

How do Swazi mothers respond when their children develop diarrhoea and what factors may underlie such responses?

A study on the home management of diarrhoea among mothers in the Manzini Region of Swaziland

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DECLARATION

I, Dr Tshikaya Kaleta, declare that this thesis embodies my original work except where acknowledgement indicates otherwise and that no part of it has been or is being submitted for a degree at any other university.

Signed by candidate

Signed :

Date : 24th May 2007

The work for this thesis was done in the School of Child and Adolescent Health of the University of Cape Town.

DEDICATION

I dedicate this work to my beloved wife Ruth Angel Ngamala Kaseka and my three children: Sarah Kamuleta, David Kaleta, and Malaika Louise Ngamala who through their love, companionship, patience, sacrifice, understanding and perseverance allowed me to complete my training.

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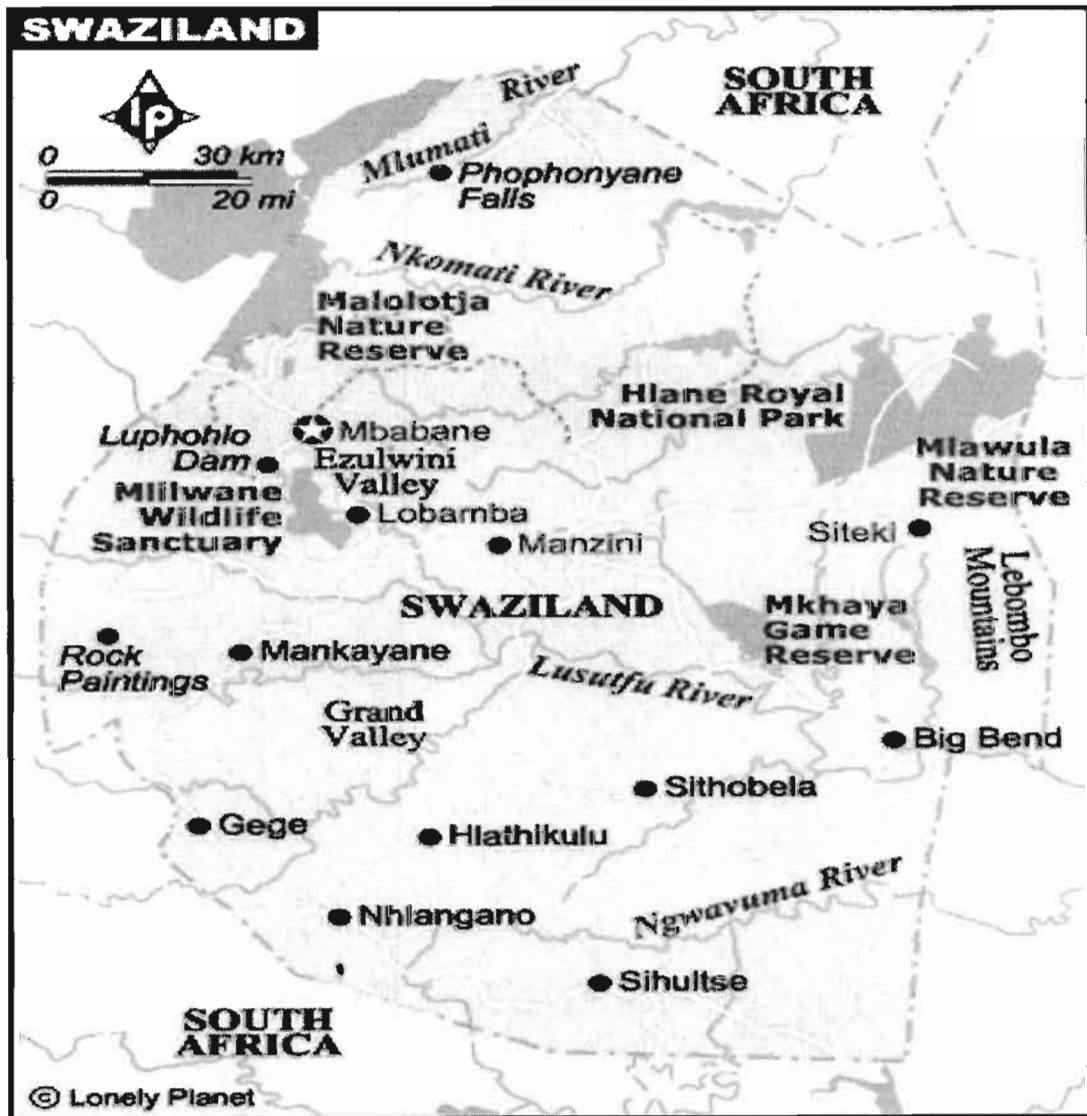
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MAP OF THE KINGDOM OF SWAZILAND



LIST OF ABBREVIATIONS

ARI	:	Acute Respiratory Infection
AIDS	:	Acquired Immune deficiency Syndrome
BMC	:	BioMed Central
CDD	:	Control of Diarrhoeal Diseases
EPI	:	Expanded Programme on Immunization
GNI	:	Gross National income
HIV	:	Human Immune deficiency Virus
MCH	:	Maternal and Child Health
NGO	:	Non-Governmental Organization
ORS	:	Oral Rehydration Solution
ORT	:	Oral Rehydration Therapy
RFMH	:	Raleigh Fitkin Memorial Hospital
SD	:	Standard Deviation
SSS	:	Sugar Salt Solution
UCT	:	University of Cape Town
UNAIDS	:	United Nations Programme on HIV/AIDS
UNDP	:	United Nations Development Programme
UNICEF	:	United Nations Children's Fund
WHO	:	World Health Organization

ABSTRACT

Introduction:

In Swaziland, diarrhoeal disease remains a leading cause of morbidity and mortality. In hospitals in the Manzini Region, more than 50% of children are admitted with diarrhoea. According to the World Health Organization diarrhoea accounted for 10% of under-five mortality between 2000 and 2003 (WHO 2006, p.2).

Aim and Objectives:

The aim of this study was to determine how Swazi mothers initially respond when their children develop diarrhoea and the factors that could influence their response.

The objectives of the study included the following:

- To assess maternal/ caregivers' knowledge of diarrhoea
- To assess how mothers of children with diarrhoea manage them at home before seeking medical assistance
- To determine the factors that influence how mothers/ caregivers manage their children with diarrhoea
- To make recommendations on how mothers can improve the home management of diarrhoea

Methods:

This was a cross-sectional descriptive study carried out at the Raleigh Fitkin Memorial Hospital and Mankayane Hospital in the Manzini Region of Swaziland. Structured interviews were conducted with 385 randomly selected mothers/ caregivers of children under-five years attending the immunization service between 4th February and 27th April 2004.

Findings:

The mean age of the mothers was 25.6 (SD 6.3) years and the mean number of children was 2 (SD 1). Of the mothers, 50.4% were married, 42.9% were single, 4.7% were widowed and 2.1% were divorced. The mean number of people per household was 6 (SD

3). Of the mothers, 55.3% had secondary, 24.4% had primary, 15.6% had tertiary and 4.7% had no education. Half the mothers/caregivers were employed but had a household income of < R1000 per month; 67.7% lived in formal houses and 21.3 % lived in informal houses. Forty-one percent had access to water in the home, while 26% had a flushed toilet.

Most mothers (84%) could define diarrhoea but did not link it to infectious agents. Signs of dehydration in their child identified by mothers/ caregivers included weakness (77%), sunken eyes and fontanel (41%), thirst (17%), dry mucous membranes (7%) and loss of weight and poor feeding (2%). Mothers/ caregivers said that the main ways of preventing diarrhoea was by providing freshly prepared food and clean drinking water (89%), washing hands (83%) and using latrines (32%). Eighty-one percent of mothers/ caregivers knew how to prepare sugar-salt solution (SSS).but only 32% who knew how to do this used it during their child's last episode of diarrhoea.

The main fluids given by mothers/ caregivers to prevent dehydration in their children included oral rehydration solution (ORS) (64%), sugar-salt solution (SSS) (29%), other fluids (e.g. tea rice beverage and herbs) (6%). Only 3.4% of mothers/ caregivers used medication to treat diarrhoea. With regard to feeding, 49 (24%) stopped giving milk to their children, and 72 (36.7%) stopped giving solids; while 73 (37.2%) increased milk and 2 (1%) increased solids. Seventy-eight percent of mothers sought medical assistance when they perceived a worsening in their child's condition. Clinical signs associated with seeking medical assistance included weakness (70%), fever (52%), vomiting (31%), weight loss (24%), illness longer than three days (16%) and bloody diarrhoea (7%).

Mothers/ caregivers who lived in formal houses compared with those who lived in informal houses were significantly more likely to feed their children appropriately ($P=0.03$). Other significant determinants of appropriate feeding included mothers with children < 11 months of age compared to those with older children ($P=0.001$) and mothers who stopped breastfeeding between zero to 6 months compared with those who stopped breastfeeding after 6 months. ($P=0.049$)

Conclusion:

In this study mothers were limited in their knowledge relating to certain aspects of diarrhoea such as the features of dehydration and the prevention of diarrhoea. Most mothers knew how to make up SSS although most used ORS rather than SSS. Few mothers followed the WHO recommendations of providing supplementary feeds when their children were recovering from diarrhoea. They sought medical assistance when they perceived a deterioration in their child's condition such as weakness, fever, vomiting, illness longer than three days and bloody diarrhoea.

Recommendations:

- Greater focus should be placed on the implementation and strengthening of programmes such as the Integrated Management of Childhood Illness (IMCI) within the district, especially the health promotion aspects relating to the management and prevention of diarrhoea.
- Existing programmes such as Diarrhoeal Disease Control Program should focus on the education and counseling of mothers/ caregivers regarding the recognition of signs of dehydration, the management of diarrhoea, continued feeding and provision of additional feeds during recovery from diarrhoea.
- The media should be utilized in preventing diarrhoea and promoting oral rehydration in its management.
- Hospitals, clinics and community health centres should counsel mothers/ caregivers about the disease and its prevention and management during child health visits, in childrens' wards and prior to discharge of children admitted with diarrhoea. The formation of hydration corners could provide opportunities for counseling and the preparation and use of SSS.
- Advocacy to the Government of Swaziland is needed to mobilize the necessary resources (financial, material and human) to improve sanitary and living conditions of people in the country.

CHAPTER 1: INTRODUCTION

1.1. Swaziland

The Kingdom of Swaziland, situated between the Republic of South Africa and Mozambique covers an area of 17,368 km² making it the smallest country in Southern Africa. The country has a total population of 1.1 million people with just over 50 percent of these being female. The country by end of 2004 had an annual population growth rate of 2 percent and a Gross National Income(GNI) per capita of US Dollars 1660 (Swazi World Bank 2000,p.4). Swaziland is divided into four administrative regions namely: Hhohho, Lubombo, Manzini and Shiselweni. The Manzini District is the largest district with over 30 percent of total population.

1.2. Socio-economic profile

Swaziland, compared to other sub-Saharan countries has relatively higher GNI per capita. In 2004, Swaziland had a Gross National Income (GNI) per capita of 1660 US Dollars compared to the average of 601 US dollars for several sub-Saharan countries (Swazi World Bank 2000, p.4). However, the GNI per capita has dropped significantly from 2880 US dollars in 1995 to the current 1660 US dollars. Recent developments in South Africa that provide generous incentives to new industries have had a detrimental effect on the economy of Swaziland because fewer of its citizens have local job opportunities with the resulting loss of tax revenue to the government. This in turn negatively impacts on women and children dependent on male earnings or financial help from social services. According to the State of the Worlds Population Report (United Nations Development Programme (UNDP), 1998) the unemployment rate has increased and women are the most affected.

1.3. Health Indicators

Social and economic development in Africa has led to substantial improvements in living conditions and in child survival during the past decade. However, these gains have been unevenly distributed: although child mortality has declined in a number of sub-Saharan

African countries, several countries with a high HIV/AIDS prevalence continue to experience high child mortality rates. In Swaziland under-five mortality has increased from 110/1,000 in 1995 to current levels of 153/1,000 and infant mortality worsened from 78/1,000 live births in 1995 to 105/1000 live births currently (Swaziland Bureau of Statistics 1995, p10). The prevalence of child malnutrition calculated as a percentage of children under-five years who are malnourished currently stands at 10 percent. Due to a high HIV/AIDS prevalence rate of 38.8 percent (UNAIDS 2000), life expectancy at birth in Swaziland has dropped from 56.6 years in 1990 to just under 43 years in 2003 (Swazi World Bank 2000, p.5; UNDP 2002).

Although the immunization coverage measured as a percentage of children under-12 months who received measles vaccination is reported to be 94 percent, the primary causes of the persistently high mortality are infectious diseases. Particularly important are diseases for which immunization is not widely available, such as diarrhoea or acute respiratory infections (ARI). In 1998, diarrhoea in under-fives accounted for over 6 percent of all outpatient consultations (Swaziland Bureau of Statistics 1998, p.3). In Manzini district, over half of the children admitted in health facilities have diarrhoea (Swaziland Bureau of Statistics 2001, p.13). In 1994, intestinal infectious diseases and respiratory diseases contributed to just under half of all hospital deaths among the under-fives. This was followed by malnutrition which contributed 8 percent of all under five hospital deaths (Swaziland Bureau of Statistics 1994, p.6).

Inadequate hygiene, sanitation and lack of access to water in rural areas is the major cause of diarrhoeal diseases (Swaziland Bureau of Statistics 1994, p.9). From 1986 to 1992, it was found that 54 percent of the rural population did not have access to safe water (Swaziland Bureau of Statistics 1994, p.9).

1.4. Rationale for the study

Diarrhoea and respiratory infections are common childhood diseases worldwide and account for more deaths among children under the age of five years than any other infectious disease (WHO 1998, p.26). Family members and mothers in particular, are

generally the key actors in determining how childhood illnesses are treated. They decide what types of remedies and care a child receives at home, whether the child sees a healthcare provider, and whether to follow the provider's advice or purchase and administer the medication prescribed (WHO 1992, p.4).

Families' treatment choices are crucial to reductions in morbidity and mortality from diarrhoea. It is therefore important to understand the local knowledge and understanding of diarrhoea and its initial management and to provide clear guidance to families about when children need to receive immediate medical attention (WHO 1992, p.6). Secondly, the appropriate management of the child at home before seeking medical care is important in preventing dehydration and malnutrition, especially as children seen at a health facility will usually continue to have diarrhoea after returning home (WHO 1992, p.4). It was on this basis that this study was conceptualized. The study aimed to examine how Swazi mothers respond when their children developed diarrhoea and to identify the factors that could underlie such a response. Understanding family choices about treatment of diarrhoea is essential for improving home care and appropriate care seeking behavior.

CHAPTER 2: LITERATURE REVIEW

This chapter presents a review of the literature on diarrhoea. The factors which place infants at risk of developing diarrhoea are reviewed. This is followed by measures aimed at treating diarrhoea. Thereafter current practices of mothers/ caregivers in response to a child with diarrhoea and the complexity of factors which interact with and inform the management of the child with an episode of diarrhoea are reviewed. This approach was followed as the study that was undertaken focused on maternal/ caregiver knowledge of diarrhoea, their home management of children with this condition, and the factors underlying their response.

2.1 Definition of diarrhoea

A significant consideration in this thesis is a shared understanding of what constitutes diarrhoea. The World Health Organization (1998, p.5) defines diarrhoea as the passing of three or more liquid stools in a 24-hour period. Diarrhoea can be classified based on factors such as duration of the illness (acute versus chronic), pathophysiologic mechanisms (osmotic versus secretory), severity, or stool characteristics (watery, fatty, or bloody). In clinical practice, duration of the illness and stool characteristics are most useful in the evaluation and treatment of patients with diarrhoea (Soffer & Andreoli 2001, p.316)

Acute diarrhoea has an acute onset with most episodes lasting less than 14 days. It involves the passage of frequent watery stools without any visible signs of blood. When death occurs, it is usually by acute dehydration (WHO 1997). Eighty percent of diarrhoea cases are acute watery and fifty percent of diarrhoeal deaths are due to it. One hundred percent of these deaths are preventable by standard case management (WHO 1998, p. 5).

Persistent diarrhoea is defined as diarrhoea with or without blood in the stools that begins acutely and lasts 14 days or more. It usually accounts for 15% of all episodes of diarrhoea but is associated with 30-50% of diarrhoeal deaths. It is usually associated with weight loss and often with serious non intestinal infections (WHO 2002, p 36).

Diarrhoea is defined as chronic when there is the passage of unformed stools for 14 days or longer (BMC 2006, p 2). There is an overlap between persistent and chronic diarrhoea, although persistent diarrhoeas arise with complications such as malnutrition (Thapar & Sanderson 2004, p.641)

Dysentery or bloody diarrhoea is defined as diarrhoea with visible blood in the stools. Clinical texts often use the term dysentery to describe the syndrome of bloody diarrhoea with fever, abdominal cramps, rectal pain, and mucoid stools. These features, however, do not always accompany bloody diarrhoea, nor do they necessarily suggest its etiology or determine appropriate treatment. Bloody diarrhoea in young children is usually a sign of invasive enteric infection that carries a substantial risk of serious morbidity and death (WHO 2002, p 29).

2.2 Disease burden

Diarrhoea is a leading cause of morbidity and mortality among children in developing countries. The World Health Organization (WHO) estimates that diarrhoea causes 18% of all deaths in children under the age of five years and 3% of deaths in neonates. Forty percent of deaths due to diarrhoea occur in the WHO Africa region (Bryce 2005, p.1147). An analysis of studies published between 1992 and 2000 found that approximately 2.5 million children died every year from diarrhoeal diseases (Kosek, Bern, Guerrant 2003, p.197). Mortality from diarrhoeal diseases has been falling but morbidity remains high, dehydration secondary to diarrhoea is a significant cause of morbidity and the need for hospital admission (Elliot, Backhouse, Leach 1996, p.18). The main cause of death from acute diarrhoea is dehydration which results from the loss of fluid and electrolytes in the stools.

Most killer diseases in Swaziland are due to poor environmental sanitation in and around human settlements. About 80% of all sicknesses and diseases in Swaziland can be traced to unsafe water that either affect people directly or serve as ground for diseases and vectors. In an analysis of the leading causes of total inpatient deaths for sentinel year 1994, the top four leading causes were: Environmentally-related, bacterial, non-vaccine preventable and cardiovascular (Swaziland Bureau of Statistics 1994, p.7).

Environmental related communicable diseases are the major causes of illnesses and death among the Swazis and account for more than 50% of all outpatient visits in the country and more than 20% of all the admissions into inpatient health care facilities. In Swaziland, diarrhoeal disease remains one of the leading causes of morbidity and mortality. It represented 11.2% of major causes of all outpatient consultations in 1999 after Respiratory diseases (26, 0%) (Swaziland Bureau of Statistics 1999, p.7). Children under-five represented 6.2% (Swazi Bureau of Statistics 1999, p.7). In Manzini hospital, more than 50% of children admitted in the children's ward had diarrhoea. (Swazi Bureau of Statistics 2001, p 13). Recent information confirms that death from diarrhoea amounted to 10% of mortality in children under-five years old from 2000 to 2003, excluding diarrhoea during the neonatal period (WHO 2006, p.2).

The following table shows that intestinal infections (10%) and respiratory diseases (12%) are still major causes of death among children under-five in Swaziland.

Table I. Causes of death among children under five years in Swaziland 2000-2003

Causes	Deaths (b) (%)	Regional average (%)
Neonatal causes (a)	27	26
Respiratory infection	12	21
Diarrhoeal Diseases	10	17
Malaria	0	17
HIV/AIDS	47	7
Measles	0	4
Injuries	4	2
Others	1	6

Source: WHO 2006, p.2

a. Includes diarrhoea during neonatal period

b. Sum of individual proportions, may not add up to 100% due to rounding

2.3 Causes of diarrhoea

Diarrhoea may be caused by an infection, or a chronic problem, like an intestinal disease (Soffer & Andreoli 2001, p.316)

. A few of the more common causes of diarrhoea are:

- Bacterial infections. Several types of bacteria, consumed through contaminated food or water, can cause diarrhoea, including *Campylobacter*, *Salmonella*, *Shigella*, and *Escherichia coli*.
- Viral infections. Many viruses cause diarrhoea, including Rotavirus, Norwalk virus, Cytomegalovirus, Herpes simplex virus, and Viral Hepatitis.
- Parasites. Parasites can enter the body through food or water and settle in the digestive system. Parasites that cause diarrhoea include *Giardia lamblia*, *Entamoeba histolytica*, and *Cryptosporidium*.
- Dietary: (a) Food intolerances. Some people are unable to digest a component of food, such as lactose, the sugar found in milk, (b) Vitamins deficiencies
- Reaction to medicines, such as antibiotics, blood pressure medications, and antacids containing magnesium.
- Intestinal diseases, like inflammatory bowel disease or celiac disease.
- Functional bowel disorders, such as irritable bowel syndrome, in which the intestines do not work normally.
- Surgical, following vagotomy or gastrectomy
- Endocrine and metabolic such as hyperthyroidism
- Chemical (poisons)

The main cause of acute diarrhoea is viral, followed by bacterial and parasitic causes with food poisoning being last.

Table II Agents causing acute diarrhoea

Viral	Rotavirus Enteric adenovirus Norwalk agents Pestivirus	Astrovirus Calicivirus Coronavirus
Bacterial	Campylobacter jejuni Salmonella Enterotoxigenic E.Coli Enterohemorrhagic E.Coli E.Coli Shigella	Yersinia Clostridium Difficile Aeromonas Pleisomonas Vibrio cholera Other species
Parasitic	Giardia Cryptosporidium parvum Entamoeba histolytica Trichuris trichiura	Dientamoeba fragilis Balantidium stercoralis Strongyloides stercoralis
Food poisoning	Staphylococcus aureus Clostridium perfringes	Bacillus cereus

Source: Mehta, 1994

2.4. Factors increasing the risk of diarrhoeal disease

Socioeconomic factors are directly linked to diarrhoea in developing countries. These include poor sanitation, overcrowding, contamination of water, and inadequate food hygiene. These factors are found in areas of developing countries where poverty is rampant. Worldwide, 29% of people do not have access to safe water and 58% of people do not have access to adequate sanitation. The areas of developing countries that have more money are able to eliminate these factors as causes of diarrhoea (UNICEF 1998, p.21).

Other risk factors include household crowding, low maternal education and low birth weight. The rates of diarrhoea in children for developed and developing countries are very similar when compared in terms of these factors (Gondwe 1998, p.11).

Behavioral factors are mostly related to the introduction of contaminated food and water. These include failure to breastfeed exclusively for the first 4-6 months of life, failure to continue breastfeeding until one year of age, using infant feeding bottles which are difficult to clean, storing cooked food at room temperature, drinking water that is contaminated with fecal bacteria, failure to wash hands before handling food and after defecation and failure to dispose of feces hygienically (Gondwe 2002, p.12). In addition, host factors such as under nutrition, measles and immunosuppression have been linked to higher rates of diarrhoea (WHO 2005, p.3).

2.5 Prevention and management of diarrhoea

2.5.1 Prevention:

Breastfeeding greatly reduces the risk of severe diarrhoea. It is cheap, clean and has antibodies that protect infants from infection (WHO 2001, p.12). Encouraging women to exclusively breastfeed for the first 4-6 months and if possible up to one year is the ideal way adequate growth and prevent infections including diarrhea in infants (WHO 2001, p.16).

Improved weaning practices are integral to the prevention of diarrhoea. Weaning is a hazardous period for many infants if a child does not receive food of adequate nutritional value or food that has been infected with pathogenic microbes. Infants should be fed frequently with vitamin rich and nutrient dense foods. The food must be prepared under sanitary conditions with proper hand washing and cooking or boiling of the food during preparation.

There are a number of preventive measures for diarrhoea, including the use of safe water for drinking and preparing feeds, hand washing and the proper disposal of feces. The latter is best done through providing adequate sanitation. The safe disposal of the stools of young children is a task that is often overlooked in many communities. The stools of young children often contain pathogens which cause diarrhoea and are a major source of infection (Health Protection Agency 2006, p.2). Educating families about proper disposal is an essential aspect of diarrhoea prevention.

Diseases such as measles increase the risk of developing diarrhoea. The effectiveness of the measles vaccine makes immunization a very cost effective way to prevent both illnesses (WHO 1998, p.16).

2.5.2 Management of diarrhoea

The majority of deaths from diarrhoea can be prevented by the timely use of oral rehydration solution (ORS) and continued feeding (WHO 1992, p.3). Thus diarrhoea poses a significant threat to child survival and receives intense attention as a component of child survival strategies aimed at improving health outcomes for children, primarily through the use of ORS.

Mortality from diarrhoea has declined drastically since oral rehydration therapy (ORT) revolutionized the care of diarrhoea patients in the developing world. This treatment reduced deaths from diarrhoea from 13.6 million per annum between 1955 and 1979 to 5.6 million per annum between 1980 and 1989 (Guerrant, Carneiro, Dillingham 2003, p.389). The WHO established diarrhoea control and surveillance programs worldwide through which training has been conducted jointly with NGOs. The principal strategy employed was to improve case-management of diarrhoea through rehydration and better feeding. This involved production and distribution of oral rehydration salts, education of families through mass media and health workers through training programs, and rehydration corners throughout the established primary health care and hospital network. This promising improvement led many to believe that the need for public health attention to diarrhoeal disease was diminishing. However, in the time that mortality had drastically declined, morbidity, or general incidence of diarrhoeal disease, had not and the incidence of the disease appears to be on the rise (Kosek, Bern, Guerrant 2003, p.197).

The World Health Organization (WHO 1992, p.9) recommends three basic rules for treatment of diarrhoea at home:

- Giving the child more fluids than usual
- Giving the child plenty of food to prevent malnutrition and

- Taking the child to the health worker if the child does not get better in three days or develops a fever, marked thirst, poor drinking, passes many watery stools, is vomiting or has blood in stool.

The principles underlying oral rehydration therapy have been applied to the development of a balanced mixture of glucose and electrolytes for use in treating and preventing dehydration, potassium depletion, and base deficit due to diarrhoea. To attain the latter potassium and citrate (or bicarbonate) salts have been included, in addition to sodium chloride. This mixture of salt and glucose is termed oral rehydration salts; when ORS is dissolved in water, the mixture is called oral rehydration solution (ORS). The following guidelines were used in developing the WHO/UNICEF recommended ORS solution (WHO 1992, p.9):

- The solution had to have an osmolality similar to that of plasma, i.e. about 300 mOsmol/L or less
- The concentration of sodium had to be 90 mmol/l and sufficient to replace efficiently the sodium deficit in children or adults with clinically significant dehydration;
- The ratio of glucose to sodium (in mmol/l) had to be at least 1:1 to achieve maximum sodium absorption;
- The concentration of potassium had to be about 20 mmol/l to replace potassium losses adequately;
- The concentration of base had to be 10mmol/l for citrate or 30 mmol/l for bicarbonate, which is satisfactory for correcting the acidosis due to diarrhoea. The use of trisodium citrate, is preferred, since this gives ORS packets a longer shelf life

Besides, the World Health Organization (1992, p.12) recommends the use of a sugar and salt solution (SSS) that can be prepared in the home. This includes making a one liter solution using one level teaspoon of salt, eight level teaspoons of sugar and one liter of clean drinking or boiled water which is cooled. The mixture is stirred until the salt and sugar dissolve. It is recommended that the SSS be covered when it is not being used and

that left over home made SSS is discarded after 24 hours and that a new solution is made each day. Sugar and salt solution has been widely promulgated for years simply because it is similar to ORS. However, the use of SSS has certain disadvantages as it involves measuring, it requires more tuition, time and a more competent parent to do it correctly; and so may be used too sparingly and therefore be of no use. The applicability of either method depends very much on local or national circumstances and policies and should be decided accordingly. There is never a universal "right" method.

The "complete formula" ORS contains potassium and a base, either bicarbonate or citrate which corrects acidosis from which small infants in particular suffer when they are dehydrated. Potassium is important in the treatment of dehydration especially for the child who suffers repeated bouts of diarrhoea. Potassium is an essential cellular element and is involved in the so-called "glucose-sodium co-transport mechanism" which is the basis of the way in which ORS and SSS achieve rehydration. Potassium is absorbed passively and more slowly. If a child is rehydrated with a solution containing no potassium each successive attack of diarrhoea could later leave the child depleted of potassium resulting in fatigue, apathy, muscular weakness and ileus.

Other fluids used in the treatment of diarrhea at home include water, rice beverage, weak tea, coconut water or unsweetened fruit juice and breast milk (Levin 2005, p.2). Although water is extremely important in preventing dehydration, it does not contain electrolytes and may lead to hyponatraemia. Liquids containing salt and either a starch, sugar, or protein are ideal because they provide the necessary ingredients for absorption of both fluid and salt. Good examples are: soups that are normally prepared with salt, salted rice water, or salted yoghurt drinks but inappropriate preparation may result in electrolyte imbalance. The adoption of these practices is still controversial, some teas may contain a certain amount of caffeine, fruit juice may have a laxative effect. Concerning milk, proteins contained in the cow milk is not well digested in case of viral enteritis (Levin 2005, p.2). Several studies have suggested that replacing the 20g of glucose in ORS with 50g of cooked rice powder (or other cereal powder) results in better absorption of the fluid and less output of diarrhoeal stools. It now appears, however, that this is only true

for adults and children with cholera, but not for children with acute non-cholera diarrhoea (UNICEF 2006). These recommended fluids need to be used with caution.

Dehydration tends to be over diagnosed and its severity overestimated in malnourished children. Intravenous route is only accessed in case of shock. Standard WHO-ORS solution has high sodium and low potassium content, which is not suitable for severely malnourished children. Recently, an ORS, called Resomal (Rehydration Solution for Malnutrition), was specifically designed for severely malnourished children with diarrhoea. The new recommendations call for modification of the standard oral rehydration salts (ORS) to reduce the risk of heart failure in severely malnourished children. (Khan 2001, p.2). ReSoMal contains more potassium and less sodium than in standard ORS. In comparing the development of over-hydration and sodium and potassium status during treatment of severely malnourished children suffering from diarrhoea with either ReSoMaL or WHO-ORS in Bangladesh, Khan revealed similar efficacy of WHO-ORS and ReSoMaL in the rehydration of dehydrated severely malnourished children with diarrhoea. ReSoMaL resulted in better potassium status compared to standard WHO-ORS, however there was a risk of hyponatraemia with ReSoMaL (Khan 2001, p.2).

2.6 Maternal knowledge and practices regarding diarrhoea in children

Given the common occurrence of diarrhoea amongst young children, it is worth considering maternal knowledge and treatment of it. Efforts to better understand mothers' beliefs, attitudes, and health practices have been carried out (Kendal 1988, p.17; Nichter 1991, p.265). Kendal and Nichter revealed that frequently, formal health care is sought only if initial treatment fails. Health care decisions are influenced by several factors including individual, household and community factors. For instance, family members are key to successful implementation of early health care decision making. In particular, mothers are mainly responsible for all the initial decisions and remedial actions for management of childhood diseases. Male spouse decisions are most likely associated with positive health-seeking behaviour, mainly outside the home. Health care decision is also influenced by the household resource base, and availability of funds and drugs at

home at the time of illness Community factors, for example, availability of a clinic in an area may increase the chance of visiting for people living there .Self-medication in an area may be preferred because professional care may not be available, inaccessible, expensive or of poor quality. Socio-cultural factors, such as traditional beliefs, would delay seeking formal care .Patterns of care will, therefore, vary from place to place. (Kendal 1988, p.17; Nichter 1991, p.265).

Regarding diarrhoea, the reported risk factors for an adverse outcome include the following: lack of information to identify complications such as dehydration, limited use of oral rehydration solutions, inadequate maternal health seeking behavior, dietary modifications such as restricting certain food or breastfeeding (Bently1988, p.452).

A pre and post comparative study was carried out in the field practice area of M.S. Ramaiah Medical College Bangalore, India (Mangala, Gopinath, Shivaram 2001, p.901), to assess the impact of educational intervention on the knowledge of mothers of under-five children with diarrhoea who were being managed at home. A sample of 225 mothers was included in the study, which was conducted in 3 stages. Stage I assessed knowledge, attitudes and practices of mothers; Stage II involved an educational intervention, which was supported by audiovisual aids and live demonstration; and stage III included post intervention knowledge, attitudes and practices after 2 months and 2 years following the intervention. There was a significant improvement in the knowledge of mothers regarding the definition of diarrhoea, signs of dehydration, awareness of ORS, correct preparation of ORS shelf-life of ORS, health-seeking behaviour and rational drug therapy during diarrhoea. The McNemar test was used to find out the change in knowledge before and after the educational intervention. The overall knowledge scores improved significantly after 2 months as well as 2 years of the educational intervention. Though the proportion of mothers retaining the knowledge at the end of 2 years dropped, there was a highly significant improvement when compared to the baseline study.

A community based survey was carried out in rural Bangladesh during 1996 with the objective of assessing the skills of mothers in preparing ORS (Ahmed et al. 2000, p.99). A total of 420 mothers whose children had been suffering from acute diarrhoea were

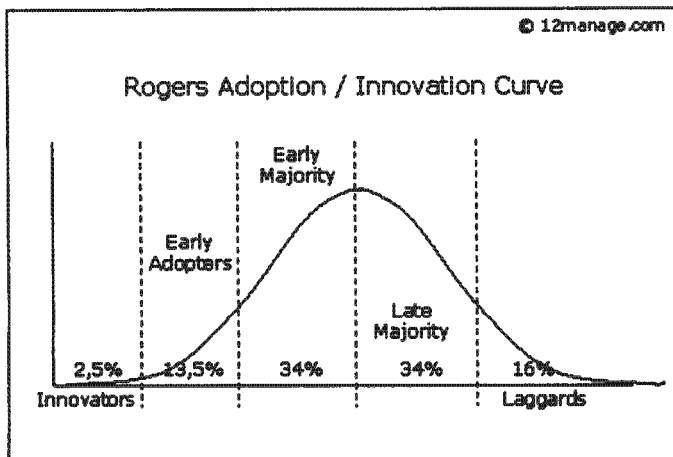
investigated. Of these mothers, 10.2% had never prepared the ORS and were unable to demonstrate the preparation and 56.4% demonstrated the preparation incorrectly

The incorrect preparation was found to be associated with insufficient knowledge and also the refusal of ORS by the children. Previous exposure of the mother to the demonstration of ORS preparation was crucial. Therefore, demonstration of preparation of ORS to the mothers should be built into the health education package of oral rehydration therapy for diarrhoeal diseases.

Knowledge is often considered to be a necessary but not a sufficient condition for behavior change. Shea's review of five major community cardiovascular disease prevention programs highlighted the significance of knowledge transfer and innovation diffusion as the most important link in the causal chain of adoption behavior (Shea & Basch 1990, p.279).

The Diffusion of Innovation Model provides a useful framework for examining the adoption of ORS. In terms of this, Roger's model categorizes individual behavior change into five stages: awareness, interest, persuasion, decision, and adoption (Rogers & Shoemaker 2006). Individuals pass through these stages and adopt new behaviors at different rates. The model classifies these different rates of adoption by dividing the population into five groups: innovators, early adopters, early majority, late majority, and laggards (Rogers & Shoemaker 2006)

When a new behavior is introduced into a population, the cumulative curve follows an S shaped rate of adoption, as more individuals reach the fifth stage and adopt or internalize the new behavior.

Figure I. Integrative model of diffusion of innovation

Rogers & Shoemaker 2006

1. Innovators: Pulling the change
2. Early adopters: Try new ideas or product but in a careful way
3. Early majority: Accept change more quickly than average people do.
4. Late majority: Sceptics who will use new idea only when the majority is using it.
5. Laggards: Traditional people, love to stick to the old ways.

The Diffusion of Innovation Theory is closely linked to the Transtheoretical Model of behavior change. Prochaska and DiClemente have identified five stages of change through which an individual must pass before achieving behavior change pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska & DiClemente 1992) Both Diffusion of Innovation Theory and the Transtheoretical Model are based on the assumption that individuals pass through several stages before successfully achieving behavior change. The difference between these two models is that the Transtheoretical Model restricts the assessment of behavior change to the individual stage, while Diffusion of Innovation describes behavior change in a population. The Transtheoretical Model has traditionally been used to analyze the cessation of addictive behavior from a psychological perspective. However, if the Transtheoretical Model is expanded and viewed from a community/ public health perspective, the two theories appear to have many shared components. A more current health education and health promotion diagnostic framework (PRECEDE/PROCEED) developed by Green and Kreuter (1999, p. 144), addresses these issues and identifies specific factors in the adoption process,

including various predisposing, enabling and reinforcing factors which can help explain why mothers/ caregivers do not translate their knowledge of ORS into two theoretical constructs and potential linkages of stages of behavioral change in the models.

Awareness of ORS is usually high for most respondents in different surveys. In Swaziland, information from different health settings revealed that the majority of mothers have heard about ORS. Although this awareness is relatively high, it is possible that there might be disproportion with the use of ORS. From a study conducted in Pakistan (Donald 2002, p.143) the gap was very large 91% (awareness) against 34.7 % (use of ORS). This was confirmed in the Sudan where awareness about ORS was high (100%) but only 25% prepared and used it correctly (Ahmed et al. 1994, p.716)

In a study conducted among rural Sudanese women, they discovered that diarrhoea was attributed to salty water and teething (Ahmed et al.1994, p.716). The study also revealed that among these mothers, only 40 percent of those interviewed could identify signs and symptoms of dehydration. Furthermore, ORS use was as low as 2.3 percent.

In the course of a study on the acceptability and feasibility of home-based ORS in rural Zimbabwe, diarrhoea was attributed to social and spiritual causes. Diarrhoea was found to be a perceived threat at community and family level and numerous possible causes of diarrhoea were described which were assigned to two broad classes: (1) Physical causes, such as a polluted environment, diet and teething and (2) Social and spiritual causes such as those associated with a depressed fontanel. Reported utilization rates of the formal health services were unexpectedly high. In contrast, there was a low demand for indigenous herbalists. Home management was common and comprised the administration of indigenous herbal remedies, of sugar and salt solutions, of over-the-counter drugs or of enemas. These remedies were given on their own or alongside the treatment prescribed by a health worker (DeZoysa et al.1984, p.727)

Victoria claims that less than one third of children under-five years living in Africa get ORS and continued feeding when they experience episodes of diarrhoea (Victoria et al. 2000, p.1246).

Since mothers tend not to use ORS, it is important to elicit how they respond to their child's diarrhoea. A survey conducted in Tlaxcala (Mexico), aimed at assessing how mothers take care of their children with diarrhoea, revealed that fluids (ORS, SSS, Herbal teas, rice beverage, milk, water) to prevent dehydration were commonly used (92.2%) although the main treatment consisted of herbal teas (52.3%) and symptomatic drugs. Of concern was the fact that a high proportion of mothers withdrew feeding, including breast milk, when their children developed diarrhoea. Changes in the feeding patterns consisted of suppression of milk and interruption of breast milk (Perez-Cuevas et al.1996, p.260). This practice was also common in Indonesia, where in a study among mothers of children admitted to health facilities it was found that over 65 percent of mothers stopped feeding their children when they developed diarrhoea (Muninjaya et al. 1991, p.200).

The health consequences of frequent or persistent diarrhoea can be severe, including malnutrition and impaired growth and development (Chen and Scrimshaw, 1983). Moreover, diarrhoea can be viewed as both a cause and an effect of malnutrition since it can be difficult to determine whether diarrhoea precedes malnutrition or vice-versa in individual cases (Walker-Smith 1993, p. 13). Failure to provide food and fluid is an extremely dangerous practice because it accelerates dehydration and denies the child essential nutrients.

Despite the widespread availability of ORS, many mothers continue to use alternative therapies to treat childhood diarrhoea or they use ORS incorrectly (Hudelson1993, p.97). Many factors contribute to the failure of some populations to adopt ORS, but one of the most important is a scarcity of social support for the behavior. Cultural beliefs and practices may encourage the use of traditional therapies, and disagreement among health care providers about which treatment is best may further impede the adoption of oral rehydration therapy in some societies. The inappropriate use of antibiotics to treat diarrhoea has become common place in many developing countries because doctors

continue to prescribe them unnecessarily as many women believe this is the only appropriate treatment for illness (Hudelson1993, p.97). Modern pharmaceuticals are readily available without a prescription in many developing countries. A study in the Philippines demonstrated that most childhood illnesses were treated without the advice of a physician, yet half of these treatments involved the use of pharmaceuticals (Hardon1987, p.277). Another study in India stated that, even when physicians were consulted, prescription practices were inappropriate and sometimes dangerous (Greenhalgh1987, p.307). Paredes et al. (1996, p1141) identified physician prescribing practices for Peruvian mothers who brought their children to the health center for diarrhoeal management. Most physicians reported that family members usually expect to receive a prescription when they visit a physician. If a prescription is not given, the physician would be considered to lack experience or to know nothing about treating diarrhoea. Furthermore, mothers who reported receiving only ORS left the consultation often unhappy or frustrated. They reported that this was because they did not receive a prescription but only ORS. With regard to maternal knowledge and practice in case of diarrhoea in children, continuous health education should be emphasized at different levels of the society.

2.7. Factors influencing the treatment of diarrhoea

Several studies inform our understanding of the factors that have a bearing on the management of diarrhoea in children. Choice about treatment for children are constrained or facilitated by factors such as access to health services, family income and family social ties which provide information, advice and support (Andersen1995, p.10; Rosenstock 1966, p.94; Mullen, Hersey, Iverson 1987, p .973).

Access to appropriate health care is limited particularly in the rural parts of Manzini. Only 55% of Swazis have access to health facilities (World vision 2002). Access to health providers, health promoters, traditional healers, also varies among communities. Thus home treatment of childhood illness, with commercial or home-made remedies, is very common.

In many communities, the quality of care and availability of medical supplies is often poor. Private clinics are available in some communities, but are generally expensive. As a result in rural areas where there is inadequate service delivery, families rely on traditional healers or Tinyanga who are part of the Swazi heritage. Around 80% of Swazi people consult traditional healers who are herbalists, especially in remote areas, far from health facilities, where they provide medical assistance (Swaziland Press statements, 2004).

Pharmacists are important sources of advice and treatment as well. Pharmacists regularly see clients who may have an undiagnosed illness. Generally they provide medicines for minor illnesses especially ailments for which medical prescriptions are not needed. (Swaziland Press statements, 2004)

Family income can be a serious constraint to seeking health care. Poor families are less likely to be able to pay fees or to purchase treatments prescribed. They are also less likely to have access to transport that allows them to take a sick child to a health facility. Regarding diarrhoea in children, from a survey of knowledge, attitudes and practices of mothers in rural Angola, it was found that ORS or other medical treatment was not commonly used, largely because of high cost (Save the children 1998, p17). The United Nations defines the poverty as the denial of choices and opportunities for a tolerable life, a lack of access to options and entitlements which are social, cultural, political and environmental as well as economic (UNDP 2002).

Even though Swaziland has been consistently categorized as a middle income country, poverty still remains very much a part of life of many Swazi people as 69% of the population is living under the food poverty line of R128.00 (US\$ 22) per month. Poverty indices show that women are the worst affected in Swaziland and as such, female-headed homes account for the highest number of poverty stricken families. (UNDP 2002) The proportion of households receiving incomes below the poverty line increased from 62% in 1985 to 66% in 1995. The National unemployment level is 40 %. In Manzini region, 63% of female are below 25 years (UNDP 2002)

Social ties with others can expand treatment options, in at least three ways: (a) as potential sources of information about health, treatment of illness, and health care providers; (b) as a means to influence others, such as health care providers; and (c) as potential sources of material assistance such as cash and transportation.

In Cuanza-Sul, Save the children (1998) found that both mothers and fathers made the decisions to seek care outside the home. The most common person that a mother would seek advice or treatment from was a relative or friend (grandmother of the child and husband were most common). After relatives and friends, the next most common source of treatment and advice was the health post in the local market. For the reasons that are not very well elucidated, few mothers whose child had a danger sign during a recent episode of diarrhoea sought treatment from the government health post (Save the children 1998, p.18).

Other factors which play a role when families make choices about treatment for childhood illness include the characteristics of the illness, their beliefs about health, their previous experience, advice received from family members and neighbours and parental education. (Heuveline & Goldman 2000, p.345)

A number of studies have shown that the perceived severity of an illness is one of the most important determinants of treatment choice (Heuveline & Goldman, 2000, p.345; Weller, Ruebush, Klein 1997, p.224; Yoder & Hornik 1996 p.429). When an illness is perceived to be more severe, families are more likely to seek treatment from other health service providers and, to consult physicians and pharmacists rather than other health providers (Heuveline & Goldman 2000, p.348). Previous research has also shown that the presence of certain symptoms increases the likelihood of treatment by a health service provider. For example, Heuveline and Goldman (2000, p.345) found that children who have fever, and especially fever and gastrointestinal symptoms, are much more likely to be taken for treatment than others. In Mexico, it was found that clinical signs associated with mother's decision to seek medical assistance in case of diarrhoea in children included vomiting, weight loss, fever, blood in the stools (Perez-Cuevas et al. 1996, p.260).

Beliefs about the causes of illness are likely to affect the choices about treatment. For example, families who believe that infection causes diarrhoea may be more likely to seek help from a health service provider (Goldman & Heuveline 2000, p.145).

Non-biomedical beliefs about the causes of childhood illness remain common in Swaziland and in certain cases biomedical and non biomedical beliefs about the causes of childhood illness are mutually exclusive. In rural Swaziland for example, it is not uncommon for adults to believe that diarrhoea can be caused both by germs and by folk explanations, that is the reason they keep on consulting both health service providers and traditional healers. (Edward 2004, p.3)

Previous childrearing experience and experience with the particular child who is ill are also likely to affect choices about treatment. In general, less experienced parents may be less confident in their own ability to treat a sick child with home remedies and may be more likely to take the child to a health service provider or to consult family members. Previous experience with the particular child who is ill is also likely to affect treatment: a child who is generally in poor health may be more likely to be taken for treatment when he or she becomes ill. However, Heuveline and Goldman (2000, p.345) found that children in very good health were significantly more likely to see a health service provider than other children. One reason may be that parents perceive a change from good health to illness as more serious than a chronic state of poor health.

Advice from other household members or from neighbors or friends may play an important role in determining the type of treatment a child receives. For example, a young mother living with her husband and parents-in-law may depend on her in-laws or husband's opinion about appropriate treatment. Advice from others may be especially influential in choices made by inexperienced or young parents (Heuveline & Goldman 2000, p.345)

In terms of level of education, there is a large body of evidence relating to demographic, public health, and anthropological literature suggesting that more educated parents - particularly mothers in poor countries use financial and other resources more effectively

than more poorly educated parents to find effective treatment when children become ill (Caldwell, 1986, p.171; Cleland & Ginnekin, 1988, p.1357; Lindenbaum, 1990, p.425). More educated mothers are hypothesized to have more self-confidence and more control over family resources, and to demand better service from health care providers.

However, Desai and Alva (1998, p.71) question the effects of maternal education on children's health and survival. One problem with many previous analyses is that they do not include household income, which is a constraint to seeking treatment for sick children in poor countries. The reason for this omission is probably due to the difficulty of measuring household income in countries where agricultural subsistence and informal employment are important sources of income. Ahmed found in Sudan that 45% of illiterate mothers stopped breastfeeding and giving food during diarrhoea compared to 30% of literate mothers and the proportion of harmful practices used in caring for children with diarrhoea was significantly higher in illiterate mothers than in literate mothers (Ahmed et al. 1991, p.716)

Swazis who are poor cannot afford an adequate education: Despite improvements in education indicators in Swaziland over the past two decades, education levels attained by the poor are worse than that for the non-poor. It takes an average of 13 years to produce a primary school graduate in what should take 7 years, and repetition and drop-out rates are thought to be higher for the poor than the non-poor. (Swazi World bank 2000, p.5)

Despite a substantial allocation of the public budget to health and education sectors, Swaziland's education and health indicators are worse than expected, and the disparities are greater for the poor, in rural areas, and for women. The under-funding of primary education and health services together with an inefficient allocation wages are implicated in the poor quality of services available to the poor (Swazi World bank 2000, p.4)

Furthermore, education level is strongly related to poverty status; country-wide, over 50 percent of the people who live in households headed by people with no education live in poverty. In contrast, the poverty ratio is halved for people in households whose heads have obtained some secondary education. This suggests that higher incomes are related to

more education and that ensuring affordability of primary and secondary education for the poor is thus an investment with high returns for society and the household (Swazi World Bank 2000, p.4).

From our literature review, it appears that worldwide, the mortality due to diarrhoea has drastically declined over the years due to the revolutionary invention of ORS. Ever since, The WHO has implemented strategies through different programs, specifically CDD (Diarrhoea Control Diseases Programs) all over the world and public health education campaigns have been launched at different levels of the communities as to combat diarrhoea diseases but still mortality and morbidity rates due to diarrhoea diseases are increasing specially in developing countries. This seems to be linked to some socio-economic and demographic factors.

Two decades ago diarrhoea was responsible for around 5 million deaths annually. Through major public health efforts primarily aimed at preventing and treating dehydration this figure has decreased to around 2 million deaths. Prevention of dehydration is primarily achieved by ensuring that children with diarrhoea are provided with more fluids than usual, and/or increased frequency of breastfeeding, during the acute episode. The combination of increased home fluids and the use of oral rehydration salts (ORS) for the treatment of dehydration have proven to be a very effective intervention in preventing childhood deaths from diarrhea (UNICEF 2006).

As in any other developing countries, the government of Swaziland's major concern is to reduce these high diarrhoeal mortality and morbidity rates in children under five. In this regard, the government established in Manzini district as well as in the three other regions the diarrhoeal disease surveillance system. Information from our health settings shows that the majority of women have some knowledge of oral rehydration therapy. Despite effort furnished by the government and different organizations, the prevalence of diarrhoea remains high. As mothers are primarily responsible for making decisions relating to the care of their children and often for their initial management, further research is needed on this. Hence, the question being posed in this study is, "How do

Swazi mothers respond when their children develop diarrhoea and what factors may underlie such responses?"

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CHAPTER 3: AIM AND OBJECTIVES OF THE STUDY

3.1 Aim of the study

The aim of this study was to determine how Swazi mothers initially respond when their children develop diarrhoea and the factors that could influence their response.

3.2 Objectives of the study

The objectives of the study included the following:

- To assess maternal/ caregiver's knowledge of diarrhoea
- To assess how mothers of children with diarrhoea manage them at home before seeking medical assistance
- To determine the factors that influence how mothers/ caregivers manage their children with diarrhoea
- To make recommendations on how mothers can improve the home management of diarrhoea

CHAPTER 4: METHODOLOGY

4.1. Definition of terms

Diarrhoea:

The presence of three or more loose or watery stools in 24 hours.

Acute diarrhoea:

The passage of abnormally loose or fluid stools more frequently than normal for < 14 days. In this definition, "normal" is dependent on the parent's perception of stools passed. Here the level of three or more loose stools recommended by WHO applies management of diarrhoea

Persistent diarrhoea:

The diarrhoea started acutely but the passage of loose stools persists for 14 days or more. The infant who presents with persistent diarrhoea generally requires hydration support.

Chronic diarrhoea:

Chronic diarrhoea differs from persistent diarrhoea in the sense that the diarrhoea continues for more than 14 days but it does not require hydration support.

Sugar Salt Solution (SSS):

The mixture of salt and glucose dissolved in water.

Oral Rehydration Solution (ORS):

The mixture of salt, glucose, potassium and a base (either bicarbonate or citrate) dissolved in water, which corrects dehydration and acidosis.

Oral Rehydration Therapy (ORT):

A balanced mixture of glucose and electrolytes for use in treating and preventing dehydration, potassium depletion, and base deficit due to diarrhoea.

Primary caregiver:

The mother or person who takes primary responsibility for the care of the child at home and when sick.

4.2. Study design

This was a cross-sectional study of mothers attending the maternal and child health (MCH) clinic at Raleigh Fitkin Memorial (RFM) Hospital and Mankayane Hospital in the Manzini Region of Swaziland.

4.3. Study population

The study population included mothers and their children with diarrhoea who were recruited between February and April 2004 at the two hospitals. The inclusion and exclusion criteria for the study sample were as follows:

Inclusion criteria

- Mothers of children with diarrhoea who were under 5 years of age and attending immunization services at MCH clinics at RFM and Mankayane Hospitals over a period of three months
- Children with history of diarrhoea in the past month

Exclusion criteria

- Children above 5 years.
- Very sick children requiring hospitalization
- Children with chronic or persistent diarrhoea

4.4. Sampling

According to RFM Hospital 2002 report, the average number of mothers attending MCH clinic with sick children is 600 per month. Among them an estimated 40% of children present with diarrhoea. The immunization service is offered Monday to Friday from 8 am to 5 pm in both hospitals. The average attendance of immunization services is 450 per month at RFM Hospital and 380 at Mankayane Hospital. Mothers who attended immunization services at MCH clinics and who had children with history of diarrhoea in the last month were given identification numbers ranging from one to twenty or thirty depending on the attendance for that day. Only those who received odd numbers starting from one then three, five and so on and whose children fulfilled the inclusion criteria

were considered for an interview. Mothers were assessed and selected for an interview consecutively until an average of ten mothers was reached each day.

To estimate the sample size, we made the following assumption based mainly on the experience of doctors working at the MCH clinics of RFM and Mankayane Hospitals: the maximum expected prevalence or proportion of mothers who have adequate knowledge on home management of diarrhoea was estimated to be 50%. The following formula was used in calculating the sample size needed for the study (Vaughan & Morrow 1989, p. 178) was used:

$$n = pq / (E/1.96)^2$$

Where n is the minimum sample size required

p is the maximum expected prevalence rate (in percentage).

$$q = 100 - p$$

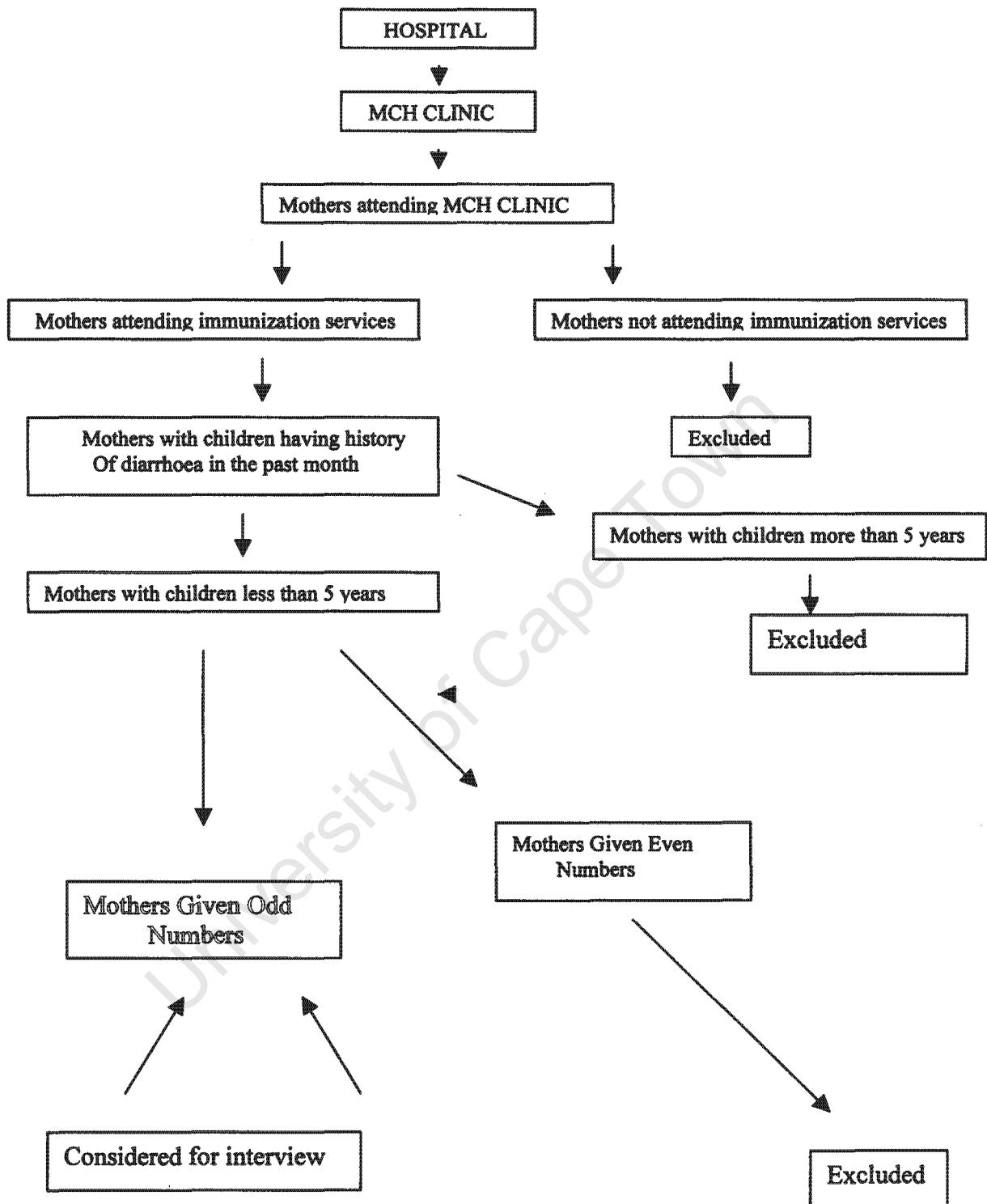
E is the margin of sampling error tolerated (in percentage)

Since p = 50% and we fixed E at 5% the minimum sample required was found to be:

$$n = (50 \times 50) / (5/1.96)^2 = 384.16$$

The required sample size of 385 was needed at RFM and Mankayane Hospitals within 3 months.

Figure II. Inclusion criteria for interview



4.5. Data collection

A questionnaire was developed following a review of the literature on home management of diarrhoea and factors influencing home treatment. Some questions were used to validate answers to questions previously asked. The questions were formulated in a simple way both in English and siSwati (local language) to avoid inappropriate answers. This was a mix questionnaire with closed and open-ended questions. Interviews were conducted by the researcher and three non medical professionals trained by the researcher during five sessions of two hours each. A pilot group of twenty mothers were interviewed at RFM Hospital and Mankayane Hospital (ten in each of them). The questionnaire was slightly altered after the pilot phase based on the difficulties of getting reliable answers to some questions and the ambiguity of other questions. Interviewers were trained to follow instructions on the questionnaire strictly, and to add extra explanation or guidance when it was clear that the respondent does not understand a question.

Interviewer variability was assessed mainly during the pilot phase where two interviewers administered the questionnaire to the same client, and the questionnaire was corrected to reduce the variability related to the way the questions were phrased, and the decision of having a pair of interviewers was adopted. The interviewers worked in pairs and reviewed the form at the end of each interview for consistency between the answer given and those recorded.

4.6. Variables that were measured

4.6.1 Maternal/ caregiver's knowledge of diarrhoea

Maternal knowledge was explored by asking questions on:

Definition of diarrhoea: Diarrhoea was well defined if the mother mentioned “three or more watery stools per 24 hours”

Causes of diarrhoea: open-ended questions depending on mother's knowledge on “the causes of diarrhoea”

How to recognize “Dehydration in children in case of diarrhoea”: If mothers or caregivers could recognize among “weakness, thirst, sunken eyes and fontanel, dry mucous membranes as signs of dehydration

How to prevent diarrhoea: This included breastfeeding, giving freshly prepared food or clean water and hygienic measures used to prevent diarrhoea

How to make "home made solution": Positive response meant, the mother or caregiver mentioned one litter of boiled water (coca cola bottle), eight level teaspoons of sugar and half a teaspoon of salt

4.6.2. Home management of diarrhoea

How mothers/ caregivers manage their children with diarrhoea before seeking medical assistance

Treatment given to the child at home: Remedies that the mother or caregiver administered to the child at home while dealing with diarrhoea.

Reasons for the preferred treatment: This referred to the choice of the mother or caregiver on a specific treatment given to the child in case of diarrhoea

Changes in the feeding practice during and after diarrhoea has stopped: Attitude of mother or caregiver regarding food or milk while managing a child with diarrhoea.

Proportion of mothers who sought treatment from health facilities or traditional healers or others: Implies the proportion of mothers or caregivers who sought assistance either from health facilities, traditional healers, relatives or others.

Reasons for seeking assistance: What motivated the mother or caregiver to seek help

Type and quality of assistance received: The description and the value of assistance received

4.6.3. Factors that influence how mothers/ caregivers manage their children with diarrhoea

Socio-demographic characteristics of the mothers/ caregivers and children

4.6.3.1 Mothers/caregivers:

Age:

Age (in years) of mother/ caregiver was determined from the date of birth. In the event that age/ date of birth were not known, the age was estimated according to great national events.

Marital status:

This included whether the mother/ caregiver was single, married, divorced, widowed or married by tradition or by law. Those who lived together on a mutual arrangement were also considered as married.

Family status:

This included whether the mother/caregiver was living with husband or not, living with extended family or not, living with both husband and extended family or not. The number of people living in the house was also explored.

Level of Education:

Participants were categorized as: having never been in school or as having received primary, secondary (high school or three years post primary school) or tertiary education.

Location:

-Urban: for participants living in Manzini city (town) or around.

-Semi urban: for participants living in areas or suburbs between Manzini city and rural areas.

-Rural: for participants living in villages (country district)

Area of residence: Official habitation (house) or address of the participants

Type of housing: Stick and mud, brick or other

Type of water source: Tap, pool, river or other

Access to water source (distance): Estimated in time spent to reach water source

Type of latrine: Pit, trench, bush or modern latrine.

Parity: Number of biological children the participant had in her life based on her obstetric history.

Race: Physical differences based on the participants' color of skin. This was categorized as black, white or colored

Primary caregiver: The mother or person who takes primary responsibility for the care of the child at home and when sick.

Access to health facility: Distance to the clinic or hospital, estimated in time spent to reach the clinic in minutes.

Employment status: This referred to employment status of the mother/ caregiver, which was as follows, employed in any job, self employed, unemployed (without job). Unemployed mother married to an employed person was not considered as employed

The source of income if unemployed.

Monthly household income: Estimated according to salary scales in use in the country. The civil servant scale was used to range the participants.

4.6.3.2 Children

Age: Expressed in months

Gender: Male or female

Birth order: Birth position in relation to one another

Immunization status: The immunization status was considered up to date if the child received all the vaccinations required for the age and not up to date if the child did not receive all the vaccinations required for the age.

4.7. Data analysis

Data were analyzed using EPI INFO version 6. A descriptive analysis of maternal characteristics was done first. This description focused on the age, marital and family status, level of education, number of people living in the house, location, parity, race and primary caregiver. A descriptive analysis of children's characteristics was also performed on the following: age, gender, birth order, immunization status, feeding practice and age of weaning.

The assessment of how mothers/ caregivers of children with diarrhoea managed them at home before seeking medical assistance was done through a descriptive analysis of the type of treatment given at home and the proportion of mothers/ caregivers knowing how to make sugar salt solution. The assessment of the factors that influenced how mothers

managed their children with diarrhoea was illustrated through the description of places used for assistance and reasons for seeking assistance, maternal knowledge related to diarrhoea, socio-economic and environmental characteristics. All these findings were used as a basis for making recommendations on ways in which mothers could improve the home management of diarrhoea.

Cognizance was taken of the fact that traditional matters were sensitive and that for many years, modern medicine has discouraged "traditional" cures. A negative response may not have meant a real "no". As the study was being done in hospitals, it is possible that participants may have modified their responses to show how knowledgeable they were.

4.8. Ethical considerations:

Ethical approval for the study was obtained from the Research Ethics Committee of the University of Cape Town, the Swaziland National Research Council, the Raleigh Fitkin Memorial Hospital Research Committee and the Mankayane Hospital Research Committee. Written consent was sought from mothers participating in the survey.

4.9. Reporting of results

The data from this study on home management of diarrhoea in Manzini district was presented, discussed to the University of Cape town and the recommendations were made based on the findings. Findings were also presented at the Raleigh Fitkin Memorial Hospital (District hospital) and Mankayane hospital doctors' meetings. Findings were shared with the Control of Diarrhoea Disease Program of Swaziland.

CHAPTER 5: RESULTS

5.1 Socio-demographic and health characteristics of study participants

5.1.1 Socio-demographic characteristics of mothers/ caregivers

The sample included 385 mothers/ caregivers whose children had diarrhoea in the previous month and who were selected for an interview. Ninety-six percent were black and 4% were coloured (Table III). The primary caregiver included the mother (72%), father (11%), domestic worker (9%) and the grandmother (8%). The mean age of the mothers was 25.6 (SD 6.3) years and the mean number of children was 2 (SD 1). Of the mothers, 50.4% were married, 42.9% were single, 4.7% were widowed and 2.1% were divorced. The majority lived with their partners (37.9%) or the extended family (38.2%); 11.2% lived with their partners and the extended family; and 12.7% lived alone. The mean number of people per household was 6 (SD 3). The level of education of the mothers/ caregivers was as follows: 55.3% secondary, 24.4% primary, 15.6% tertiary and 4.7% no education. Area of residence was 11.4% urban, 48.3% peri-urban and 40.3% rural.

Table III. Sociodemographic characteristics of mothers/ caregivers (N=385)

Variable	Number (n=385)	Percentage
<u>Marital status:</u>		
- Married	194	50.4
- Single	165	42.9
- Widowed	18	4.7
- Divorced	8	2.1
<u>Race:</u>		
- Black	371	96.4
- Coloured	14	3.6
<u>Primary caregiver</u>		
- Mother	277	71.9
- Father	42	10.9
- Domestic worker	34	8.8
- Grand mother	32	8.3
<u>Location</u>		
- Peri-urban	186	48.3
- Rural	155	40.3
- Urban	44	11.4
<u>Type of housing</u>		
- Stick and mud house	82	21.3
- Brick house	303	78.7
<u>Employment status</u>		
- Employed	194	50.4
- Non employed	113	29.4
- Self employed	78	20.3
<u>Access to health facilities</u>		
- < 30 Minutes	190	49.4
- 30 Min-1Hour	109	28.4
- > 1 Hour	86	22.3
<u>Access to water source</u>		
- < 30 minutes	169	43.8
- Water source at home	158	41.0
- 30 Min-1Hour	50	12.9
- > 1 Hour	8	2.0
<u>Level of education</u>		
- Secondary	213	55.3
- Primary	94	24.4
- Tertiary	60	15.6
- None	18	4.7

<u>Type of latrine</u>		
- Pit latrine	268	69.6
- Modern latrine	101	26.2
- Bush	14	3.6
- Trench latrine	2	0.5
<u>Type of water source</u>		
- Personal tap	156	40.5
- River	114	29.6
- Community tap	105	27.3
- Pool	10	2.6
<u>Household status</u>		
- Living with extended family	147	38.2
- Living with partner	146	37.9
- Living alone	49	12.7
- Living with extended family and partner	43	11.2
<u>Monthly household income</u>		
R500 – R1000	130	33.8
Less than R500	109	28.3
R1001 – 2000	71	18.4
R2001- 3000	60	15.6
R3001- 5000	13	3.4
Above R5000	2	0.5

5.1.2 Socio-demographic and health status of children

Of the children, 49.7% were under 12 months and 50.3% were above 12 months of age. There were 58.4% males and 41.6% females. The mean age of the children was 17.7 (SD 15.5) months. The mean birth interval was 2.1 (SD 1.4) years. In terms of immunization status, 94.5% were fully immunized and 5.5% were incompletely immunized. The large majority of them (n=280; 72.2%) were on both complementary feeding and milk; 53 children (13.8%) were breastfed, 11 (2.9%) received cow's milk and 41 (10.6%) only received complementary feeding. Of the mothers, 51 (13.2%) were still breastfeeding and 334 (86.8%) had stopped breast feeding. The majority of mothers 262 (68.1%) stopped breastfeeding between 0 to 6 months, only one mother breastfeed for more than 25 months. (Table IV)

Table IV. Socio-demographic and health status of children

Variables	Number	Percentage
Age groups		
- 12-60 months	194	50.3
- 0-6 months	124	32.3
- 7-11 months	67	17.4
Gender		
- Male	225	58.4
- Female	160	41.6
Immunization status		
- Complete	364	94.5
- Incomplete	21	5.5
Feeding practices		
- Complementary feeding and milk	280	72.7
- Breast milk	53	13.8
- Complementary feeding only	41	10.6
- Cows milk	11	2.9
Age of cessation of breastfeeding		
- 0 to 6 months	262	68.1%
- 7 to 12 months	41	10.6%
- 13 to 24 months	30	9.0%
- 25 to 60 months	1	0.3%

5.2. Maternal/ caregiver's knowledge of diarrhoea in children

Diarrhoea was defined as the presence of three or more loose stools per 24 hours. The table V shows that 327 (84.9%) mothers could define diarrhoea. The causes of diarrhoea were mainly attributed to drinking unclean water (n=152; 39.4%), eating contaminated food (n=115; 29.8%) and poor sanitation and hygiene (n=134; 34.8%). A very small proportion (n=18; 4.6%) mentioned that multiple causes contributed to diarrhoea in their child including bottle feeding and the lack of adequate sanitation.

The main signs that that mothers identified with respect to dehydration in their children were weakness (n=298; 77.4%), sunken eyes and fontanel (n=158; 41.0%), thirst (n=67; 17.4%), dry mucous membranes (n=28; 7.3%) and other signs (loss of weight and poor feeding, n=8; 2.1%).

The main ways of preventing diarrhoea were giving freshly prepared food and clean drinking water (n=341; 88.6%), washing hands (n=318; 82.6%) and using latrines (n=124; 32.2%). Practices such as avoiding bottle feeding (n=59; 15.3%), covering the child's food (n=10; 2.6%), keeping the environment clean (n=4; 1.0%), cleaning or sterilizing child's feeding utensils (n=4; 1.0%) were mentioned by some mothers

Table V. Maternal/ caregiver's knowledge of definition of diarrhoea, causes, signs of dehydration and prevention (n=385)

	Number of women	Percentage
Correct definition of diarrhoea	327	84.9
Knowledge of causes of diarrhoea		
Unclean water	152	39.4
Poor sanitation and hygiene	134	34.8
Contaminated food	115	29.8
Unhygienic utensils	58	15.0
Others	18	4.6
Knowledge of Signs of dehydration		
Weakness	298	77.4
Sunken eyes and fontanel	158	41.0
Thirst	67	17.4
Dry mucous membranes	28	7.3
Others(loss of weight, poor feeding)	8	2.1
Knowledge on prevention of diarrhoea		
Give freshly prepared food and clean drinking water	341	88.6
Hand washing	318	82.6
Using latrine	124	32.2
Avoid bottle feeding	59	15.3
Breastfeeding	58	15.1
Covering child's food	10	2.6
Keep environment clean	4	1.0
Clean or sterilize child's feeding utensils	4	1.0

Of the 385 mothers/caregivers who were interviewed, 311 (80.8%) knew how to make sugar salt solution (SSS). Of those who knew how to make SSS, 100 (32.1%) used it to

treat the last episode of diarrhoea. Seventy-four mothers (19.2%) did not know how to make correctly SSS; of these 6 (8.1%) used it to treat the last episode of diarrhoea (Table VI)

Table VI. Mothers'/ caregivers' knowledge and use of sugar salt solution (SSS).

	n	Number	%
Knew how to make SSS	385	311	80.8
Did not know how to make SSS	385	74	19.2
Knew how to make SSS and used it to treat last episode of diarrhoea	311	100	32.1
Did not know how to make SSS and used it to treat last episode	74	6	8.1

5.3. Home management of diarrhoea

As far as change in the feeding patterns were concerned, 49 (12.8%) stopped giving milk to their children, and 72 (18.7%) stopped giving solids. On the other hand, 73 (19%) increased milk and 2 (0.5%) increased solids. Only 3.1% of children were not given any treatment.

5.3.1 Fluids used to prevent dehydration by mothers/caregivers

The table VII shows that 360 mothers/caregivers (94.0%) used fluids to prevent dehydration out of 385 participants. Percentages in table VII are based on the sub-sample of 360 subjects. Twenty-five mothers/caregivers (6.0%) did not use fluids. Out of these 25 participants who did not use fluids, 13 children received some medications, mainly antacids and acetaminophen. Twelve did not receive any treatment. ORS was the main fluids used to prevent dehydration 232 (64.4%) followed by SSS 106 (29.4). Other fluids used included tea (n=2; 0.6%), water (n=9; 2.5%), rice beverage (n=5; 1, 4%) and milk (n=4; 1.1%) and other herbs or home remedies thought to stop diarrhoea (n=2; 0%).

Table VII. Fluids used to prevent dehydration

Type	Number (n = 360)	Percentage
ORS	232	64.4
SSS	106	29.4
Water	9	2.5
Rice beverage	5	1.4
Milk	4	1.1
Tea	2	0.6
Others (e.g. herbs)	2	0.6

5.3.2 Change of Feeding pattern

As far as change in the feeding patterns was concerned, 196 mothers/caregivers (51%) changed the feeding pattern out of 385 participants while 189 mothers/caregivers (49%) did not. It should be noted that percentages in table VII are calculated for a subgroup (196 subjects) of our sample. Forty-nine (25%) stopped giving milk to their children, and 72 (36.7%) stopped giving solids. On the other hand, 73 (37.2%) increased milk and 2 (1%) increased solids as shown in table VIII.

Table VIII. Change of feeding pattern

Type	Number(n=196)	Percentage (%)
Increase breast milk	73	37.2
Withholding solids	72	36.7
Withholding other milk	43	21.9
Withholding breast milk	6	3.1
Increase in solids	2	1.0

5.3.3 Reasons why mothers/ caregivers preferred a specified treatment

The tables IX.a and IX.b gives reasons why mothers/ caregivers preferred a specific treatment. Most of them (n=192; 49%) said that it restored strength. Some (N=130; 33%) were of the opinion that the treatment given stopped diarrhoea and restored strength as well. Twenty-two (5.7%) thought that it stopped diarrhoea. Others said that it was needed

for rehydration (n=25; 6.5%), while others (n=4; .1.0%) believed that it was conventional or that the child could tolerate it.

Table IXa. Reasons why mothers preferred the specified fluids

Reasons	Number (n = 372)	Percentage
Restore strength	192	51.6
Stop diarrhoea and restore strength	130	35.0
For rehydration	25	6.7
Stop the diarrhoea	22	5.9
Other (Conventional, child can tolerate it)	3	0.8

Table IXb. Reasons why mothers preferred the specified drugs

Reasons	Number (n = 13)	Percentage
Stops diarrhoea	8	61.5
Restores strength	3	23.1
Other (Conventional, child can tolerate it)	2	15.4

5.3.4 Medical and other assistance sought

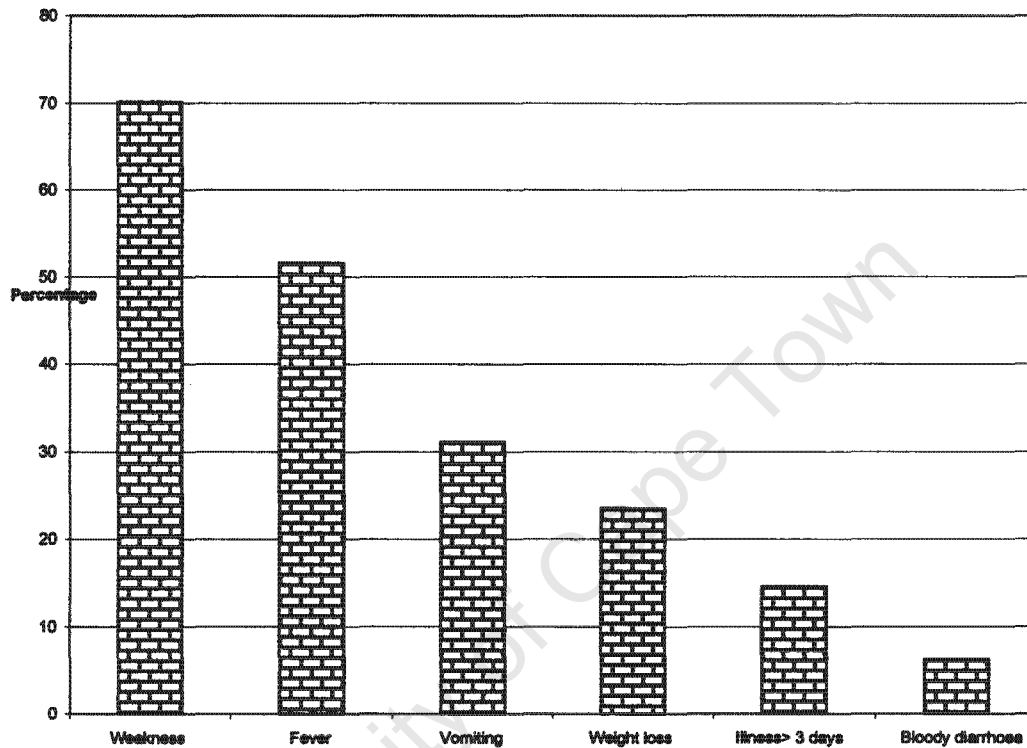
Of the mothers interviewed, 302 (78.5%) sought medical or other assistance in the management of their child, while 83 (22.5%) did not seek assistance because the condition of the child improved during home management. Of the mothers who sought assistance, 289 (95.7%) consulted a health worker at a health facility, 4(1.3%) consulted both a traditional healer and a health worker at a health facility and 7 (2.3%) obtained assistance from relatives (Table X)

Table X. Medical and other assistance sought by mothers/ caregivers

Place	Number	Percentage
Health worker at a health facility	289	95.7%
Health worker and traditional healer	4	1.3%
Relatives	7	2.3%
Other (pharmacy and health motivator)	2	0.7%
Total	302	100%

The main reasons for seeking medical assistance are outlined in Figure III. These included weakness (70.2%), fever (51.6%), vomiting (31.1%), weight loss (23.5%), illness longer than three days (15.6%) and bloody diarrhoea (6.9%).

Figure III. Reasons for seeking assistance



The assistance received at health facilities was satisfactory for 88.2% of mothers (n=289) and unsatisfactory for 11.8%. The assistance received at other places (relatives, traditional healers and other) was satisfactory at 100% (n= 4, 7 and 2). The assistance was regarded as satisfactory because the child got better (n=262; 86.8%) or because the diarrhoea stopped (n=6; 2.0%). The assistance was unsatisfactory because of slow recovery (n=33; 10%) or no improvement (n=1; 0.3%).

5.3.5 Summary of quality of home management of diarrhoea

Table XI shows that of the mothers/ caregivers, 93.5% gave more fluid to their children to prevent dehydration, 97.7% took their child to a health facility when there was no improvement or deterioration in the child's condition. However, only 38.2% of mothers/ caregivers gave additional food to their child to prevent malnutrition when the diarrhoea had subsided.

Table XI. Summary of quality of home management of diarrhoea

	Yes (%)	No (%)	Total (%)
More fluid given to child to prevent dehydration	360 (93.5%)	25 (6.4%)	385 (100.0%)
More food given to child to prevent malnutrition	75 (38.2%)	121 (62.8%)	196 (100.0%)
Child taken to health care worker when condition deteriorates	295 (97.7%)	7 (2.3%)	302 (100.0%)

5.4. Factors that influence how mothers/ caregivers manage their children with diarrhoea

It was noted in our descriptive statistics that lack of appropriate feeding practice when the child had diarrhoea was mother's major problem (table VIII). The vast majority of mothers gave fluids and sought assistance when their children had diarrhoea. Table XII shows the results of the analysis of the association between appropriate feeding practice and some maternal characteristics. A statistically significant association was obtained with one maternal characteristic. Mothers who lived in brick houses were more likely to have appropriate feeding practice than those who lived in stick and mud houses ($P=0.03$). There was a marginally significant association between appropriate feeding practices and the age of the mother ($P=0.05$), employment ($p=0.05$) and parity ($p=0.06$). There was no statistical significant association between appropriate feeding practice and other maternal characteristics.

Table XII. Variables related to appropriate feeding practices in mothers/ caregivers

Variables	Number (percentage)		Chi square (X ²)	P value (=)
	Yes	No		
Urban and peri-urban	48 (12)	182 (47)	0.70	0.40
rural	27 (7)	128 (34)		
2 nd and 3 rd education	57 (15)	216 (56)	1.17	0.27
Primary and no education	18 (5)	94 (24)		
Parity (3 to 8)	19 (5)	114 (30)	3.50	0.06
Parity (1 to 2)	56 (14)	196 (51)		
Mother aged 20 or more	58 (15)	268 (85)	3.87	0.05
Mother aged less than 20	17 (4)	42 (96)		
Employed (any form)	46 (12)	226 (59)	3.90	0.05
Unemployed	29 (7)	84 (22)		
Stick and mud house	9 (2)	73 (19)	4.80	0.03
Brick house	66 (17)	237 (62)		
Water source at home	32 (8)	126 (33)	0.10	0.75
Water source not at home	43 (11)	184 (48)		
Personal tap	32 (8)	124 (32)	0.18	0.67
Not having personal tap	43 (11)	186 (48)		
Modern latrine	17 (4)	84 (22)	0.61	0.43
Not having modern latrine	58 (15)	226 (59)		
Less than 30mn away from the health facility	32 (8)	158 (41)	1.66	0.20
More than 30mn away from the health facility	43 (11)	152 (39)		
Income less than R500	20 (5)	89 (23)	0.12	0.724
Income of R500 or more	55 (14)	221 (57)		

Table XIII shows the results of the analysis of the association between appropriate feeding practice and some characteristics of the children. A statistically significant association was obtained with two characteristics in the children:

- Mothers seemed to have appropriate feeding practice in children up to 11 months of age (P= 0.001)
- Mothers who stopped breastfeeding between zero to 6 months were more likely to have appropriate feeding practice than those who stopped after 6 months.(P=0.049)

There was no statistical significant association between appropriate feeding practice and other child variables.

Table XIII. Child variables related to appropriate feeding practices

Variables	Number (percentage)		Chi square (X ²)	P value
	Good	Poor		
Male	42 (11)	183 (47)	0.23	0.63
Female	33 (9)	127 (33)		
Complete immunization	73 (19)	291 (76)	0.81	0.367
Incomplete immunization	2 (0)	19 (5)		
0 to 11 months	53 (14)	138 (36)	16.52	
12 to 60 months	22 (6)	172 (44)		
Fed with breast milk	6 (2)	47 (12)	2.61	0.106
Fed with other food and milk	69 (18)	263 (68)		
Stop breastfeeding at 0 to 6 months	65 (19)	197 (59)	3.87	
Stop breastfeeding at 7 to 60 months	10 (3)	62 (19)		

CHAPTER 6: DISCUSSION

To understand the social context of diarrhoeal disease, different studies carried out worldwide have followed different approaches. Descriptive and analytical studies examining fluid intake, changes in feeding patterns and household treatment have shown a great diversity in maternal practices.

6.1 Socio-demographic and health characteristics of study participants.

A considerable body of research suggests that maternal education is the most important factor in explaining differentials in child health outcomes; it is regarded as being more important than paternal education, health service availability, and socio-demographic status. Comparative studies in developing countries reveal a relationship between education and childhood mortality (Bicego & Ahmad, 1996, p.1207). However, more recent research calls into question the causal association between maternal education and child health outcomes (Desai & Alva, 1998, p.71) In particular, Desai and Alva concluded that maternal education is a proxy for socioeconomic status and geographic area of residence, with a reduced effect of maternal education when controlling for these factors. Thus, there is continued debate regarding the influence of maternal education on child health outcomes and additional research is needed to understand how maternal education impacts on child health (Barrett & Brown, 1996, p.1579; Desai & Alva 1998, p.71). Mason (1984) hypothesized various pathways linking maternal education and infant and child mortality. These included contraceptive use, female autonomy, and family socioeconomic status. LeVine (1994) linked female schooling to fertility and child survival through the acquisition of skills related to health, socioeconomic aspirations, and interpersonal behaviors. Based on both qualitative and quantitative research in Mexico, they found some empirical evidence to support these pathways (LeVine 1994, p.303). More recently, Glewwe (1999) connected parental schooling to child health through parental values, parental cognitive skills (literacy and numeracy), parental health knowledge, and household income. Thus, maternal education appears to influence child health outcomes both at the community level and at the individual level. Communities with higher proportions of more educated women are likely to provide better sanitation

and medical services and shared health knowledge within the community (Desai & Alva, 1998, p.71). At the individual level, potential pathways linking maternal education and child health include: (1) improved socioeconomic status (2) health knowledge (3) modern attitudes towards health care (4) female autonomy and (5) reproductive behaviors.

Maternal education has a clear connection with income as women with an earning capacity are more likely to supplement the family income (Barrett & Browne 1996, p.1579). Furthermore, educated women are more likely to marry husbands with greater educational attainment and higher paying jobs (Barrett & Browne 1996, p.1581). Higher levels of income are correlated with better housing conditions with latrine facilities, piped water and electricity; the results are lower contaminant levels than households without such amenities (Barrett & Browne 1996, p.1581; Defo 1997, p.1023). Additionally, more money can be spent on food, clothing, medicine, and health care services that can directly impact on children's health (Barrett & Browne 1996, p.1581). Socio-economic status is thought to be one of the most important pathways linking maternal education and child health status.

Education facilitates mothers' learning about the causation, recognition, prevention and management of disease; children's nutritional requirements (Defo, 1997, p. 1023); and an understanding of health messages promoted through the media (Cleland, 1990). Studies linking formal education, health knowledge and child health outcomes are limited and the relationship between knowledge and health behavior is inconclusive. Some research has shown that higher levels of education are associated with specific types of health knowledge, such as the dangers of not boiling water, the importance of hand washing after latrine use, the proper use of oral rehydration therapy to treat diarrhea, and an understanding of causes of disease (Bicego & Boerma 1993, p.1220). However, knowledge of these factors has not always been a consistent predictor of health outcomes (Glewwe 1999, p.124; Cleland 1990, p.400).

In addition to basic health knowledge, education can also influence attitudes about health behavior by producing a shift from traditional beliefs and practices to an acceptance of

the explanations of disease based on modern medicine (Barrett & Browne, 1996; Defo, 1997). This may result in a greater willingness on the part of mothers to utilize preventive health services (Bicego & Ahmad 1996, p.1207) and to seek modern health care (Addai 2000, p.2; Desai & Alva 1998, p.71).

Maternal education could influence child health outcomes by increasing the decision-making power of women within the family. Mothers are usually primary care givers and the first to recognize that a child is ill (Caldwell 1993, p.125). However, in many traditional cultures uneducated women often do not act until other authority figures notice the child's illness (Caldwell 2003, p.125). Increased maternal education could change the traditional balance of power in families so that mothers have greater authority in making decisions about the health of their children (Caldwell 1993, p.125). This is supported by a study where an increase in the mother's control over family income was associated with improved nutritional status of female infants (Saraswathi 1992, p.73). Also the survival of children has been positively associated with (Jejeebhoy 1995, p.82) maternal education and maternal decision-making autonomy.

Reproductive factors provide another pathway between education and child health and previous studies have attempted to link maternal education and reproductive behaviors to child survival (Le Vine 1994, p.303). With higher levels of education, women are prone to view reproduction as being under their direct control with respect to the timing of births and prevention of unplanned pregnancies. Previous research has found a connection between higher maternal education and lower fertility, reproduction at low-risk ages, and longer birth intervals. These factors could be associated with increased child survival (Tagoe-Darko 1995, p.25). The overall support for reproductive factors as a pathway linking maternal education and child health is mixed. Cleland (1990) argued that the effect of maternal education on childhood mortality has little to do with changing reproductive behavior, while it is countered that there are links between maternal education, changes in reproductive behaviour and child survival (Mason, 1984).

In this study the socio-demographic status of the majority of mothers (71%) included secondary and tertiary education and the expectation is that their socio-economic status would be better than mothers with no or poor education. However, most mothers lived in crowded households where sanitation and access to piped water were inadequate. Half the mothers/caregivers were employed but had a low household income and access to health services was relatively difficult. The poor socio-economic status of these mothers may partly be explained by the fact that only half of them were married and living with their partners

In this study the majority of the children were under-two years of age with almost half of them below a year. The high rate of diarrhoea in this age group of children is in keeping with the environmental conditions under which they lived. Previous reports, show that the risk of diarrhoea is particularly high in children of this age group when there is limited access to an inside tap, inadequate sanitation and a low household income (Kibel & Wagstaff 2001, p. 334). Contributing to the risk of diarrhoea in this population of children was the early cessation of breastfeeding (before 6 months) by 68% of the mothers in the study.

6.2 Maternal/ caregiver's knowledge of diarrhoea in children

Most mothers/ caregivers could define diarrhoea. In terms of the causes of diarrhoea infectious agents were not mentioned but several factors were implicated such as unclean food, contaminated water as well as poor sanitation and hygiene. These findings are similar to a study undertaken in the Sudan of rural children with diarrhoea. The study showed that mothers could define and describe diarrhoea but had limited knowledge of the underlying causes. In that study, the majority of mothers attributed diarrhoea to teething, drinking milk from pregnant women, eating hot food and drinking salty water (Ahmed 1994, p.716). From this it can be deduced that in developing communities the causes of diarrhoea are not well understood by mothers/ caregivers, which could impact on the prevention and management of the disease.

In our study, the main signs that mothers identified with respect to dehydration in their children were weakness and sunken eyes and fontanelles. Other clinical signs of dehydration such as thirst, dry mucous membranes and loss of weight were not known. Similarly in Sudanese mothers, less than 40% identified symptoms and signs of dehydration. Only 10% could relate danger signs such as the inability to drink to severe dehydration in their child (Ahmed 1994, p.716). In Mexico, signs of dehydration were not recognized by mothers and did not lead to them seeking health care for their children (Perez-Cuevas et al 1996, p.262).

In the present study the main ways of preventing diarrhoea were related to improved hygiene such as giving freshly prepared food and clean drinking water and hand washing. Only a third of mothers thought that diarrhoea could be prevented through improved sanitation. Other aspects like avoiding bottle feeding, breastfeeding, covering the child's food, keeping the environment clean, cleaning or sterilizing feeding utensils were not well recognized by mothers. These findings are corroborated by a community-based qualitative study done in Angola that investigated the possible health status differences among settled and recently resettled populations where the transmission of diarrhoea was not understood resulting in inadequate disposal of faeces, lack of protection of water from contamination and poor hand washing practices. Only two of the six communities had drinking water sources protected from faecal contamination. Nevertheless, every community had the potential to have safe water, by virtue of their proximity to at least one natural spring. Instead most stored their water in clay jars and plastic buckets, which were easily contaminated. None of the communities used latrines and a minority of mothers disposed of their child's faeces safely. It was also not common for people to wash their hands after defecating or handling a child's faeces (Save the children 1998, p.16). This could point to a lack of awareness among mothers/ caregivers and communities living in these settings concerning the transmission of diarrhoea and simple measures that can be taken to prevent the disease in their children.

Research conducted in developed and developing countries provides strong evidence that prolonged breastfeeding decreases the incidence and severity of a wide range of infectious diseases in children including diarrhoea, respiratory tract infection, necrotizing

enterocolitis, otitis media, urinary tract infection, bacterial meningitis and bacteremia (American Academy of Pediatrics 2005, p.496). Breastfeeding is essential in ensuring the health and survival of children. Studies show that breastfed babies are at a lower risk of diarrhoea than formula fed babies (Ghosh 1992, p.53). Early cessation of breastfeeding increases the risk of diarrhoea and according to Wright (2004, p.813) babies who were weaned before three months compared to those who were weaned later had an increased risk of diarrhoea. In terms of the risk of mortality in infants who were weaned early, in rural Senegal, Binta using data on 12 208 infants showed that the main reasons for early cessation of breastfeeding were maternal death and a new pregnancy (in 41% and 27% of cases, respectively). Of the infants who were weaned early, 26% died before the age of 2 years, particularly those weaned as a result of the mother's death (Binta, Kirsten, Simondon 2006, p.139). In this study the majority of mothers (68%) stopped breastfeeding before their infants were 6 months old and only one mother breastfed for more than 25 months. This is in contrast to mothers in Angola and living under similar conditions where infants were breastfed until the end of the first year of life and in some cases until they were two years of age (Save the children 1998, p.16). The early cessation of breastfeeding among babies in this study probably results from the increasing prevalence of HIV/AIDS infection, which increased from 38.6% in 2002 to 42.6% in 2004 (Kaiser daily HIV/AIDS report 2005). This constitutes one of the main reasons for the early cessation of breastfeeding in preventing maternal-to-child transmission.

In this study most mothers (80%) knew how to prepare sugar salt solution (SSS). This is compared to other studies which showed that the percentage of mothers who prepared SSS incorrectly was 62% in Brazil (Barros et al, 1991, p.59) and 40 % in Mexico (Perez-Cuevas et al, 1996, p.266). In Sudan, although awareness about ORS was high (100%), only 25% prepared and used it correctly (Ahmed 1994, p.716). Preparing SSS is still a major challenge for mothers in quite a number of communities in developing countries and has been widely promoted through campaigns (McDivitt, Hornik, Carr 1994, p.1221). Success regarding the knowledge among mothers in correctly preparing SSS may be attributed to public health campaigns of the Control of Diarrhoeal Diseases Program, media and other influences.

Although mothers had knowledge of the preparation of SSS, information regarding its purpose, use and correct way of administration appeared to be incomplete. Only a third of mothers who knew how to make SSS used it in the present study. This gap between the knowledge and the adoption of SSS may be linked to mothers' beliefs about dealing in their own way with diarrhoea in their children or may be associated with a lack of confidence in using SSS; it is also likely that ORS obtained at health facilities or pharmacies was perceived as being better. Some studies have reported maternal misconceptions about the properties of SSS (Nyatoti, Nyati, Mtero 1993, p.95). In Swaziland, for instance it was previously reported that mothers thought that ORS was a medicine that could stop diarrhoea. These misconceptions may also be related to improper information given by health providers, relatives or friends.

6.3 Home management of diarrhoea

Household treatment for diarrhoea often includes an array of home-made liquids, such as teas, rice-based beverages and commercial solutions, which are commonly used. In this study, it was shown that the majority of mothers (90%) gave either ORS or SSS to prevent dehydration. These were more frequently used when the child showed signs of dehydration. Surveys carried out in Indonesia have shown a 68% use of ORS (Muninjaya & Widarsa 1991, p.200.). In Mexico, fluids (ORS, SSS, water, milk, herbal tea, rice beverage) to prevent dehydration from diarrhoea was used by 92% (Perez-Cuevas et al 1996, p.260). While the rate observed in other countries was lower than in our sample of mothers. For example in the Sudan ORS use was 2-4% although awareness about ORS was high (Ashmed et al.1994, p.716). In Cuanza (Angola), ORS was not commonly used because of its cost (Save the children 1998, p17). The widespread use of ORS and SSS by the mothers in our study probably points to the success of the Control of Diarrhoeal Disease Program and public health campaigns aimed at making mothers/caregivers aware of the dangers of dehydration and its prevention.

There appeared to be a preference for the use of ORS compared to SSS in this study with most mothers using either of these. Mothers had access to ORS in the home, from relatives or community health workers in the village. A large number gave ORS or SSS

because they believed that it restored strength and stopped diarrhoea; a minority believed that it rehydrated the child. Few mothers gave fluids such as rice beverage, water, tea, milk and herbs. According to the World Health Organization, fluids other than ORS or SSS can be used to prevent dehydration. In other developing countries such as Mexico, 52% of mothers used herbal teas (Perez-Cuevas et al 1996, p.260) and in the Sudan water, rice beverage and juice were used by 45% of mothers (Ashmed et al, 1994, p.716). In the latter case there appeared to be a discrepancy between the awareness of ORS (100%) and its use (4.3%) and an indiscriminate use of drugs and herbs mainly because of traditional practices. However, with health promotion campaigns the use of ORS may have changed in these settings.

A variety of drugs (antidiarrhoeals, antiemetics and antimicrobials) are used in the treatment of acute diarrhoea but none of these have been proven to be beneficial; while some may have dangerous side-effects (David & Camilleri 2001, p.241). Studies conducted in Mexico showed that one third of mothers used symptomatic drugs (Perez-Cuevas et al.1996, p.260). The proportion was very high in Indonesia where more than 50% of mothers administered drugs to children while treating diarrhoea (Muninjaya & Widarsa 1991, p.200). In this study, the use of symptomatic drugs was minimal (3%) and mothers did not see the necessity for using drugs in the treatment of diarrhoea.

The World Health Organization guidelines for home management of diarrhoea encourage continued feeding during a diarrhoeal episode and an increased intake of food once diarrhoea has subsided (World Health Organization 1992, p.9). Reasons for this include the retention of the normal digestive and absorptive capacity of the bowel during the diarrhoeal episode, the fact that feeds may be tolerated and improved weight gain following diarrhoea (Thapar & Sanderson 2004, p.647). For most mothers, the reasons for food restriction were loss of appetite or vomiting. Studies carried out in Mexico show that 12.2% of mothers/ caregivers restricted milk and dairy products and interrupted breastfeeding during diarrhoea (Perez-Cuevas et al, 1996, p.262). In Indonesia over two thirds of mothers stopped or reduced the intake of milk and solids during episodes of diarrhoea in their children (Muninjaya & Widarsa, 1991, p.201). However, in Angola,

mothers did not believe in withholding fluids or food during diarrhoea but the amounts ingested during diarrhoea episodes were usually reduced due to diminished appetite or vomiting.

From previous studies conducted worldwide (Perez-Cuevas 1996, p. 260, Muninjaya 1991, p.200), the explanation given concerning the mother's decision to seek medical assistance was the perception of a worsening condition. Similarly in this study 96 % of mothers consulted health facilities because they perceived that there was deterioration in their child's condition. Furthermore it was found that a sign such as weakness, perceived by mothers to be a sign of dehydration, was the most important determinant to seek medical care for their children. The reasons for not seeking medical assistance were the mothers' perception that the illness was mild or that the child was recovering.

6.4 Factors that influence how mothers/ caregivers manage their children with diarrhoea

Factors that influence mothers' decisions to seek medical care include access to health facilities, finance, transport or drugs that were prescribed (Martinez et al, 1991, p.235). In this study, determinants of appropriate maternal feeding practices following diarrhoea included housing, the age of the child and the time of cessation of breastfeeding. It may be that this group of mothers/ caregivers makes up a group that is better off socio-economically and may be early adopters who have better access to the media and other information sources and are open to health promotion messages (Morisky et al 2002, p.149). Health promotion campaigns may therefore need to consider which communication channels will be most effective. Reasons for the association between appropriate feeding in infants and the early discontinuation of breastfeeding might be due to the fact that mothers tend to pay more attention to younger children because of their vulnerability and to frequent feeding to prevent malnutrition.

6.5 Limitations of the study

The most likely sources of bias in our study could have been related to the interviews and reporting of the information. Special attention was given during administration of the questionnaire to maximize the chance of collecting the right information and thus minimizing the risk of reporting bias. As most participants spoke only Siswati, the interviewers had to collect the information by using simple terms and make sure that the participants really understood the question. The questionnaire was clear, simple and precise. Some of the questions were open-ended. This was addressed through training and conducting a pilot study. Non-professionals (interviewers other than nurses or health workers) were used to minimize bias as well. There may have been discrepancies between the knowledge and practices. In addition, traditional matters are often sensitive as modern medicine has discouraged "traditional" cures. A negative response may not mean a real "no". The study being done in hospitals, it is possible that participants may have modified their responses to show how knowledgeable they were. Moreover, the mothers interviewed may have had difficulties in recalling information related to past episodes of diarrhoea. This may have introduced some information bias in our study. Mothers/care givers considered for interviews were not exposed to any posters or other information relating to the making up or use of oral rehydration solution. To avoid information bias, posters were not displayed in the rooms where interviews were conducted. It will not be possible to generalize the results of our study to all mothers/caregivers of children in the catchment area served by RFM and Mankayane hospitals as the study was conducted on a study population seeking health care. This may represent a select group of mothers/ caregivers who could be different to others in the catchment area and who may not be in a position to seek health care at these hospitals.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

In this study maternal/caregivers' knowledge of certain aspects of diarrhoea e.g. features of dehydration and its prevention was limited. Most mothers knew how to make up SSS. However, the majority used ORS rather than SSS. Few mothers followed the WHO recommendations of providing additional feeds when their children were recovering from diarrhoea. They sought medical assistance when they perceived a worsening in their child's condition such as weakness, fever, vomiting, illness longer than three days and bloody diarrhoea. A statistically significant association was obtained with one maternal characteristic. Mothers who lived in formal houses were more likely to have appropriate feeding practice than those who lived in informal houses ($P=0.03$). A statistically significant association was obtained with two child characteristics. Mothers seemed to have appropriate feeding practice in children up to 11 months of age ($P=0.001$). Mothers who stopped breastfeeding between zero to 6 months were more likely to have appropriate feeding practice than those who stopped after 6 months ($P=0.049$).

7.2 Recommendations

7.2.1 Recommendations for the Manzini District Health Management Team

It is recommended that District Health Management Team should consider implementing the Integrated Management of Childhood Illnesses (IMCI) strategy to improve health promotion on diarrhoea in the Manzini Region of Swaziland. Counselling of mothers/caregivers about diarrhoeal disease should receive high priority in the ongoing programmes such as Control of Diarrhoeal Disease Programme for improving maternal and child health.

7.2.2 Recommendations for diarrhoeal disease programmes

It is recommended that the Diarrhoeal Disease Control Program along with other Non-Governmental Organizations should focus not only on the role and proper use of oral

rehydration therapy but also on counseling mothers/ caregivers on how to feed their children with diarrhoea, the causes of diarrhoea and the signs and symptoms of dehydration. Moreover it is necessary to counsel them about preventing diarrhoea through improved hygiene, adequate sanitation and safe water and better living conditions.

7.2.3 Recommendations for health professionals working at different levels of care

Hospitals should explore avenues and implement strategies on how to sustain health education and counseling on diarrhoea during MCH visits, in childrens' wards and on discharge of children admitted for diarrhoea. Special attention should be given to the importance of ORS and SSS and to improving feeding practices. The appointment of a monitoring team would be necessary. Medical officers working in MCH should also be involved in health education and counselling. In community health centres and clinics, nurses should play a more active role in counseling mothers/ caregivers, especially about issues pertaining to diarrhoea.

7.2.4 Advocacy to policy-makers about the prevention and control of diarrhoeal disease

Advocacy to the Swazi Government is needed about ensuring that the prevention and control of diarrhoea becomes a national priority. There should be mobilization and pooling of resources (financial, material and human) to improve the socio-economic and basic conditions of the population, including the provision of adequate sanitation, piped water, electricity and housing.

7.2.5 Involvement of the media in health promotion concerning the prevention and control of diarrhoeal disease

The media can play a role in the fight against diarrhoeal disease through greater emphases on health education, community-based strategies that can be put in place to prevent it and the management of the disease.

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Appendix 1**WHO recommendations for treating diarrhoea at home (WHO, 1992, p.9):****1. Give the child more fluids than usual to prevent dehydration:**

- Use recommended home fluids. These include: ORS solution, food-based fluids (such as soup, rice water, and yoghurt drinks) and plain water. If the child is under 6 months and is not yet taking solid food, give ORS solution or water rather than a food-based fluids.
- Give as much of these fluids as the child will take
- Continue giving these fluids until the diarrhoea stops.

The following is a general guide for the amount of ORS solution or other fluid to be given at home after each loose stool:

-Children under 2 years: 50-100ml

-Children aged 2-10years:100-200ml

-Children 10 years of age or older and adults should take as much as they want

2. Give the child plenty of food to prevent malnutrition:

- Continue breast-feed frequently.
- If the child is not breast-fed, give the usual milk
- If the child is 6 months or older, or already taking solid food;
 - Also give cereal or another starchy food mixed, if possible, with pulses, vegetables, and meat or fish. Add 1 or 2 teaspoonfuls of vegetable oil to each serving.
 - Give fresh fruit juice or mashed banana to provide potassium.
 - Give freshly prepared foods. Cook and mash or grind food well.
 - Encourage the child to eat; offer food at least six times a day.
 - Give the same foods after diarrhoea stops, and give an extra meal each day for two weeks.

3. Take the child to the health worker if the child does not get better in 3 days or develops any of the following:

- Many watery stools
- Repeated vomiting
- Marked thirst
- Eating or drinking poorly
- Fever
- Blood in the stool

Composition of Oral Rehydration Salts (ORS) (WHO 1992, p.10)

The principles underlying ORT have been applied to the development of a balanced mixture of glucose and electrolytes for use in treating and preventing dehydration, potassium depletion, and base deficit due to diarrhoea. To attain the later two objectives, potassium and citrate (or bicarbonate) salts have been included, in addition to sodium chloride. This mixture of salts and glucose is termed "Oral rehydration salts" (ORS); when ORS is dissolved in water, the mixture is called ORS Solution. The following guidelines were used in developing the WHO/UNICEF recommended ORS solution:

- The solution should have an osmolality similar to, or that of plasma, i.e. about 300mOsmol/L or less
- The concentration of sodium should be sufficient to replace efficiently the sodium deficit in children or adults with clinically significant dehydration;
- The ratio of glucose to sodium(in mmol/l)should be at least 1:1 to achieve maximum sodium absorption;
- The concentration of potassium should be about 20 mmol/l to replace potassium losses adequately;
- The concentration of base should be 10mmol/l for citrate or 30 mmol/l for bicarbonate, which satisfactory for correcting base-deficit acidosis due to diarrhoea. The use of trisodium citrate,dehydrate,is preferred, since this gives ORS packets a longer shelf life

Preparing a Salt and Sugar Solution at Home

Mix an oral rehydration solution using one of the following recipe; depending on ingredients and container availability:

Making a 1 (one) liter solution using Salt, Sugar and Water

Ingredients:

One level teaspoon of salt

Eight level teaspoons of sugar

One liter of clean drinking or boiled water and then cooled
5 cupfuls (each cup about 200 ml.)

Preparation Method:

Stir the mixture till the salt and sugar dissolve

Keep homemade ORS covered when it is not being used.

Throw away leftover homemade ORS after 24 hours.

Mix new homemade ORS each day.

Appendix 2**QUESTIONNAIRE****SURVEY ON HOME MANAGEMENT OF DIARRHOEA****IN MANZINI (SWAZILAND)****I. DEMOGRAPHIC DATA****A) MOTHER'S CHARACTERISTICS:**

Age: _____ years

Marital status:

- Single (1)
 Married (2)
 Divorced (3)
 Widowed (4)

Family status:

- Living with husband (1)
 Not living with husband (2)
 Living with extended family (3)
 Living with husband and extended family(4)

Number of people living in the house: _____

Level of Education:

- None (1)
 Primary (2)
 Secondary (3)
 College/University (4)

Location :

- Urban (1)
 Semi urban (2)
 Rural (3)

Area of residence: _____

Parity: _____

- Race: Black (1)
 White (2)
 Coloured (3)

Primary caregiver:

- Mother (1)
- Father (2)
- Grandmother (3)
- Maid (4)
- Relatives (5)

If relatives, specify: _____

B) CHILD'S CHARACTERISTICS INCLUDING HEALTH

Age: _____ years (or months)

Sex:

- Male (1)
- Female (2)

Birth order: _____

Immunization status (checked on the road to health card):

- Up to date (1) (Received all the vaccinations required for the age)
- Not up to date (2) (Not received all the vaccinations required for the age)

Feeding practice:

- Breast milk (1)
- Cow milk (2)
- Both (3)
- Normal food (4)
- Normal food and Milk (5)
- Others (6)

If others, specify _____

Age of weaning: _____ Years (or Months)

II. MANAGEMENT

a. Refer to the last episode of diarrhoea:

- How many times did the child pass watery stools? < 3(1) ≥ 3(2)

- For how long? 3 day or less (1)
 4 to 13 days (2)
 14 days or more (3)

b. Refer to last episode of diarrhoea, what did you use to treat diarrhoea?

- Home made solution (ORT)
- ORS (Oral Rehydration Solution)
- Tea or herbal tea
- Drugs

If yes, specify _____

- Water
- Rice beverages
- Milk
- Others,

If others, specify _____

c. Why do you prefer the treatment used?

d. Do you know how to make home made solution (salt, sugar solution) if yes explain

- Yes (1)
- No (2)

(Yes means that the mother mentioned 1 liter of boiled water (coca cola bottle), 8 level caps of sugar, half level cap of salt.

e. Feeding practice: Any change in the feeding practice?

- Yes (1)
- No (2)

f. If yes Why? _____

g. If yes, How?

- Withholding breast milk (1)
- Withholding cow milk (2)
- Withholding food (3)
- Increasing breast milk (4)
- Increasing food (5)
- Others (6)

If others, specify _____

h. After Diarrhoea stopped, how was the feeding?

- The same as during diarrhoea (1)

- Less than what he received during diarrhoea (2)
- More than what he received during diarrhoea (3)
- i. For how long was the child on that feeding?
 - Less than two weeks (1)
 - Two weeks (2)
 - More than two weeks (3)

III. NEED FOR ASSISTANCE

- a. Did you look for assistance?
 - Yes (1)
 - No (2)
- b. If "Yes", where about?
 - Health facilities (1)
 - Traditional healers (2)
 - Both (3)
 - Relatives (4)
 - Others (5)
 If others, specify _____
- c. If "No", Why?
 - The child became better (1)
 - The child had diarrhoea for less than three days (2)
 - Others (3)
 If others, specify _____
- d. Why did you look for assistance?
 - Weakness
 - Fever
 - Vomiting
 - Weight loss
 - Bloody diarrhoea
 - Illness longer than three days.
 - Others
 If others, specify _____
- e. Describe the type of assistance received: _____

- f. Quality of assistance:
 - Satisfactory (1)
 - Not satisfactory (2)
 Why satisfactory or not satisfactory: _____

IV. MATERNAL KNOWLEDGE

a. What is "Diarrhoea?" (Well defined if mother mentions: Three or more watery stools per 24 hours)

- Well defined (1)
 Not well defined (2)

b. What are the causes of diarrhoea?

1. _____
2. _____
3. _____
4. _____

c. How do you recognize that the child has lost a lot of water (Dehydration)?

- Weakness
 Thirst
 Sunken eyes and fontanelles
 Dry mucous membranes
 Others

If others, specify _____

d. What can you do to prevent diarrhoea?

- Breast-feeding
 Giving freshly prepared food and clean drinking water
 Washing hands before preparing and eating food and after passing stools.
 Using latrine
 Avoid feeding bottle
 Others

If others, specify _____

V. SOCIO-ECONOMIC AND ENVIRONMENTAL HEALTH

Time made to reach the health facility:

- Less than 30 Min (1)
 30 Min to 1 Hr (2)
 More than 1Hr (3)

Employment status:

- Employed (1)

Non Employed (2)

Self Employed (3)

If non employed, what do you do for a living: _____

In which of the following ranges your monthly household income falls :(one Emalangeni=one Rand)

Less than E 500 (1)

E 600 – E 1000 (2)

E 1,100 – E 2000 (3)

E 2,100 – E 3000 (4)

E 3,100 – E 5000 (5)

Above E 5000 (6)

Housing:

Stick and mud house (1)

Brick house (2)

Others (3)

If others, specify: _____

Water source:

Personal tap (1)

Community tap (2)

Pool (3)

River (4)

Others (5)

If others, specify: _____

If no personal tap or pool, What is the time made to reach your water source:

Less than 30 Min (1)

30 Min to 1 Hr (2)

More than 1 Hr (3)

Type of latrine:

Pit latrine (1)

Trench latrine (2)

Modern flush latrine (3)

Bush (4)

Others(5)

If others, specify: _____