high (39° C and above), it should be reduced to prevent the child developing convulsions (fits) (Stanfield, 2005; WHO, 2005). Convulsions may be followed by death if temperature rises to 40° C and above. Various methods can be used to treat fever. These include anti-pyretics, reducing clothing and tepid sponging. Reducing fever is important in preventing deterioration of the child's condition and improving the general condition of the child (Stanfield, 2005; WHO, 2005; Nordberg, 2007).

Twenty seven percent (27%) of the respondents did tepid sponging. Tepid sponging is considered inappropriate in some instances and it can be harmful to the child (Mugo, 2007). This study observed that some of the respondents added fried onions, fat and salt to warm water before using it for tepid sponging. Inappropriate administration of tepid sponging may have contributed to increased morbidity and mortality.

Thirteen percent (13.2%) of the respondents considered malnutrition as a complication of childhood diarrhoea. Infection of the gastro-intestinal tract by diarrhoea causing micro-organisms such as the *Rotavirus* results in increased bowel motility. The food/fluids pass through the gastro-intestinal tract fast. This interferes with food absorption. The diarrhoea causing micro-organisms such as *Rotavirus* damage the gastro-intestinal tract and reduce the surface area for

food absorption (Stanfield, 2005; WHO, 2005). Malnutrition can occur within the second day of diarrhoea (Mugo, 2007). Malnutrition makes diarrhoea more prolonged, more severe and more frequent (Stanfield, 2005; WHO, 2005). Malnutrition results in increased hospital stay. It also increases child morbidity and mortality. (Wood, 2008).

5.1.2 Childhood Diarrhoea Treatment Regimes

Eight one percent (81%) of the respondents considered giving extra fluids during diarrhoea. These results agree with other findings in health facilities in Kenya (Health Facility Survey, 2006) which observed that extra fluids were given during diarrhoea. The results differ from findings by UNICEF (2009) that children in Africa received less fluid during childhood diarrhoea. This difference may have been observed because the UNICEF research covered a wide geographical area while the researcher in this study covered a small geographical area. The respondents used various fluids to treat the child under 5 years with diarrhoea. These included plain water, salt sugar solution (SSS), oral rehydration solution (ORS), sour milk, soda, bottled juices, tea with milk and sugar. Body fluid replacement is essential in childhood diarrhoea (Stanfield, 2005; WHO, 2005; Nordberg, 2007).

Thirty five percent (35%) of the respondents considered giving plain water. Although plain water is used in home care management of diarrhoea. It is considered inappropriate since it cannot replace the electrolytes such as potassium which are lost in diarrhoea (Wood, 2005; WHO, 2005). Although body fluid replacement is important in diarrhoea, it must be accompanied by replacement of the lost electrolytes. The electrolytes lost in diarrhoea include potassium, sodium, chloride, bicarbonate and zinc. If the lost fluids and electrolytes are not replaced immediately, the child develops shock, cardiac arrest and death (Stanfield, 2005; WHO, 2005).

Thirty four point two percent (34.25%) of the respondents used salt sugar solution (SSS) to treat childhood diarrhoea. The salt sugar solution is considered inappropriate and harmful. The use of salt sugar solution can lead to hypernatraemia (excess sodium). This occurs because of faulty measurement of the salt and sugar ingredients by mothers/caretakers in the process of preparing the SSS. The teaspoons used in the household are of various sizes. This affects the amount of sugar measured. The amount of a pinch of salt measured by mothers using three fingers differs in different women. This also affects the amount of salt used to prepare the SSS (Stanfield, 2005). This study observed that only 10.25% of the respondents had correct skill for preparing SSS. This result agrees with findings in Nigeria (Akpemde, 1997) who observed inadequate skill among caretakers in preparation of SSS. Health workers have been discouraging mothers/caretakers from using SSS for many years (Stanfield, 2005). The use of homemade SSS may have contributed to the increased diarrhoea morbidity and mortality.

Seventeen point two percent (17.25%) of the respondents considered giving ORS but only 7.75% gave ORS. The ORS is considered the most effective fluid for rehydration in childhood diarrhoea. It contains potassium, sodium, chloride, citrate and glucose. ORS is considered effective in rehydration because even when gastro-intestinal tract cells are affected by diarrhoea causing micro-organisms, absorption of electrolytes continues (Stanfield, 2005; WHO, 2005; Nordberg, 2007). Glucose enhances ORS absorption. The modified Osmolarity reduced ORS (WHO, 2002) reduces the stool volume, reduces vomiting and the need for intravenous therapy. The findings in this study agree with previous research studies, which observed limited prescription/use of ORS during diarrhoea in Nepal, Nairobi, Indonesia, Nigeria and Uganda (Konde-Lule, 1992; Goel, 1996; Ross-Degnan, 1996; HFS, 2006; Anzari, 2009). Certain factors have contributed to limited use of ORS. These include a reduction in prescription of ORS by health workers such as pharmacists and doctors. The inaccessibility of the ORS sachets to

mothers at the community level. Inadequate knowledge on the effectiveness of ORS in treating diarrhoea. Inadequate knowledge and skill on preparation of ORS among mothers/caretakers have also contributed to the decrease in its use. Further, the mothers/caretakers beliefs about the cause and treatment of diarrhoea in children under 5 years has affected its use. These results agree with findings by UNICEF that Africa has the lowest level in giving ORS during diarrhoea (UNICEF, 2009).

Eighteen point two percent (18.25%) of the respondents knew how to prepare ORS while 81.75% had inadequate skill. These results agree with previous research findings in Nigeria (Akpende, 1997). Mothers/caretakers were found to have inadequate skill on preparation of ORS/SSS. In order for the ORS to benefit the child suffering from diarrhoea, it should be properly prepared. One sachet of ORS should be dissolved in half a litre of cold boiled water. Proper hand hygiene should be observed at specific periods to avoid contaminating the ORS with diarrhoea causing micro-organisms. The mother should give ORS using a cup or cup and spoon. The amount of ORS given depends on the child's weight and level of dehydration (Stanfield, 2005; Nordberg, 2007). Mothers/caretakers are given a demonstration on preparation of ORS at the ORT centre when the child is receiving ORS therapy. The mothers give a return demonstration. It is expected that after the teaching session mothers should be able to prepare and give the child ORS if diarrhoea occurred.

Other homemade fluids which are considered appropriate during childhood diarrhoea include unsalted fluids such as soup, thin porridge, ricewater, yoghurt, green coconut water, fresh fruit juice and plain water. ORS and other homemade fluids are offered to the child during diarrhoea until diarrhoea stops. The breastfeeding child suffering from diarrhoea should be breastfeed

frequently. The child should also be offered ORS. These fluids are offered to the child during diarrhoea in order to prevent and to treat dehydration (Stanfield, 2005; WHO, 2005).

Nine percent (9%) of the respondent offered sour milk and soda during diarrhoea. Soda and other soft drinks are considered inappropriate in childhood diarrhoea because of the presences of sugar. They are also not nutritious. These make diarrhoea worse (Stanfield, 2005; WHO, 2005). Two point seven percent (2.7%) of the respondents offered the child under 5 years suffering from diarrhoea bottled juices. These have sugar and are also not nutritious. These are also considered inappropriate in childhood diarrhoea (Stanfield, 2005; WHO, 2005). Tea with milk and sugar was offered to the child during diarrhoea by 1.7% of the respondents. This is also considered inappropriate during diarrhoea. During childhood diarrhoea, the sweetened drinks result in more fluid being released into the gastro-intestinal lumen. This results in the child becoming more dehydrated and increases diarrhoea morbidity and mortality (Stanfield, 2005; WHO, 2005).

Seventy point seven five percent (70.75%) of the respondents considered giving food but only 68% gave food. These results agree with previous findings in Uganda that certain foods are given during diarrhoea (Konde-Lule, 1992). Food intake is an essential aspect of management of diarrhoea in children under 5 years. Food intake promotes fluid absorption in the gastro intestinal tract and prevents development of malnutrition (UNICEF, 2009). The child should be offered foods such as mashed potatoes and porridge, which are easily digested. The child suffering from diarrhoea should be offered 5-6 freshly prepared meals each day. Oil is added to increase energy and reduce the bulk. The food should contain protein such as skinned mashed beans or an egg. Vitamins and minerals are included by adding fresh items such as fresh dark green vegetables and lemon juice to the food. The frequent fresh meals should be continued for 2 weeks after recovery from diarrhoea to reduce chances of malnutrition from occurring (Stanfield, 2005; WHO, 2005).

Thirty point seven percent (30.7%) of the respondents considered using porridge during diarrhoea. But forty one point five percent (41.5%) of the respondents offered carbohydrate cereals to the child during diarrhoea. Porridge and cereal based foods are considered appropriate during childhood diarrhoea. The cereals are nutritious and they also enhance absorption of ORS in the gastro-intestinal tract (Stanfield, 2005). Porridge prepared from millet, sorghum and maize flour is available in Baharini location. However, the addition of sugar into porridge (which is a common practise) during diarrhoea may not be appropriate.

Two percent (2%) of the respondents offered the child both animal and plant protein foods during childhood diarrhoea. During diarrhoea, there is reduced food absorption because of damaged cells and the increased bowel motility. The child suffering from diarrhoea requires extra protein for repair and replacement of the damaged cells. The child also requires protein for the rapid growth. Inadequate protein intake during diarrhoea leads to malnutrition. Malnutrition makes diarrhoea more frequent, more prolonged and more severe (Stanfield, 2005; WHO, 2005). This may result in increased childhood diarrhoea morbidity and mortality

Certain foods such as beans, maize, porridge and all foods cooked in fat and oil were omitted by 55.75% of the respondents. These results agree with previous findings in Nepal and in Uganda (Konde-Lule, 1992; Anzari, 2009). Mothers/caretakers omit foods and fluids due to various reasons such as the belief that these will increase diarrhoea. Omission of foods and fluids during diarrhoea results in malnutrition. Malnutrition has long term negative effects on future education and productivity of the child (Stanfield, 2005; WHO, 2005). Mothers have inadequate knowledge on importance of appropriate food intake during diarrhoea (Stanfield, 2005; WHO, 2005; Wood, 2008).

Thirty-three point five (33.5%) of the respondents omitted milk during diarrhoea. This result agrees with findings in Nepal (Anzari, 2009) where mothers omitted breast feeding during diarrhoea. Milk is an important source of protein for the child suffering from diarrhoea. The cow's milk and formula milk may not be appropriate for the child below 4 months but it is appropriate for the older child (Stanfield, 2005).

Seven percent (7.0%) of the respondents omitted mashed potatoes during diarrhoea. Mashed potatoes are considered appropriate during diarrhoea. These provide the needed energy during diarrhoea. Milk and oil can be added to mashed potatoes to make it more nutritious to the child (Stanfield, 2005; Wood, 2008). Potatoes are available in Nakuru.

Certain foods/fluids can be omitted during childhood diarrhoea. Fluids which can be omitted include soft drinks such as soda, sweetened bottled fruit juice, tea, coffee and herbal drinks because they make dehydration worse. The foods which can be omitted during diarrhoea include coarse vegetables and whole grain cereals such as maize because they are not easily digested (Stanfield, 2005; WHO, 2005).

Eighty five point seven percent (85.75%) of the respondents did not know that breastfeeding can prevent childhood diarrhoea. When a mother is not able to practice exclusive breastfeeding for the first 6 months of the child's life, this may result in diarrhoea. Diarrhoea may occur due to poor absorption of cow's milk and the milk formulas offered to the child. The methods used to prepare the milk offered to the child may result in introduction of diarrhoea causing micro-organisms. The method of child feeding such as bottle-feeding may also result in introduction of diarrhoea causing micro-organism to the child (Stanfield, 2005; Frazer 2003).

Diarrhoea in children under 5 years of age can be prevented. Only 13.5% of the respondents considered breastfeeding as a method of preventing diarrhoea. The breast milk contains IgA factor which coats the intestinal mucosa and protects the child from attack by diarrhoea causing micro-organisms. The breast milk also contains the *Lactobacillus* which dominates the gastro-intestinal tract and therefore reduces chances of growth of the diarrhoea causing micro-organisms. Further, the breast milk promotes maturity of the gastro-intestinal tract therefore reducing chances of diarrhoea causing micro-organisms from damaging it (Frazer, 2003; Wood, 2008). Exclusive breast-feeding should be practiced for the first six months then later continued with complementary feeds after weaning. Mothers should continue breastfeeding for 2 years and above. Mothers should be encouraged to prepare for breastfeeding during pregnancy period. Mothers should be trained on proper breastfeeding techniques to ensure successful lactation is established and then maintained (Frazer, 2003; Stanfield, 2005).

Seventy six percent (76%) of the respondents did not know that proper child weaning methods can prevent childhood diarrhoea. During the weaning period, sudden introduction of different types of food may result in diarrhoea. The child should be offered freshly prepared food. Hands should be washed with soap and clean water before and after serving and offering food to the child (Stanfield, 2005; Wood, 2008)

Twenty three point five percent (23.5%) of the respondents considered proper child weaning as a method of preventing childhood diarrhoea. Proper child weaning protects the child from developing diarrhoea. The weaning diet should be introduced after 6 months of age. Each new food item should be offered to the child gradually one at a time. The food should be soft and semi-liquid so that the child can swallow easily. It should be well cooked to make it easily

digested. The child should be offered 4 -5 meals per day since small meals are easily digested (Stanfield, 2005; WHO, 2005; Wood, 2008).

5.1.3 Household Risk Factors for Childhood Diarrhoea

Diarrhoea in children under 5 years is caused by infective micro-organisms such as viruses, bacteria, parasites, fungus and intestinal worms. The none infective factors that cause diarrhoea include inappropriate child weaning methods, malnutrition, intersusceptions, prolonged use of antibiotics and unknown aetiology. Various research studies have been done on causes of diarrhoea in children under 5 years. The above causes contribute to diarrhoea which affects children under 5 years in Nakuru. Most of the stools of children who present with diarrhoea in Baharini location are not examined for the aetiological agents.

The aetiological agents of diarrhoea are excreted in faeces of an infected person and the port of entry of the organism is oral. Diarrhoea is transmitted through the commonly known 5 F's. These are Foods, Fingers, Faeces, Fields and Flies. Improper disposal of faeces that contain diarrhoea causing micro-organisms results in soil pollution and contamination of water. Food and utensils are contaminated by hands, which are not properly washed after defaecating

Eighty eight point seven percent (88.75%) of the respondents knew that good hygiene prevents diarrhoea. This result agrees with findings in Nicaragua and Peru (Favin, 2004) where it was observed that proper hand hygiene reduced diarrhoea occurrence. Diarrhoea causing micro-organisms such as the *Rotavirus* can remain in hands for many hours (Hay, 2003). The reduced availability of water during the dry months and the low income may affect hand washing especially during the dry months resulting in increased diarrhoea transmission.

Diarrhoea can be prevented at the household level by proper personal hygiene especially hand hygiene. Hands should be properly washed with soap and running water at specific periods such as after defaecating, before handling food and utensils and before breastfeeding. This ensures that diarrhoea causing micro-organism are not transmitted from faeces to hands, food and utensils. All cooked food and fluid should be properly covered to protect them from contamination by the houseflies. The clean utensils should be protected from contamination by storing them properly in a flyproof cupboard. Dirty utensils should be cleaned immediately after use to avoid houseflies feeding on them and transmitting diarrhoea-causing micro-organism (Wood, 2008).

All fruits should be properly cleaned with clean water before eating. All people suffering from infective diarrhoea such as cholera should be treated with effective antibiotics. They should be encouraged to practice proper hand hygiene to avoid transmitting diarrhoea-causing micro-organism. Improving mothers knowledge on the importance of proper personal hygiene especially proper hand washing at specific periods will reduce diarrhoea transmission in the households (Favin, 2004).

Seventy three point two percent (73.25%) of the respondents knew that domestic refuse could be disposed by use of covered dustbins. On observing the compound by use of a checklist, 49.25% had poorly disposed their domestic refuse. The refuse was either disposed in an uncovered bin or it was littered near the disposal site. Improper disposal of refuse creates an environment which is favourable for houseflies which transmit diarrhoea causing micro-organisms. Each household produces refuse through its day-to-day activities. Both wet and dry refuse should be properly disposed to prevent diarrhoea transmission. It should be disposed by burning, burying, controlled tipping or recycling. Dry refuse such as papers are recycled by making items such as toilet papers. Wet refuse such as vegetable peelings are disposed by controlled tipping. The refuse

should be taken by the local municipality and disposed to the designated site regularly (Wood, 2008).

Sixty-three point twenty five percent (63.25%) of the households had proper disposal of excreta. Previous study found that proper disposal of faeces in Nicaragua and Peru reduced diarrhoea occurrence (Favin, 2004). A study conducted in Nigeria observed that mothers did not dispose the child's faeces properly (Jinadu, 2004). Some mothers consider a child's faeces safe and they may not dispose it properly (Wood, 2008). This agrees with findings that 36.75% of the households had improper disposal of faeces. Each household should have its own excreta facility. The types of excreta facilities used in Baharini location includes the flush toilet, the latrine and the ventilation improved latrine. Some of the households shared the excreta facility.

Proper disposal of excreta is essential in order to reduce diarrhoea disease transmission (Wood, 2008). Some of the estates in Baharini location such as Lakeview, Flamingo and Manyani are overcrowded. Latrine/toilet sharing for more than one household contributes to poor maintenance. During the dry months of January to March, there is a reduction of amount of water available to the family. This affects flushing of the toilet. The low income contributes to use of improper toilet paper that prevents proper flow of excreta in the sewage pipe. These factors contribute to poor maintenance of the latrines/toilets resulting in diarrhoea transmission.

The study found that 93.25% of the respondents considered the latrine/toilet as the source of houseflies. Diarrhoea disease is transmitted by the housefly. The houseflies feed on rotten materials, faeces and human food. The houseflies transmit diarrhoea-causing micro-organisms from faeces to food and utensils by physical and mechanical means. Previous study on the use of insecticide spray to reduce houseflies resulted in reduction in diarrhoea occurrence (Brian, 2004).

Other risk factors in the household such as improper disposal of domestic refuse and improper disposal of droppings from animal and birds were considered as source of the housefly by 21.75% of the respondents. These factors promote breeding and multiplication of the housefly in Baharini location resulting in increased diarrhoea morbidity and mortality.

Ninty one point five percent (91.5%) of the respondents agreed that contaminated water transmits diarrhoea. These results agree with findings in Nicaragua, Peru, Nairobi and Njoro which observed that availability of safe water to families reduced diarrhoea occurrence (Favin, 2004; Graf, 2008; Liwari, 2009).

Childhood diarrhoea can be prevented by use of safe and adequate water supply. Although mothers recognize the importance of using safe water supply at the household level, inadequate water supply may affect their practice. During the dry months, the use of alternative water supply sources contributes to diarrhoea occurrence. The low income may hinder water treatment at the household level. The main source of water for the population in Baharini location is piped water from ministry of water. The water is treated by chlorination. The other water sources include river Ndarugu and rainwater harvesting.

River water can be made safe by treating it at the household level. The methods of water treatment include boiling, the three-pot system, household chlorination and household sand filter. The low-income households may find it difficult to boil water since this would be an extra expense on the fuel cost. Although the three-pot system and the household sand filter can be used at the household level, these methods do not destroy all the diarrhoea causing micro-organisms in the water (Wood, 2008).

Rain water can be made safe by allowing the first rain to wash out the dust from the roof top before collecting it in a well prepared water tank or drum. The tank should be cleaned once a year (Wood, 2008). The water tank should be covered to prevent insects such as mosquitoes contaminating the water. It is easier to protect water from contamination than to treat it once it has been contaminated.

Water can be protected from contamination by proper disposal of human excreta. Animals and birds should be prevented from contaminating water by keeping them away from water sources and protecting water sources for example fencing the area surrounding the eye of the spring. Access to piped water in Kenya is at 3:10 (G.O.K Census, 2009). There is need for capacity building among mothers on importance of safe water supply for drinking, cooking, washing utensils, vegetables and fruits. Chlorination of water at the household level should be encouraged. Other appropriate methods of water treatment such as boiling, filtering and the three-pot system can also be encouraged. Families should be encouraged to harvest rainwater to supplement the water supply since only 10% of Kenyans are harvesting (G.O.K, 2009).

The study concluded that mothers were not able to recognize early signs of dehydration. This resulted in the deterioration of the child's condition to complications of diarrhoea. The mothers were inadequately prepared to appropriately implement the household childhood diarrhoea management regimes. Mothers had inadequate knowledge on household risk factors for diarrhoea. Other factors such as overcrowding, inadequate safe water supply, disposal of refuse and excreta affected the mother's practice.

SUMMARY, CONCLUSION AND RECOMMENDATION

5.2 SUMMARY

This study was conducted in order to assess the mother's level of knowledge on signs of dehydration and complications of childhood diarrhoea. The study also purposed to determine the management regimes used by mothers during childhood diarrhoea. Further, the study intended to identify household risk factors for diarrhoea transmission in children under 5 years of age in Nakuru municipality, Kenya. Data was collected using pre-tested questionnaires and an observation checklist was used to assess the household sanitation. The respondents were identified using simple random sampling technique. A sample of 400 mothers of children under 5 years of age were interviewed. Eighty eight point five percent (88.5%) of the respondents did not know the early signs of dehydration. This resulted in the child deteriorating to complications of diarrhoea and delay in starting treatment. Although 81% of the respondents gave fluids to children suffering from diarrhoea, inappropriate fluids were used. Seventy six percent (76%) of the respondents considered offering food to the child during diarrhoea, 66% gave carbohydrates and 2% gave protein foods.

Fifty five point seven percent (55.75%) of the respondents avoided giving foods such as beans while 33.5% omitted milk during diarrhoea. The study observed that 51.75% of the households had poorly disposed domestic refuse although 73.25% of the respondents knew the proper method of disposing domestic refuse.. At the time of the study excreta was poorly disposed in 36.75% of the households. The methods of excreta disposal used at the household were high risk for diarrhoea transmission. The management regimes used by mothers to treat children during diarrhoea were inadequate. The study concluded that the mothers were inadequately equipped with knowledge concerning the signs of dehydration and complications of diarrhoea in children under 5 years of age. The childhood diarrhoea management regimes used by mothers were

inappropriate. The mother's practices did not adequately prevent children under 5 years from suffering from diarrhoea. There is need to improve level of knowledge and skills on home care management of diarrhoea among mothers in Baharini location, Nakuru and to involve other stakeholders in order to reduce diarrhoea morbidity and mortality in children under 5 years of age.

5.3 CONCLUSION

This study was conducted to determine the knowledge and practice of mothers on home care management of diarrhoea in children under 5 years in Nakuru. Inadequate knowledge on early signs of dehydration lead to delay in starting dehydration treatment during diarrhoea resulting in increased morbidity and mortality. The study found that 11.5% of the respondents knew early signs of dehydration. There is need for training of mothers to identify early signs of dehydration and on importance of starting dehydration fluids as soon as diarrhoea starts.

Fluid rehydration should be accompanied by proper replacement of electrolytes (sodium, potassium, chloride and bicarbonate). Electrolytes can be replaced by use of WHO ORS formula as soon as diarrhoea starts. Seventeen point seven five percent (17.75%) of the respondents considered using ORS during diarrhoea but only 7.75 used ORS therapy. Training mothers on importance of replacement of electrolytes during diarrhoea is necessary in order to prevent and treat dehydration. The WHO ORS sachets should be made available at shops in the estates so that mothers can access them for use when necessary. Some of the respondents, 51.25% had inadequate skill in preparing ORS, while 30.5% did not know how to prepare ORS. There is need for health workers to work with mothers/the community in order for mothers/care takers to adopt appropriate skills for preparing and administering ORS. Mothers can also be encouraged to give appropriate home made fluids such as soup, yoghurt, unsweetened fresh juice or plain water during diarrhoea.

Malnutrition can occur during diarrhoea because of omitting to give food, inadequate food intake and inadequate food absorption during diarrhoea. Mothers should be given proper information and importance of appropriate methods of offering food to the child during diarrhoea. Only 13.25% of the respondents knew that malnutrition could occur due to diarrhoea. Some of the

respondents, 66% gave carbohydrate food during diarrhoea but only 2% gave proteins foods. Fifty-five point seven percent (55.75%) of the respondents omitted various foods such as beans and foods cooked in fat/oil. Malnutrition occurs within the second day after diarrhoea starts unless the child is offered nutritious foods. Malnutrition makes diarrhoea more prolonged, more severe and more frequent (WHO, 2005).

Most of the respondents, 85.75% did not know that breastfeeding can prevent childhood diarrhoea. Some of the mothers who are not able to breast feed give cow's milk and other milk formulas. This contributes to childhood diarrhoea because of poor milk absorption and improper hygiene. A well-nourished and immunized child is less likely to develop other infections that contribute to diarrhoea and malnutrition.

Seventy six percent (76%) of the respondents did not know proper child weaning prevents childhood diarrhoea. Early weaning before age 4 months result in diarrhoea due to poor food absorption. Inappropriate choice of child weaning foods and faulty weaning methods result in diarrhoea (Wood, 2005, Stanfield, 2005).

Proper hand hygiene prevents contamination of food, water, utensils and hands from transmitting diarrhoea-causing micro-organism. Majority of the respondents, 88.75% agreed that proper personal hygiene prevents diarrhoea. Diarrhoea causing micro-organisms such as the *Rotavirus* can remain in hands for many hours

Improper disposal of domestic refuse encourages breeding of houseflies that transmit diarrhoea causing micro-organisms. The target group such as, family/community should be given information on importance of proper disposal of domestic refuse. The local authority should facilitate appropriate methods of refuse disposal. This would reduce or eliminate the housefly

population that transmits diarrhoea. The study observed that 51.75% of the households had poorly disposed their domestic refuse. Improper disposal of domestic refuse increases breeding and multiplication of houseflies which transmit diarrhoea causing micro-organisms.

On observing the household excreta facility, 63.25% were properly maintained. Sharing of the excreta disposal facility between households contributes to poor maintenance, poor use of the excreta facility and this results in diarrhoea transmission. When an excreta facility is kept locked, children and other household members tend to dispose excreta on the area near the excreta facility. The excreta facility surrounding becomes more favourable for breeding and multiplication of houseflies.

Adequate and safe water supply is important in prevention of diarrhoea. Households should be encouraged to improve the quality of water at the household level by use of methods such as household chlorination. Inadequate safe water supply during the dry months resulted in increased diarrhoea occurrence.

The *Rotarix* vaccine provides protection against childhood diarrhoea. It is given before the child is six months of age. The cost of *Rotarix* vaccine has limited its use in Baharini location, Kenya (Mugo, 2010). Child immunization against diseases such as measles provides protection against infections that contribute to diarrhoea.

5.4 RECOMMENDATIONS

The Ministry of Public Health should consider the continuation of promotion of exclusive breastfeeding and encourage proper child weaning methods.

- The community should be provided with proper information on appropriate childhood diarrhoea management regimes by Ministry of public health staff and where possible, mass media can be used to provide information.
- The WHO -ORS sachets should be made accessible to mothers/caregivers in places such as the estate shops for convenience of availability and use. Since ORS is known to be effective in preventing and treating dehydration, the target group should be trained on skills for preparation and administration of ORS by public health workers.
- *Rotavirus* vaccine should be made available and accessible for all children at the MCH/FP clinics and the hospitals by the Ministry of Public Health staff.
- There is need to improve knowledge on appropriate methods of refuse disposal. The Public Health department of the municipality needs to improve methods of refuse collection from the estates.
- The public health workers need to improve knowledge among the respondents on proper maintenance of the existing excreta facilities.
- The public health department should consider policy on chlorine water treatment at household level especially during dry period when alternative water sources are used.
- Community health workers should be more involved in implementation of household practices for childhood diarrhoea management at the household/community level.
- There is need to provide community with the information on diarrhoea diseases and the mode of transmission. There is need for training of mothers on identification of early signs and complications of childhood diarrhoea. The Ministry of Public Health staff should provide the information.

- Long-term solutions can be considered to increase the number of excreta facilities among household and also to improve availability of safe water supply. This will involve the public health department, the community and other stakeholders.

5.5 FURTHER RESEARCH

Further research can be considered as follows:

- Further research can be carried out to determine factors that limit use of ORS.
- Childhood diarrhoea morbidity and mortality can be done to determine the trend/patterns.
- Qualitative research on childhood diarrhoea in order to determine more appropriate and relevant approaches of interventions.
- Research can be done to determine types and extent of use of antipyretics.
- Research can also be done to determine extent and use of tepid sponging because of its harmful effects in order to improve on its application where necessary.

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REPUBLIC OF KENYA

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MOST 13/354/19

14th December 2006

Jackbeth Mumbi Mugo
Kenyatta University
P.O. Box 43844
NAIROBI

Dear Madam,

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, '*A Study on Knowledge, Attitude and Practice (KAP) of Urban Caretakers on Home Management of Diarrhea in Children below Five Years of Age in Nakuru*'

I am pleased to inform you that you have been authorized to carry out research in Nakuru District for a period ending 31st December 2007.

You are advised to report to the District Commissioner, the District Education Officer and the Medical Officer of Health, Nakuru District before embarking on your research project.

On completion of your research, you are expected to submit two copies of your research report to this office.

Yours Faithfully,

A handwritten signature in dark ink, appearing to read 'M. O. Ondieki', written over a light blue circular stamp.

M. O. ONDIEKI

FOR: PERMANENT SECRETARY

Copy: District Commissioner
Nakuru District

District Education Officer
Nakuru District

The Medical Officer of Health
Nakuru District

APPENDIX II.

11.1 QUESTIONNAIRE

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

6.1 Instructions:

The interviewer to this questionnaire are mothers of children under five years of age. The questionnaire has three sections; Demographic information, knowledge and practice. Household demographic information.

6.2 Demographic Information

Q1 Who is the household head?

1=Male

2=Female

3=Age <20 years

4 = 20 – 30 years

5= >31 years

Q2 Who is the child care taker?

1=Mother

2=Father

3=Sibling

4=Grand parent

5=Relative

6=Friend

Q3 What is the age of the youngest child?

Age

1.=< 2 months

2 months – 59 months

Q4 What is the marital status of caretaker?

1=Married

2=Single

3=Widow

4=Separated

5=Widower

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q5 What is your tribe?

1=Kamba

2=Kalenjin

3=Kikuyu

4=Kisii

5=Luo

6=Luhya

7=Masaai

8=Other

Q6 What is the family source of income?

1=Formal employment

2=Business

3=Farming

4=other, specify

Q7 What is your highest level of education?

1=None

2=Primary

3=Secondary

4=Post secondary

Q8 What is your religious affiliation?

1=Catholic

2=Christian

3=Muslim

4=Other

Q9 Type of house used by family

1=Permanent

2=Semi-permanent

3=Temporary

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

6.3 Knowledge Questions

Q10 Has your child had any diarrhoea in the last 6 month?

1=Yes

2= No

If yes, how many episodes?

Q11 How is diarrhoea treated at home?

1=Fluids

2=Herbs

3=Drugs

4=Others specify.....

Q12 What fluids can a child with diarrhoea be given at home?

1=ORS

2=Salt Sugar Solution

3=Plain Water

4=Tea with milk and sugar

5=Fruit juice

6=Others specify.....

(If ORS is not given omit Q13)

Q13 If a child with diarrhoea is given ORS, how much should be given?

(Half a cup)

1=Correct

2=Needs improvement

3=Wrong

4=Don't know

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q14 What foods can a child with diarrhoea be given?

1=Porridge

2=Milk

3=Vegetables

4=Mashed foods

5=Others- Specify.....

Q15 Are there fluids/foods, which should be avoided during diarrhoea?

1=Yes

2=No

3=If yes, which ones?

Q16 What does blood in stool mean?

1=Correct

2=Needs improvement

3=Wrong

4=Don't know

Q17 What are the symptoms of a child with diarrhoea?

1=Drinks eagerly

2=Irritable

3=Other, specify.....

Q18 What are the effects of diarrhoea in children?

1=Malnutrition

2=dehydration

3=other diseases

4=failure to thrive

5=other diseases, specify.....

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q19 What symptoms would make you decide to take a child to the hospital?

Age < 11 months,

1=Fits

2= Unconscious

3=Unable to drink/breastfeed

4=Vomiting

5=Frequent diarrhoea

6=Lethargy

7= Other, Specify.....

Age 12 – 59 months

1=Fits

2= Unconscious

3= Unable to drink/breastfeed

4=Vomiting

5=Frequent diarrhoea

6=Lethargy

7= Other, Specify.....

Q20 How should fever be treated at home?

1=Drugs

2=Herbs

3=Exposure

4=Tepid sponging

5= Other, specify.....

Q21 What causes diarrhoea?

	Strongly Agreed	Agree	Don't know	Disagree	Strongly disagree
1=Micro-organism					
2=Contaminated water/food					
3=Poor hand hygiene					
4=Poor refuse disposal					
5=Houseflies					

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q22 How can diarrhoea be prevented?

	Strongly Agreed	Agree	Don't know	Disagree	Strongly disagree
1=Proper disposal of refuse					
2=Proper child weaning					
3=Breast feeding					
4=Good personal hygiene					

Q23 How should domestic refuse be disposed?

	Strongly Agreed	Agree	Don't Know	Disagree	Strongly Disagree
1=Put in compost pit and bury					
2=Put in covered dust bin					
3=Thrown in open pit					
4=Other, specify...					

Q24 How should child's faeces be disposed?

	Strongly Agreed	Agree	Don't know	Disagree	Strongly disagree
1=In pit latrine/flush toilet					
2=Childs faeces is thrown with refuse or waste water					
3=Other, specify...					

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q25 Where do houseflies come from?

	Strongly Agreed	Agree	Don't know	Disagree	Strongly disagree
1=Poorly kept pit latrine flush toilet					
2= Poorly disposed refuse					
3= Dirty compound					
4=Other, specify...					

Q26 Why do houseflies come from the mentioned site?.....

6.4 Practical Questions

Q27 What can you do if your child has diarrhoea?

Take to:

- 1=Public health facility
- 2=Private health facility_
- 3=Traditional health facility
- 4=Buy medicine from shop/chemist
- 5=Treat with ORT
- 6=Treat with salt/sugar solution
- 7=Other,

Q27. Why? (Reason for choice).....

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q28 Why should fluids be given in diarrhoea? (ANSWER – To prevent dehydration)

- 1 Correct
- 2 Needs improvement
- 3. Wrong
- 4. Don't know

Q29 What fluids do you give when your child has diarrhoea?

- 1=Correct
- 2=Needs improvement
- 3=Wrong

Q30 How do you prepare ORS?

- 1=Correct
- 2=Needs improvement
- 3=Wrong
- 4= Don't know

Q31 How do you prepare the salt sugar solution?

- 1=Correct
- 2=Needs improvement
- 3=Wrong
- 4= Don't know

Q32 Which foods would you give your child during diarrhoea?

- 1=Carbohydrate cereals
- 2= Carbohydrate roots
- 3=Animal proteins
- 4=Plant proteins
- 5=Fruits
- 6= Other, specify.....

7= Why are these foods the best to give curing diarrhoea?

Reason.....

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q33 How many times do you feed your child in 24-hour day?

1=Correct

2=Needs

3=Wrong

Q34 Are there other forms of treatment that can be given to a child with diarrhoea other than Fluids and foods?

1=Yes

2=No

3= If yes, which ones?

4= Why?

Q35 Are there any other things that you avoid when your child has diarrhoea?

1=Yes

2=No

3=If yes, which ones?

Why? (Reason for avoiding)

Q 36. What fluids/foods should you avoid to feed your child during diarrhoea?

1=Milk

2=Porridge

3=Water

4=Vegetables

5=Mashed food

6= Other, specify.....

Why? (Reason for avoiding)

Q37 Which symptoms would you find in a child with diarrhoea?

1=Drinks eagerly

2=Irritable

3= Other, specify.....

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q 38 Why does a person see blood in stool during diarrhoea?

1=Correct

2=Needs improvement

3=Wrong

4= Don't know

Q 39. What symptoms would make you take a child with diarrhoea to hospital?

Age <2 months.

1=Fits

2=Unconscious

3=Unable to breastfeed

4=Vomiting

5=Frequent diarrhoea

6=Lethargy

7= Other, specify.....

Age 2 -59 months

1=Fits

2=Unconscious

3=Unable to drink/breastfeed

4=Vomiting

5=Frequent diarrhoea

6=Lethargy

7= Other, specify.....

Q40 What effects would diarrhoea have on the child?

1=Malnutrition

2=Failure to thrive

3=other disease

4=Death

5= Other, specify.....

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q41 What remedies would you give to a child with fever?

1=Drugs

2=Herbs

3=Exposure

4=Tepid sponging

5= Other, specify.....

Q 42 What do you do to prevent diarrhoea affecting other members of your household?

1=Correct

2=Needs improvement

3=Wrong

Q43 How do you dispose your domestic refuse?

	Strongly Agreed	Agree	Don't know	Disagree	Strongly disagree
1=Put in compost pit and cover with soil each day.					
2=Put in dust bin and cover					
3=Burnt weekly					
4=Thrown in open area					
5=Other, specify...					

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q44 How should you dispose child's faeces?

1

	Strongly Agreed	Agree	Don't know	Disagree	Strongly disagree
1=Thrown in pit latrine/flush toilet					
2=Thrown with refuse					
3=Thrown in waste water					
4=Other, specify...					

Q45 Where do houseflies come from?

Specify

.....

Q46. Can houseflies cause any disease?

	Strongly Agreed	Agree	Don't know	Disagree	Strongly disagree
1=Diarrhoea					
2=Eye infection					
3=Other, specify...					

BLOCK NO. / PLOT NO.....HOUSEHOLD NO.....

Q47 Where do you dispose your domestic refuse? (Observe compound).

1=Correct

2=Needs improvement

3=Wrong

Q48 Where do you dispose the child's faeces? (Observe latrine/toilet, compound).

1=Correct

2=Needs improvement

3=Wrong

THE END

APPENDIX III

11.2 OBSERVATION CHECK LIST

1. Domestic refuse disposal in a covered dust bin
2. Domestic refuse disposed in a bin without a cover
3. Domestic refuse disposed in an open area and not covered

Disposal of Faeces

1. Faeces disposed into the flush toilet pan and flush with water or faeces disposed into the pit latrine and the pit hole has a cover
2. Faeces disposed into a pit which has no cover or faeces disposed into a flush toilet pan which is not flushed
3. Faeces disposed into a flush toilet pan without being flushed and some scattered around the pan or faeces disposed into a latrine without a cover and some faeces scattered around

- END -

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