AN INVESTIGATION OF INFLUENCES OF SOCIO-ECONOMIC AND ENVIRONMENTAL FACTORS ON HEALTH: A CASE STUDY OF MAKONGENI LOCATION, NAKURU DISTRICT.

BY

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JUNE 1993.
DECLARATION

This is my original Work and has never been Presented in any other University for Examination:

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This Thesis has been Presented for Examination with my authority as University Supervisor

Dr. S.O Akatch
(Supervisor)
DEDICATION

This Work is Dedicated to My Parents, Brothers and Sisters for their contribution towards my academic pursuit, love, and concern.
(iv)

ACKNOWLEDGEMENT

The writing of this thesis would have been more difficult without the cooperation of all people, organizations and any other parties who participated and contributed towards the realization of this work. My debts to all those who assisted me to make this work what it is are huge.

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Responsibility for any error or omission, remain entirely my own.
Health development is a social issue of pressing importance especially in the African setting. In recognition of the fact that health and development cannot be separated, the heads of state of the organization of Africa have declared that 'health is the basis of development' and also that 'health is a pre-requisite for development'. Due to its role in development the health sector has continued to be a focus for international, national and community based collaboration and support.

No nation can be said to have adequately met the health needs of its people wholly, although some to a larger extent are at a better position others. It is in the light of this that the study endeavoured to investigate the problem of health service provision in Makongeni location which is a predominantly a low income settlement.

Studies done elsewhere show that among the low income people, the major health problems and causes of death are largely due to environmental and social economic deficiencies. The diseases suffered by many are rooted in the ecology of poverty which hence can only be conquered by eradicating their social-economic and physical origins. The area of the study has a high mortality rate of children below age five,
malnourished children are a common sight in the villages. It has also had an outbreak of cholera and typhoid. Cholera is seen as a disease of underdevelopment, a flag of poverty and the disadvantaged, and a living testimony of deficiencies in water supplies, sanitation, food safety and public hygiene (45th World Assembly Vol 12 No 2 1992). Looking at the disease pattern in Makongeni location, the health problems seem to have socio-economic and environmental origins. It is in the light of this that the study endeavoured to investigate the social-economic and environmental factors as they affect the health of the people.

The study examined how various socio-economic and physical factors have influenced the health of the population in Makongeni location. From the analysis of the data collected, education was a very important variable in influencing health behaviour of an individual. Mortality and sanitation practices were found to be related to education level of the household head. Protected water sources were found to be a good control measure against water transmitted diseases. Housing was found to be in poor condition for a healthy living.

The major findings of the study show that solution to rural health problems must take into account the most effective, cheap and available approach in provision of health care. The concern
should move from conventional health care to a more comprehensive approach which should encompass sectors of agriculture, water supply housing, environment, education and other health-related sectors. This calls for Community-Based Health Care. It is important to develop skills to encourage and teach people to share the responsibility for preventing disease, promoting good health practices, and even some aspects of caring for the poor.
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CHAPTER ONE: INTRODUCTION

1.0 Introduction

Health development is a social issue of pressing importance especially in African setting. The Kenya government has been laying a lot of emphasis on health in recognition of the fact that 'Human development has a major role to play in economic development. That there is a direct relationship of a population and its productivity is self evident and has been demonstrated in the industrial countries, which are now benefitting from the years of investment in health' (Kenya National Development Plan 1966-70).

About 1.6 billion, a third of the world's people, living in the least well-off countries of Africa, Asia and Latin America, suffer overwhelmingly the world's burden of illness and premature death. Every year in the developing world nearly 15 million children die from infection and malnutrition, 40,000 children each day or nearly 2,000 every hour. Infectious diseases for example account for less than 10% of deaths in industrialised countries but over one-third of all deaths in the developing world, where life expectancy is still low. (UN, publication 1991: Health Research. The Essential to link Equity in Development)
Different types of diseases tend to have different death patterns among the developing countries. People in developing countries tend to die of diseases which can be prevented. Diarrhoeal and respiratory infections, tend to take a large proportion of lives of people in the developing countries especially children. Malaria has continued to kill people and deprive them of energy to work throughout Africa, Asia and South America. Children in developing countries face a number of problems. The major threat include malnutrition due to poor weaning practices, diarrhoeal infection from contaminated water and infectious diseases that prosper in malnourished children. Children often become malnourished because infection depresses their appetites while it consumes additional calories. Repeated episodes of diarrhoea, which are common where clean drinking water is unavailable, lead to further malnutrition, infection and even death (World Bank Health sector Policy Paper 1984)

1.1 Kenya's Health Problems

The population at an average of 3.8%, (W.H.O Nairobi Report 1988) has continued to put increased pressure on the government budgetary allocation for health services. Provision of medical personnel and facilities like beds and cots has been quite hard due
to faster growth in population e.g in 1988 to 1989, the number of doctors increased from 3,176 to 3,266 but due to faster growth in population the average number of doctor per 100,000 population remained static. The ratio of beds and cots to 100,000 population actually dropped from an average of 141 in 1988 to 138 in 1989 once again reflecting the high rate of population growth.

Kenya has a number of health problems which include:

(i) Diseases of respiratory system: These include pneumonia, tuberculosis, bronchitis, measles, and whooping cough. This group accounts for more than 30% of disease and over 13% of the mortality rate per 100,000 cases reported.

(ii) Non communicable diseases: such as malnutrition, hypertension, and neoplastic diseases are important causes of mortality and morbidity in certain age groups. Trauma and traffic accidents are increasing worrying causes of death and disability.

(iii) Maternal and perinatal problems: These are often related to lack of family planning.

(iv) Parasitic and infectious diseases: The major diseases in this group include malaria which is widespread in hot lowlands around lake Victoria in Western Kenya and in the coastal region; schistosomiasis found in irrigation scheme areas and other vector borne
diseases such as sleeping sickness, kalaazar, filariasis, etc. These diseases are responsible for high morbidity and mortality rates in Kenya, accounting for over 18% of all deaths reported. Some important communicable diseases are measles and sexually transmitted diseases.

(v) Diseases related to poor environmental sanitation: These include amoebiasis, cholera, enteris and dysenteries and other intestinal parasitic diseases, accounted for 10% of outpatient morbidity in 1980 (W.H.O Report on Kenya 1988, Nairobi office)

1.2 Deficiencies and Constraints in Health Services

Deficiencies and constraints in provision of health services are functionally related to the economic and social structures of the society. The poor and other vulnerable groups in any given society tend to suffer most from economic recession. Yet priority in the distribution is in most cases biased against the welfare of such groups. This results in increased disease incidence affecting such groups.

The highest population growth rate within Kenya are reported among the poorest communities, shanty dwellers and those with minimal education. Yet planners tend to concentrate their efforts on population controls through the media, newspapers, radio, television, all of which are invariably beyond
the reach of the majority of the vulnerable groups.

Utilisation and distribution of health is biased towards urban centres and major hospitals e.g. the 1979 census data revealed that nearly 87% of Kenya population resides in rural areas, yet nearly 80% of the health resources are concentrated in the major towns of Nairobi and Mombasa. The 1974-1978 rural health services were to take 21.4% of the estimated total of K£ 28,000,000 allocated to the Ministry of Health. In the 1984-1988 annual development estimates, the rural health services were to be allocated 41.8% of the estimated expenditure allocated to the ministry of health. Although there has been a conscious move to improve rural health by making it a priority area and also increasing the national expenditure on it, the actual expenditure is still low, especially considering the poor state of health prevailing in the rural areas, and that the bulk of the population live and work in the rural areas. (WHO Report on Kenya 1989). It will be important to find out to what extent the study area reflects, what is happening at national level.

The annual report of Medical Practitioners and Dentist Board, 1978 indicates that the number of doctors licensed for private practice in that year was 892 in Nairobi and 159 in Mombasa. Ministry of Health estimates that only less than 15% of Kenyan Physician
practice in rural areas outside the major towns. It is further estimated that over 80% of Kenya's most highly trained nurses serve in the largest urban centres, leaving less than 20% to serve in the rural areas. (Kirigia 1985)

At the outset of Uhuru in 1963, there were three enemies of development identified. These included poverty, diseases, and ignorance. The current development plan 1989-93, on health sector stipulates that the aim of the government is to achieve the long term objective of providing health for all by the year 2000. It is government policy that health services should be accessible to all, but due to the growth in population estimated at 3.8%, and inadequate capital, health services have not always met demand. The demand has always outstripped the supply and therefore leading to inadequate health provision. The worst hit are normally the majority rural poor, where in some parts even the health services are non existent.

1.3 Statement of the Problem

Health has been defined by (WHO) as a state of complete physical, mental and social well being, and not merely the absence of disease or infirmity. A lot of emphasis is put on health because of the fact that, quality of human life depends on the state of
health care which is in turn dependent upon the availability of adequate food, water, waste disposal, transportation and housing. The medical communities in the developing countries, where nearly all preventable deaths occur, often fail to meet the simple health care needs of the poor, especially the rural poor. Medical systems in many developing countries, have tended to follow the organisational example of the west with the result that modern hospitals and developed urban areas receive unjustifiable shares of scanty health resources.

While it underscores the need for more equitable dissemination of medical resources, analysis of disease problems of the poor reveals solving these problems has a little to do with medical care as such. Paradoxically, the major health problems and causes of death are largely due to environmental health and social economic deficiencies. The diseases suffered by many are rooted in the ecology of poverty which hence can only be conquered by eradicating their social-economic and physical origins.

Because the costs of operating capital-intensive urban clinics and hospitals consume the largest portions of the health budgets, the poorest people in both rural and urban areas are often denied basic health services. Thus while the burden of ill health is heavily borne by the rural poor, the benefits of
health expenditures accrue largely to more economically advantaged in urban areas.

Over 13,000 Africans died of cholera in 1991, the worst year in record. It is a growing threat to millions of marginalised communities. Cholera is seen as a disease of underdevelopment, a flag of poverty and the disadvantaged, and a living testimony of deficiencies in water supplies, sanitation, food safety and public hygiene (45th World Assembly vol2 no2 1992). Makongeni location has had an outbreak of Cholera and Typhoid. In 1987, over 100 cases of cholera were treated in Mogotio health centre while in 1992 the same health centre treated over 150 cases of typhoid. Two private clinics outside the area of the study treated over 100 cases of typhoid during the same year who, according to the private practitioners, a good number were from Makongeni location. Studies confirm that improvements in sanitation and water supply can go along way in preventing the occurrence of typhoid and cholera. A world bank paper on health sector (1984) notes that in the last century in the United States and Great Britain, cholera and diarrhoeal rates dropped sharply, mainly due to improvement in sanitary conditions. It further notes that in twenty American cities the average reduction in typhoid fever following the installation of water filtration was 65%. A case study in Philippines found
that toilet construction reduced cholera incidence by 70%. Privy construction according to the world bank, helped cut the death rate to half for diarrhoea and related diseases in 1942 and 1954.

J.C. Azurin and M. Alvero on a study 'Field evaluation of Environmental Sanitation Measures against Cholera' 1974 found that provision of sanitary facilities for human waste disposal can reduce the incidence of cholera by as much as 68%, while provision of safe water supply can decrease it by 73%. Where both toilets and water supplies are provided, the incidence can be reduced by as much as 76%.( J.C.Azurin and Alvero)

Due to the occurrence of the two diseases, which are sanitation and water related, it was therefore important to investigate the adequacy of sanitary facilities and safety of water drunk by the people in the study area, in an attempt to find the causes and sources of these environmental related health problems. It is also important to find the factors that affect the availability and the utilisation of latrine facilities.

Much of the population in Makongeni location consists of workers in the sisal estates. This is because sisal industry is labour intensive. Given that the work done in the estates for instance sisal cutting, weeding and to some extent factory work do
not require high skills, it therefore attracts people of low level of education. At the same time given the low incomes received i.e household income of Ksh 800, not all parents are in a position to take their children to secondary schools and above. The same children who drop at primary level of education become future parents. Studies done elsewhere have shown education to be very important in influencing health behaviours, mortality (Merrick 1976) and nutrition.(Ronald Burkhart 1981), CBS (1982). It is very important therefore to find to what extent the low level of education has influenced sanitation practices and mortality in the study area.

In the light of the problem defined above, the following objectives have been set to address the problem defined. The objectives are set at two levels i.e broad and specific.

1.4 Objectives of the Study

The broad objective is to determine the relationship between health and socio-economic and environmental factors. From this, the following narrow objectives are derived:

(1) To determine the relationship between mortality and education.

(2) To determine the influence of education on sanitation practices.
To assess the sanitary situation of Makongeni location.

The following tentative statements have been formulated to explain the possible scenario in Makongeni Location.

1.5 Hypotheses

(1) The level of education of the head of household is likely to be positively related to appropriate sanitation practices and inversely related to mortality.

(2) There are poor and inadequate sanitary facilities in Makongeni location.

(3) Health problems in Makongeni location have socio-economic and physical origin.

1.6 Justification of the Study

Health problems in the area of study have been quite acute. This has actually been worsened by the frequent outbreaks of water related diseases like cholera. The problem of health planning becomes very tricky especially because of sharing of health services between districts which are differently administered. It becomes difficult when it comes to meeting the maintenance and operational costs. It therefore raises a very important planning issue that needs to be addressed.

In 1987 the area of the study had cholera
outbreak, two years later Alphega village had cholera outbreak. In 1992 there was typhoid fever outbreak. The two diseases are water and sanitary-related. Within a period of five years there have been three epidemics of water and sanitary related diseases. There is therefore need to investigate the possible contributory factors.

The fact that majority of the people are poor especially in the sisal growing Makongeni Location, implies that government provision of health services will continue to be a major source of medical care. This necessitates the need for planning for health services in the area of study.

1.8 Research Methodology/Data Analysis

The study drew information from a number of sources. These included publications from agencies involved in health e.g W.H.O, AMREF, government ministries etc. Government health officers, private practitioners, school heads, and administrative officers were also interviewed.

There were two sets of questionnaires that were administered. One was administered to the households at place of residence and the other to the patients at the health facilities. The one administered at the health facilities was mainly for gathering information on utilisation. Health officers from government health
institutions and private clinics were interviewed (see appendix 1 and 2).

Formal and informal interviews, were also used to get information from personalities involved in health. This approach was mainly applied when getting information from village health committees. Physical count of toilet facilities provided was done. This was to be used to compare with the standards expected per given population.

Observation of the breeding places of mosquitoes e.g lagoons and dams, was another method that was used. Observation of general cleanliness of the villages was also done.

There were a number of methods that were used in data analysis. The method that was mainly used was qualitative analysis. The study used mainly frequencies. The statistical test used in hypothesis testing was chi-square. This was applied in an attempt to find how variables considered are related. In data presentation charts were mainly used.

1.9 Sampling
The study applied two types of sampling procedures; simple random sampling and systematic random sampling. Simple random sampling was applied in the sections of the villages where houses were congested and did not have a well defined arrangement
in either rows or columns. This method was used to ensure that each household had an equal chance of being selected for interview.

Systematic random sampling was used where the houses in the village followed a well defined arrangement i.e where the houses in the village were either arranged in rows or columns. In total 130 households were selected and interviewed.

1.10 Limitations of the Study

There are a number of problems that were encountered during the carrying out of the field research: one of the problems was the volatile political climate that was existing at the time of carrying out of the research; the preparations for the first ever multi-party election and the tribal clashes that were going on in some parts of the country, made it difficult to collect certain household characteristics. In some places the people were not willing to receive the researcher fearing that he could be linked with the people perpetrating the tribal clashes; thereby fearing that information so obtained could be used in identifying the tribes targeted in the tribal clashes. Some of the villagers too had left to their ancestral areas fearing possible out break of the clashes in the area of study.
Due to poor transport and communication networks among the various estates, movement from one estate to another was difficult. The situation was worsened by the fact that there is no public transport plying from one estate to another except for Banita and Majani Mingi. Due to all these problems the only means of transport available was walking on foot or using a bicycle. This made the keeping of appointments with the officials to be interviewed at times hard.

Most of the inhabitants of the villages in the sisal estates are workers in the sisal estates: since the salaries paid by the estates are low, both the wife and husband are forced to go to work so that at the end of the month they can get a better pay package to make them survive and feed the children. Since most of the residents were out of their residences during the morning hours, this meant that interviews were done in the afternoons after people are from duty. This made the time for interview quite short.

In terms of coverage, the study covered a location. As far as water is concerned, only the physical aspects were considered. No laboratory test was done to ascertain the extent of contamination. As regards the socio-economic factors, only those that have been found in other studies elsewhere of almost a similar setting, to have major influences on the low income group, were investigated.
Like other descriptive surveys, the study did not provide an in-depth understanding or ascertain cause but suggested relationship between variables.

1.11 Organisation of the Work

The thesis is organised in six chapters. The first chapter defines the problem the research was designed to solve. Under this are included objectives, hypothesis, justification of the study, research methodology and data analysis.

Chapter two gives an analysis of the studies done in the related field. The chapter looks at aspects like water supply, nutrition, mortality and sanitation etc as they relate to health of the population.

Background to the study area and policy are highlighted in chapter three. Under health policy are considered aspects like health development plans, strategies and policy trends. Achievements that have been realised in the health sector are also highlighted.

Data analysis is considered in chapters four and five. In chapter four are given household socio-economic characteristics and how they influence health in Makongeni location. Considered in details is how education relates to mortality and sanitation practices in Makongeni location.

Chapter five looks at water and sanitation. Under
sanitation are considered such factors as adequacy of latrines, factors influencing utilisation, and general problems facing latrine provision. A link is made between state of sanitation and health problems faced in the study area. Findings that emerged from the study are highlighted in chapter six. Recommendations are also made based on the findings of the study in this particular chapter. Finally the conclusions of the study are considered.
CHAPTER TWO: LITERATURE REVIEW

2.0 Theoretical Frame Work

This particular chapter analyses work done by other people in the related field.

2.1 Economic factors

In case of financial accessibility, Omburo (1988) found out that poor people will consume more service where costs are minimal. He states that because government services are almost free, the accessibility will be assessed from transport cost incurred. It is therefore expected that transport cost will be among the factors that determine people's choice of health facilities.

Ikiara (1988) found out that over 60% of those who seek medical care in public facilities have income between Ksh 700-2500 per month. This shows that the cost element is an important factor in determining the distribution of patient to various categories of health units that is both in public and private.

2.2 Water and Sanitation

Source (1990, medical journal) indicates that in Tunisia, following increase in the incidence of water borne diseases in 1984, new efforts in health were focused on improving water quality. It was noted that many of the wells contained dangerous levels of salt and germ causing diseases such as viral, hepatitis,
typhoid and other strains of diarrhoea. The ministry of health attributed the presence of these diseases to lack of sanitation in the rural areas, and the siting of latrines and septic tanks above or at the same level as water table. It further notes that, the pace of improvement in health facilities and people’s health has been accelerated greatly due to new emphasis on health education and much better organization at village level. The combination of raw water supply facilities and health training has cut the incidence of viral hepatitis by 50% in five years to less than one case in 1000 people. Diarrhoea was reduced by 80% Dr Camcross says that washing with soap may be the most cost-effective diarrhoeal control. Experts have long agreed that diarrhoeal epidemics—the occasional outbreaks of cholera or dysentery which assail entire community—are often caused by drinking from the common water source contaminated by virus. Increasingly however, they are coming to the view that many endemic diarrhoeal diseases—those widely scattered causes of sickness, malnutrition and death among the developing world’s children—are caused by inadequate hygiene rather than drinking contaminated water. Current estimates suggest that diarrhoeal deaths of perhaps more than three million under five years old could be averted each year through better hygiene.
The London school of hygiene and tropical diseases has helped advance world understanding of linkages between water and health to new frontiers. "Up until 1970s, it was assumed that clean water (for drinking) equalled less diarrhoea says professor Feacham." But during this decade researchers have explored the truth of the assumption and shifted opinion substantially. The school's conclusion is that more water brings greater health benefits than clean water but both are important" says professor Feacham.

A world bank paper (1980), shows that in many areas diseases related to deficiencies in water supply and waste disposal are contributory causes of most of the infant deaths and account for a very large proportion of adult sickness. The paper notes that water and excreta are the prominent factors in the transmission of most of the serious diseases of the developing world. In addition gastrointestinal infections waste food, by reducing the absorption of the nutrients. The paper further note that control of diseases related to water and sanitation requires ample quantities of safe water, good hygiene and sanitary disposal of excreta. Sanitary disposal of human waste is generally necessary if contamination of water and food is to be able to avoid direct contact with the disease causing organisms. Especially in
tropical area, where conditions for multiplication of waste organisms are ideal, good personal and household hygiene are critical to control of disease; education in health that is tailored to local beliefs and conditions can contribute to the improvement of hygiene.

The paper notes that a combined approach is therefore required that includes ample water supplies, hygienic disposal of excreta, and education as to the water-use practices and household hygiene wherever people have been uncustomed to good water supply and sanitation. Teachers, health workers, extension agents, and staff of public utilities must all contribute to the vitally important education. The paper notes that, the effects on community health of providing safe water supply depends on the extent to which the community makes use of the supply, and this in turn depends on social customs, an understanding of health implications, and on the level of services provided. If water has to be carried from distant wells, or public standpipes, the quantity fetched is usually small. Use of this safe water for drinking and cooking reduces waterborne diseases such as typhoid and cholera, but the supply may be insufficient for personal hygiene, so that "water-washed" diseases (e.g. trachoma and some skin diseases) cannot be effectively controlled. The risk also exists that the
safe water obtained from the source is contaminated in transit or while being stored prior to use. Moreover, continuing use of ponds and streams for laundry and personal hygiene means that the villagers are still vulnerable to parasitic infection such as schistosomiasis (bilharzia) and dracontiasis (quinea worm). If villager have frequent contact with polluted water (for example, for laundry, bathing, fishing or paddy cultivation), improving the water supply will only have limited effect on reducing diseases, such as schistosomiasis; in these cases, means must be found to break the chain of transmission. The studies cited by sunders and warford suggest that improving both water supply and method of excreta disposal may be more effective and less expensive than controlling the snail vectors by molluscides, and similarly, for long control, may be more efficient than immunization against cholera and typhoid (cholera immunization in particular, is of doubtful effectiveness). Excreta disposal system (usually of very simple self-help component) should be considered as essential counterparts of village water supply programmes in improving public health and should be executed at the same time.

A world Bank paper (1980) notes that diseases related to water deficiencies and waste disposal are contributory causes of most infant deaths and account
for a very large proportion of adult sickness. It further notes that water and excreta are prominent factors in the transmission of most of the serious diseases of developing world. The paper further notes that the control of diseases related to water and sanitation requires ample water, good hygiene and sanitary disposal of excreta.

1. A world bank paper (1976) on village water supply notes that epidemiological studies have identified contaminated water as the principal agent in the transmission of typhoid, cholera, shigellosis. Lack of safe water for drinking and washing is also an important factor in the spread of other diarrhoeal diseases, which form possibly the most important single disease throughout the developing countries: up to half the number of deaths in the developing world, occur in children under five years of age, with diarrhoeal diseases being the most common causes. The paper further notes that typhoid, cholera, dysentery and more rarely hepatitis may be caused by drinking water contaminated with human wastes, but may also be due to contaminated food, milk and to a lesser extent, to other vectors such as flies.

J.C. Azurin and M. Alvero, on a study 'Field Evaluation of Environmental Sanitation Measure against Cholera', 1974 done in Philippines, came up with the conclusions that provision of sanitary facilities for
human waste disposal can reduce the incidence of cholera by as much as 68%, while the provision a safe water supply can decrease it by 73%. Where both toilets and water supplies are provided, the incidence can be reduced by as much as 76%.

F.C. Sang, Z.W Gatheru, N. Koske, T. Hayashi and A. Utsunomiya in their study on 'cholera surveillance in Kwale district Coast province 1982) note that experience during the current pandemic of cholera (since 1961) has shown that improved sanitation and personal hygiene would not only make a country free of cholera but also make it non-receptive to cholera infection and bring about permanent solution.

The documented impact on cholera and typhoid, decline in mortality rates, the lasting campaign for hygienic environment have led to the firm belief that safe water is one of the basic needs for human life and that its health benefits are abundant.

Duncan J.W (1974) notes that excreta disposal is an important part of the environmental sanitation and inadequate and insanitary disposal of infected human faeces, leads to a number of gastro-intestinal infections. He notes that in planning for permanent solution to excreta disposal problem many interrelated factors should be considered. Among them cultural patterns, religious customs, economic standards, general health education etc
2.3 Mortality

Berg (1975) attributed malnutrition to poverty stricken areas for instance, the under five year old children in Brazil constituted less than fifth of the population but accounted for four fifths of all deaths.

The international Encyclopedia volume 5 highlights malnutrition as widespread and persistent bother in the underdeveloped areas and is responsible for much of the high mortality in these areas, whether by itself or in combination with infectious diseases of various types.

Lotham (1976) notes that in Newyork city in summer months 1892, the infant mortality rate was 340 per 1000 and diarrhoea accounted for half these deaths. He notes that measles is a severe disease with a case fatality rate around 15% in many poor countries, because the young children who develop it have poor nutritional status, lowered resistance and poor health. He attributes the difference in the clinical severity and the fatality rates from measles in developed and developing countries are due to differences in the state of nutrition.

P.R. Puffer and C.V Serranno(1973) note that the intra-American investigation of mortality in childhood showed that of the 35,000 deaths of children under five years of age in ten countries, 57% had
malnutrition as either underlying cause of death.

Robert. E. Jarett (1970), 'Environmental Factors and Childhood Mortality study concluded that:

(a) There is a strong negative correlation between childhood deaths and the use of piped water;
(b) There is a strong negative correlation between childhood deaths and use of flush toilets;
(c) There is a quantifiable relationship between access to piped water and flush toilets and childhood mortality. It was suggested the 'total access' to piped water is a better indicator of mortality than is piped water inside or outside dwellings.

2.4 Education and Health

A fertility survey (1982) carried out by Central Bureau of Statistics found that among the factors which affect child survival is the educational attainment of the mother. A world bank paper (1984) also notes that improved levels of female education also plays a critical role in reducing infant mortality rates. Education generally improves the health behaviour and help to, prevent illness.

Education is known to speed up cultural change by creating more awareness and understanding. This has influence on the basic social needs, such as water, sanitation, health and social-economic status.

Level of education affects health through a
number of channels. Education increases productivity too. The higher income resulting from increased market productivity should lead to increased expenditures on food, housing and medical care, with improved health as a consequence. Likewise for a given expenditure on such market goods, higher non-market productivity should result in more efficient conversion of market goods into the final consumption of good health, through more nutritious diets, more consistent sanitation, earlier diagnosis of illness and more effective purchase of drugs and medical care. It is important to note too that increased education might increase the value people place on health (without increasing either their earning power or their effectiveness in converting food, sanitation and medical care into health) and hence lead them to devote more of their time and resources to health. The average level of education in a community may affect the health of individual members. Any individual should typically experience better health in a community where the education levels is higher. This will result partly from the fact a better educated community will want and be able to afford better public health, water and sanitation facilities and partly because better educated individuals and their families will have better 'private' health and hence will be less likely to be a source of communicable
Most studies find parental educational level to be positively associated with the nutritional status of their children. A study by Christiansen et al; 1974 in Bogota, Columbia using education measures of mother's and father's years of school and mother's literacy, found a significant positive association between all three education measures and the child being well nourished (defined in terms of both weight and height and height for age). There was also a positive correlation between all education measures and child's height for age and weight for age separately. A study too by Shueyare et al 1977 in South Africa found a strong positive correlation between years of school of the head of household and weight for age of children below two years.

Education of more than eight years has been found to have a positive influence in mortality, morbidity, fertility and life expectancy. Studies on non-clinical intervention for diarrhoeal control have indicated that better educated communities enjoy relative protection against several diseases compared to less educated but otherwise similar communities. This protection may be conferred both by general education and by disease specific—education of the head of the household. The effects of improving personal hygiene on diarrhoeal morbidity have been studied and indicate
that educational attainment and certain religious customs predisposed communities to diarrhoea because of behavioral factors. (Dr Johnson Muema 1992)

Lewis et al (1976) argues that although a variety of social and ethnic differences have been noted, education has been the most consistently observed factor influencing medical utilisation. A person with more education uses more preventive methods and have higher average use of medical facilities and are more likely to take advantage of new medical programmes.

Chege (1992) notes that there is need to address the health provision as a package. The rising level of community health is mainly attributed to the rising standards of living and amenity rather than in medical care and treatment reflected in increasing sheer number of facilities and personnel. Therefore there is need to tackle the problems of poverty, expanding population, poor nutrition, sanitary facilities, housing education, safe water and clean water. Absence of these services leads to deteriorating health conditions, marked by high incidence of communicable diseases. This may lead to high morbidity and mortality rates, unhealthy population and unproductive labour force. This leads to an increasing demand for curative services. The result of this is escalating medical budget which is also aggravated by increasing costs of drugs and
equipment. This calls need to step primary health care strategy amongst other community based health and poverty alleviation strategies.

From the literature review, it is evident that education is a very important variable that affects health of the people. It will be important to find out to what extent it affects the health of the community in Makongeni location especially given that the sisal industry mainly attracts unskilled labour which in most cases has low level of education.

* Literature review reveals that protected water sources and adequate sanitation are better measures against the spread of cholera, typhoid and other sanitary related diseases. By studying the water sources and adequacy of sanitary facilities, it would be possible to establish a link between the two diseases and conditions prevailing in the area of the study. A possible causal relationship can therefore be established.
3.0 CHAPTER THREE: HEALTH POLICY AND STUDY AREA

BACKGROUND

3.1 Health Provision, Policy and Strategy

The Ministry of Health is responsible for running health services for entire population. The activities of the ministry are carried out at the levels of Kenya's administrative units. These levels are central, intermediate (provincial and district) and peripheral.

At the central level we have the head quarter where political, professional and administrative matters are coordinated and policy decisions made. Overall technical leadership is provided by the Director of Medical Services (D.M.S). The Director of Medical Services supervises all matters of preventive, promotive and curative health services. He is assisted by Deputy Directors who are responsible for various units, sections or divisions of health care activities.

The Provincial Medical Officer is the Ministry's health representative at the provincial level. In the province there is a provincial hospital. The District Medical Officer at every district coordinates all health services both governmental and no-governmental.

The District Hospital provides the logistics and technical support to the health centres and dispensaries in the periphery. At the community level
in divisions, locations and sub-locations, health centres and dispensaries provide basic curative, promotive and preventive services which are however clinic based.

In the ministry, there are sections geared towards areas such as manpower development, maternal and child health and family planning, curative and preventive services section which undertake responsibilities specific for each. Under the preventive section is the unit responsible for overall environmental health aspects of public health. There is also a section rural health services.

The organisational structure in the health delivery is such that smaller units (lower level of health facility) refers difficult cases to the health facility immediately bigger than itself and that the provincial hospital refer what cannot be managed at that level to the National Referral and Teaching hospital.

3.2 Health Status and Care in Kenya.
Kenya's high annual growth rate of population of 3.8% (W.H.O Report on Kenya 1988) ranks it among the countries that have the most rapidly growing population in the world. This is as a result of declining mortality and high fertility. Kenya's 21 million people will virtually double by the end of the century. About fifty percent of the population is
under fifteen years of age. This implies that the country has a high dependency ratio.

The provision of health is a basic need and an essential condition for overall economic development. The health status of the population can be assessed by a number of indicators including death rate, infant mortality rate, life expectancy at birth and the number of medical staff and facilities available per unit of the population. Considerable progress has been made in improving the health status of the population. The crude death rate is estimated to have dropped from 22 per thousand in 1962 to about 13 per thousand in 1987. Between 1948 and 1979 the infant mortality rates dropped from 184 to 87; but there is a wide variation in infant mortality rates within the country. It is estimated that 20% of the children die before reaching their second birth day. It is estimated that eighty children will survive to their fifth year. Estimates of infant mortality in Kenya during the period 1950-1980, show that infant mortality declined gradually from a level of over 150 per 1000 live births in 1950s to the present level of 80. Life at birth improved remarkably from 44 years in 1962 to an estimated 58 years in 1987.

Analyzing the figures representing the declining mortality rate, crude death rates and increasing life expectancy, it is reasonable to state that health
status in Kenyan population is improving. However, the positive signs of health improvement are limited to a certain percentage of the population in numbers and geographical terms.

While great progress has been made in the general status of Kenyans, there is still much room for improvement. The country's major health concerns can be classified into three groups:

(1) diseases of respiratory system: These include pneumonia, tuberculosis, bronchitis and whooping cough which are found mainly in high altitude areas; this group of diseases account for over 20% of all out-patient cases treated in health facilities;

(2) parasitic and infectious diseases: The major diseases include malaria (which is wide spread in hot lowlands around lake Victoria in western Kenya and coastal region), schistosomiasis found in irrigation schemes and other vector-borne diseases such as sleeping sickness, filariasis etc. These diseases are responsible for high morbidity and mortality rates, accounting for over 18% of reported deaths.

(3) diseases related to poor environmental sanitation: Such diseases include amoebiasis, enteritis and dysentery, intestinal parasitic diseases; intestinal diarrhoeal diseases. These accounted for 10% of all out-patient morbidity in 1980. Together these diseases account for nearly 70%
of all deaths reported and over 60% of total morbidity. About 33% of childhood deaths have malnutrition as contributing factor and approximately 20% of the reported deaths of children under five years are attributable to diseases which can be prevented by immunisation.

The Kenya Government has also improved the provision of health services substantially. There were 148 hospitals at independence. By 1987, however, the number had risen to 254. With the increase and expansion of health institutions, beds and cots increased from 11,430 at independence to 31,356 in 1987. By 1989 there were a total of 264 hospitals, 294 health centres, 1,553 sub health centres and dispensaries. The number of beds and cots were 3,2543.

In addition the government continued to expand training opportunities to promote career development for health personnel through continued education and on-the-job, refresher and residential training.

Given below is the table showing the growth in medical personnel of various cadres per 100,000 population in selected years.
Table (i): Registered Medical Personnel per 100,000 Population.

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3.3 Health Development Plans, Strategies, and Policy Trends in Kenya

The development of health is geared toward contributing to the long term objective of achieving 'Health for All by the year 2,000.' In meeting this objective, three important principles are to be taken into account: (a) to achieve cost effectiveness, the promotion of health awareness should lead to individuals and communities taking greater responsibility for their own health; (b) the achievement of the above objective should not be
viewed as largely a public sector concern (c) the belief that responsibility lies with the ministry of health is untenable. The achievement of sound physical and mental health must also rely on integration of basic services such as education, training, water and sanitation, distribution of basic food stuffs and feeling of mental, social and spiritual well-being for which other ministries and agencies are largely responsible. (National Development Plan 1989-1993).

In recognition of the fact that it is unlikely that any existing health service strategy could achieve this objective, the government endorsed the primary health care strategy with emphasis on rural areas where over 80% of the population lives.

In 1971 and 1972, a joint GOK/WHO mission formulated the proposal for improvement of rural health services in Kenya and the establishment of six rural health training centres. The MCH/FP programme was launched in 1974. Both projects ended in 1979. In 1982 the integrated Rural Health and Family planning project was launched. A community based Health care was unit was subsequently set up within this project. It is therefore evident that significant efforts have been made to provide adequate health coverage to the people particularly after independence.

The IRH/FP programme sets up a new inter-agency information and education programme for the promotion
of small families and strengthens Rural Health and Family Planning Services through improved accessibility and quality of rural health services aimed at reducing further mortality and morbidity in rural areas as well as fertility. This IRH/FP programme marks the beginning of MOH's largest scale involvement in supporting Community-Based Health Care schemes where it respects the principle that communities served by the community health workers (CHW) should play a decisive role in their development.

A number of publications touch on issues related to "Health For All Principle". These include the 1984-1988 Development Plan (published 1983), Health Strategy for Kenya (published in 1982) and the implementation plan of Rural Health and Family Planning Programme (the main vehicle through which most programmes are being implemented). The following aspects are brought to light in these documents:

- Increase in coverage and accessibility of health services in rural areas;
- Further consolidation of urban, curative, preventive and promotive services;
- Increased emphasis on maternal child health at the family planning services in order to reduce morbidity, mortality and fertility;
- Strengthening of ministry of health management capabilities with emphasis at district levels;
- Increase in inter ministerial coordination;
- Increase in alternative financing mechanisms.

The following strategies were to guide the implementation of the above stated policies:
- Increasing the provision of preventive and promotive services and improving methods of early detection and treatment of communicable and vector diseases, with emphasis on the groups at risk (i.e., children and mothers);
- Encouraging widespread community participation and mutual social responsibility of all Kenyans in health development process through primary health care;
- Increasing the number of workers receiving training in preventive and promotive health methods (environmental, nutritional, maternal and child health and family planning, communicable and vector borne disease control etc);
- Improving the facilities and management of outpatient services and the quality of in-patient services;
- Continuing the strengthening of planning skills at all levels with emphasis on the district level;
- Improving and consolidating various components of national health information
system (including data gathering, processing, analysis, reporting and dissemination methods;
- Continuing the development and strengthening of logistics and drug supply system;
- Pursuing an intersectoral, multidisciplinary approach to health care at all levels, with particular emphasis on increasing interministerial sanitation projects;
- Favouring projects which include innovative approaches to cost-sharing and alternative financing.

The present policy of the ministry of health is aimed at increasing the number of communities active in their own health care, encouraging more community participation, changing the altitude of health personnel towards PHC. To achieve these aims, the district medical officers in particular are charged with the responsibility of coordinating the PHC activities in the districts. The policy is explicit and guidelines for the implementation of the policy if closely followed by all involved in improvement of primary health care will go a long way in achieving the goal.

3.4 Community Involvement in Health
The following steps have been taken to initiate community-based health care on a national scale:
(1) Setting up of a unit in the ministry of health to coordinate planning and training;

(2) Orientation of district development committees, district health management teams and other health extension workers;

(3) initiation of Community Based Health Care (CBHC) in one rural health unit per district by:
   (a) meeting with communities;
   (b) creating a health committee to assess priorities;
   (c) selecting individuals to be trained as community health workers and working out their remunerations;
   (d) commencing environmental improvement and income-generating activities;

(4) Training of the facilitators in provinces and districts;

(5) Training of trainers for community health workers at rural health units;

(6) Elaboration of training programme for CBHCWS and traditional birth attendants (TBAS);

(7) setting up a joint coordinating committee between the Ministry of Health and NGOs working in the district CBHC;

(8) WHO/UNFPA support in the form of supplies and equipment, manpower development and training etc;

(9) consultancy services: A notable example is the
services of a WHO medical officer STC/PHC, October-December 1884, activities had been launched in 12 of 13 districts. Nineteen communities had been involved and beneficiaries numbered over 500,000. Facilitators from 10 districts and 5 rural health training centres had been trained by the end of 1984 and the training of the community health workers had started in at least four districts. Courses for traditional birth attendants (TBAS) had been conducted in 26 districts.

3.5 The community-based (primary) Health care approach

The international conference on primary health care, jointly sponsored by W.H.O and UNICEF in 1978 defined primary health care (PHC) as: essential health care based on practical, scientifically sound and socially acceptable methods and technology, made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self reliance and self determination. It forms an integral part of both country's health system, of which it is the central function and main focus and of the community. It is first level of contact of individuals, the family, and the community
with the national health system, bringing health care as close to as possible to where people live and work, and constitutes the first element of continuing health care process.

Kenya is a party to the declaration and the resolutions of the conference. The community-based approach envisages, a situation in which the health system and the community are partners, collaborating in the business of establishing services. It implies active participation by the communities in decision making regarding the organisation and the types of services at the community level. It implies a state of mobilized community interest and support and not simply placement of a health facility in the community for clinic-based services. Its greater potential is in health promotion and disease prevention, since these touch on the behaviour that would change the health picture in a community.

Primary health care is seen as a system which inculcates into the community the realisation that they themselves have the greatest potential to improve their health status through community mobilisation and participation in identifying community health problems and in planning and implementing interventions to solve these problems making use of the available community resources. Primary health care has seven principles:
Primary health care should be shaped around the life patterns of the population it should serve. The local population should be actively involved in the formulation of health care activities so that health care can be brought into line with local needs and priorities. Health care offered should place maximum reliance on available community resources, especially those which have hitherto remained untapped, and should remain within the stringent cost limitations that are often present. Primary health care should be an integrated approach of preventive, curative, and promotive services with for both the community and the individual. All health interventions should be undertaken at the most peripheral practicable level of health services by the worker most simply trained for this activity. Other echelons of services should be designed in support of the needs of the peripheral level, especially as this pertains to technical, supply, supervisory and referral support. Primary health care services should be fully integrated with the services of other sectors involved in community development (agriculture, education, public works, housing and communication). Kirigia 1985
3.6 Background of the Study Area

Nakuru district, with an area of 7,200 sq.km, is located between 35 degrees 28' and 36 degrees 35' East and 0 degrees 13' north and 1 degree 13' South. The district is one of the thirteen districts of Rift valley province and lies in the Great Rift Valley and borders seven other districts; Kericho to the west, Baringo and Laikipia to the North; Nyandarua to the east; Narok to the south west; and Kajiado and Kiambu to the south. (see map (1))

Most of the district lies within the Great Rift valley and most of it is over 1800 metres above the sea level. The geographical features of the district have been greatly influenced by faulting and volcanic activities. There are dormant and extinct volcanoes like Longonot (2,774) and Menengai (2,280). Faulting within the district is evidenced by such features as Aberdares and Mau Escarpments and Rift Valley lakes such as Nakuru, Naivasha and Elementaita.

Historically, the district lies in the former 'White highlands', an area which until 1960 was reserved for European farming. The district is characterised by large scale farming. The distinguishing feature of the district from other scheduled areas is dominance of mixed farming. In Kenya's economy, the district has been chief supplier of high quality livestock products as well as other
agricultural products which make an important contribution to the national economy.

3.7 Rainfall.

Throughout the district, the long rain fall between March and June with peak periods between April and May. Short rains fall between the months of October and December. The amount and the timing has however differed from year to year greatly affecting yields and pastures especially in the lower and more marginal areas on the Rift Valley floors.

3.8 Soils.

The distribution of soil types in the district is complex having been influenced by extensive variation in relief, climate, volcanic activity and underlying rocks types. The soil are derived primarily from weathered volcanic and basement system rocks with numerous local variations and mixtures. The major soil types are Andosols derived from ashes; Cambisols - rich and young soils showing little profiles development; Regasols - soils formed from loose materials; Phalozens - soils having topsoil rich in organic matter; and Lithosols - soils limited in depth by rock within 10 centimetres. The nature of the soils, coupled with steep slopes, heavy rains and intensive land use in the district easily lead to soil erosion.
3.9 Ecology and Water Resources

There is a considerable variation in climate throughout the district. Throughout the district, the long rains fall between March and June with peak periods in between April and May, short rains fall between the months of October and December. The amount and timing has however differed from year to year greatly affecting yields and pastures especially in the lower and more marginal areas on Rift valley floor.

In the Rift Valley floor the maximum mean temperatures are between 26 degrees and 30 degrees while on the Western highlands Molo and Olenguruone temperatures fall to 18 degrees. Nakuru district can be divided into three climatic zones.

Zone I: Rainfall of over 1015 mm annually, humid to semi-humid equatorial climate with a moisture index of less than 10. This zone covers Mau Narok, Molo, Olenguruone and lower Subukia.

Zone II: Rainfall of 760-1015 mm annually, dry sub-humid equatorial climate with moisture index of 10-30. This covers Bahati, Subukia Njoro, Kinangop and parts of Rongai.

Zone III: Rainfall of less than 760 mm annually, semi-arid climate with moisture index of 30-42. This zone covers Gilgil, Naivasha, Longonot, Solai, Lanet and parts of Rongai.
The only large rivers in the district are the Molo river in the North which flows into lake Baringo and the Malewa river which originates in the Aberdare ranges in Nyandarua and drains into lake Naivasha and is a source of water for Nakuru town. There are other small streams which dry up during the dry season and are not dependable for water supply. Because of the shortage of surface water, for domestic use more reliance has been put on the use of ground water. Many boreholes were drilled in the area especially during the colonial period and most have become disused during the subdivision of farms. These constraints and large influx of people into the settlement areas in the district has seriously strained both surface and ground water sources and supplies.

3.10 District Population

In 1979 the population of the district was 522,709 compared to a population of 290,853 in 1969; an average increase of 6% per annum. This rate was well above the national average of 3.4%. Over half the district's population in 1979 was born elsewhere and can be considered migrants into the District. The projected 1993 district Population is 1,074,546.

In 1979 46% of the district's population comprised of children below age 14. This has been estimated to be 49% of the population in 1988, and 1990. In 1993 children below this age is projected to
comprise 48% of the population. This percentage is the total of the 15-59 age group. This is an indication of high birth rate over the fourteen year period between 1979 and 1993. Rongai division within which the study area falls is projected to have 68,655 people by the year 1993.

3.11 Health Facilities in the District

The district has in total seven hospitals (1989) which are government and institutionally owned. The district had 18 health centres (1992) and 45 dispensaries (1989). In terms of absolute numbers these facilities might look sufficient but many of them are institutional and serve only limited populations, for example Army, NYS, Anti-stock theft unit, schools and colleges and large agricultural; concern. Most of the health centres were started in old houses on harambee basis. The table below shows the distribution of health facilities in the district (see map 2).
Source: Nakuru dist. dev. plan

Njoroge P. M.A. Planning 1993

NAKURU DISTRICT HEALTH FACILITIES

MAP 2
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<thead>
<tr>
<th>DIVISION</th>
<th>NUMBER OF HEALTH CENTRE</th>
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<tbody>
<tr>
<td>Municipality</td>
<td>1</td>
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<td>Bahati</td>
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<td>Naivasha</td>
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<td>Njoro</td>
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<td>Molo</td>
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<td>Gilgil</td>
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<td>Rongai</td>
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<td>Olenguruone</td>
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<td><strong>Total</strong></td>
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source: Ministry of health Nakuru 1992

The district has in total 103 public health technicians and 10 public health officers. The table below shows the distribution of public health technicians and public health officers in the district.
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<td>12</td>
</tr>
<tr>
<td>Rongai Division</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Njoro Division</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mbogoine Division</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Olenguruone Division</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>103</strong></td>
</tr>
</tbody>
</table>

Source: Ministry of Health Nakuru 1992

3.12 Makongeni Location

This is predominantly sisal growing area as the name suggests. The location borders with Baringo district to the north and west. To the east it borders Bahati division and to the south Kampi ya moto location. (see map 3)

3.13 Economic Activities in Makongeni Location

The main economic activity undertaken is sisal growing. The sisal is grown in large scale by two main companies; Banita group and Migotiyo plantations. The Banita group runs four estates and a spinning factory.
These estates include: Lomolo, Athinai, Banita and Majani Mingi. The spinning factory is situated in Majani Mingi estate. The spinning factory processes sisal fibres into final products like coffee bags, tea bags, sisal twine, coffee dry cloths, ropes etc. Migotiyo plantations runs Alphega estate and which is bigger than any single estate under Banita group of companies. Both companies have coffee estates. In each estate there are retail shops which serve the commercial needs of the people. The workers mainly depend on incomes from the sisal estates for survival.

3.14 Agro-Ecological Zoning
In terms of agro-ecological zone the area is found in upper midland zone 4 i.e sunflower-maize or upper sisal zone (See map 4). The first rains normally start at the end of March. The second rains start around the end of June. Large scale sisal cultivation is normally done in the drier subzone with weak rainy seasons. The soils are normally of high fertility. They are well drained, moderately deep to deep, brown to dark brown, very friable, loam to sandy clay loam. 
(Jaetzold and Schmidt: Farm management hand book 1982)

3.15 Settlement patterns
In each estate there is a village where the workers live. The houses constructed by the estate are in linear form. The houses constructed by the workers
Nakuru District - Simplified Agro-Ecological Zones

Wheat Pyrethrum Zone
Sheep Dairy Zone
Livestock Sorghum
Sheep Dairy Zone
Wheat-Maize zone
Wheat-Maize zone
Sheep Dairy Zone
Forest
Ranching zone

District boundary
Zone
Roads
Town
Lake
Crater

Source: Nakuru district development plan.
themselves do not have any well defined pattern. The villages are named according to the names of the estates. The main villages are therefore: Athinal, Banita, Majani Mingi, Alphega and Lomolo. Within the main villages, there are sections of the villages which bear different names.

3.16 Population in Makongeni Location

The estimated population of the villages by 1991 are as follows:

Table (iv): population Distribution in Makongeni Location

<table>
<thead>
<tr>
<th>Village</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphega</td>
<td>3,000</td>
</tr>
<tr>
<td>Athinal</td>
<td>3,500</td>
</tr>
<tr>
<td>Lomolo</td>
<td>4,000</td>
</tr>
<tr>
<td>Banita</td>
<td>4,500</td>
</tr>
<tr>
<td>Majani Mingi</td>
<td>5,000</td>
</tr>
</tbody>
</table>

Source: Local Chief office
4.0 CHAPTER FOUR: HOUSEHOLD CHARACTERISTICS

Socio-Economic Characteristics of Households

Deficiencies and constraints in provision of health services are functionally related to the economic and social structures of the society. The poor and other vulnerable groups in any given society tend to suffer most from economic recession.

4.1 Household size

Parents with smaller families are in a better position to provide economic, social and emotional support for their children, all of which contribute to a healthy living. Depending on family's economic status, the more people there are to be fed, the smaller the amount is available for each individual and the poorer the quality of life. An analysis of the household size showed that the average household size was five. Household size ranged from one to twelve.

4.2 Economic Constraints

Economic constraints may hinder people from receiving the type of health services they would like to have. Even where users of health services are not charged, the cost of transportation and time away can be prohibitive to the poor. Accessibility of an individual especially to private clinics is to a
larger extent determined by the ability to pay for the service; though the quality of services provided also matter. In any community, general health is determined by the socio-economic status of the people. Ikiara (1988) found that over 60% of those who seek medical care in public facilities earn income between ksh 700-2500 per month. This shows that the cost element is an important factor in determining the distribution of patients to health facilities. In the area of study, 80% of the respondents could not seek medical services from private clinics due to lack of finance, which is a reflection of cost element. (see figure 1)

**Figure (1): Household Annual Income Levels**
The type of occupation one is engaged in is a good indicator of an individual economic status. A person with a well paying job is normally able to provide better housing, nutrition and general health care to the family. The fact that majority of the villagers are sisal estate workers where the monthly household income is ksh 800; this means spreading this income to meet individual needs like better housing, nutrition, sanitation cannot be possible. An analysis of the occupation of the head of household shows that majority of the people interviewed (87%) were workers in the sisal estates. With monthly household income of Ksh 800, it is difficult for such people to afford better housing, nutrition and sanitation. Even affording health services where payment has to be made is difficult. (see figure 2 showing the household head's occupation)
4.3 Social Cultural Factors

Community's beliefs, practices and their concept of health and diseases as well as illness determine whether to seek health care or not. Defecation behaviour in some communities are strongly entrenched in the cultural beliefs e.g where cases of sharing toilets with in-laws is not allowed.

Religion also affects health in some ways e.g in case of catholic faith, it demands that catholics should practice natural family planning. This has a negative impact on the level of acceptance of non-
natural method of family planning.

An analysis of the religion of the head of household shows that 46% of the people in the study area are protestants while 45% are catholics; 1% muslims and 8% from other religions. See figure 3 showing the religion of the head of household.

Due to a large proportion of the catholics, its very important any family planning intervention in the area of the study, to give catholic faith attention it requires failure to which the intervention is likely to fail.

Figure 3: Religion of the household head
4.4 Education

A fertility survey (1982) carried out by central bureau of statistics found that among the factors which affect child survival is the educational attainment of the mother. A world bank paper (1984) also notes that improved levels of female education also plays a critical role in reducing infant mortality rates. Education generally improves the health behaviour and help to, prevent illness.

Education is known to speed up cultural change by creating more awareness and understanding. This has influence on the basic social needs, such as water, sanitation, health and social-economic status.

Level of education affects health through a number of channels. Education increases productivity too. The higher income resulting from increased market productivity should lead to increased expenditures on food, housing and medical care, with improved health as a consequence. Likewise for a given expenditure on such market goods, higher non-market productivity should result in more efficient conversion of market goods into the final consumption good health, through more nutritious diets, more consistent sanitation, earlier diagnosis of illness and more effective purchase of drugs and medical care. It is important to note too that increased education might increase the value people place on health (without
increasing either their earning power or their effectiveness in converting food, sanitation and medical care into health) and hence lead them to devote more of their time and resources to health. The average level of education in a community may affect the health of individual members. Any individual should typically experience better health in a community where the education levels is higher. This will result partly from the fact that a better educated community will want and be able to afford better public health, water and sanitation facilities and partly because better educated individuals and their families will have better 'private' health and hence will be less likely to be a source of communicable diseases (World bank staff paper no.405 July 1980).

Most studies find parental educational level to be positively associated with the nutritional status of their children. A study by Christiansen et al; 1974 in Bogota Columbia using education measures of mother's and father's years of school and mother's literacy, found a significant positive association between all three education measures and the child being well nourished (defined in terms of both weight and height and height for age). There was also a positive correlation between all education measures and child's height for age and weight for age.
separately. A study by Shuey et al. 1977 in South Africa found a strong positive correlation between years of school of the head of household and weight for age of children below two years.

Education of more than eight years has been found to have a positive influence in mortality, morbidity, fertility and life expectancy. Studies on non-clinical intervention for diarrhoeal control have indicated that better educated communities enjoy relative protection against several diseases compared to less educated but otherwise similar communities. This protection may be conferred both by general education and by disease specific education of the head of the household. The effects of improving personal hygiene on diarrhoeal morbidity have been studied and indicate that educational attainment and certain religious customs predisposed communities to diarrhoea because of behavioral factors. (Dr Johnson Muema 1992)

Lewis et al. (1976) argues that although a variety of social and ethnic differences have been noted, education has been the most consistently observed factor influencing medical utilisation. A person with more education uses more preventive methods and have higher average use of medical facilities and are more likely to take advantage of new medical programmes.

An analysis of education levels in Makongeni location shows that 33% of the respondents had no any
formal education; 56% had primary education and 11% secondary education. See figure (4) showing the household's head level of education. It can be concluded that Makongeni location has a population which has a low level of education.

Figure 4: Household head education level

With this low level of education (33% with no formal education) and 56% with primary education, people may not place value on certain variables that affect their lives e.g. they may not know the risk they expose themselves to by bathing in stagnant water. It
is possible too for people with such a level of education to lack understanding on certain functions of food in the body. They may assume that "a full belly" is all that is necessary for food to provide good health. This could be one of the contributing factors for malnutrition in the area of the study which is quite common as will be noted later in this chapter.

Facilities for personal and domestic hygiene when used by the people tend to optimize the potential for health. Body cleanliness, most importantly hand washing after defecation, is necessary to break chain of faecal-oral and other infection, and to reduce skin and eye infection. Lack of washing facilities may cause some diseases e.g skin diseases, eye diseases e.g trachoma or may force people to go and bathe in pools of water with snails thereby risking transmission of schistosomiasis. The desire to attain personal hygiene may be limited by lack of bathing facilities.

In the area of the study people bathed in different places. 51% of the respondents used bathrooms for bathing. Of this 51% only 33% used permanent bathrooms provided by the estates where they are available. Other places for bathing included: inside the house 14%; outside at night 17% and in the river 18%. This analysis shows that there are no
Figure 5: Household place of bathing

In Lomolo village it was observed that some people were bathing in stagnant water in dams. This exposes such people to risks of diseases like schistosomiasis. Some people were also bathing and washing clothes in the rivers especially in Athinai and Alphega villages. This practice pollutes the river water which is used for domestic consumption. See plate (i)
Plate 1: People washing and bathing in the river. This pollutes the river water especially during the dry period when the water volume is very small.

4.5 Methods of Refuse Disposal

Proper disposal of refuse is very important since rubbish can act as a breeding place of disease causing vectors e.g. mosquitoes, houseflies etc. So proper disposal of refuse does not only provide a good environment for living in, but also help in reducing possible living and breeding places for disease causing vectors like house flies and mosquitoes. Adequate and safe disposal of solid domestic wastes discourages breeding of insects and rodent vectors of
disease, protects people against poisonous substances and objects likely to cause accidental injury, and promotes a more pleasant living environment. Inadequate storage, collection, and disposal of solid wastes can generate a number health hazards, especially through insect and rodent vectors of diseases, for which organic and other refuse serve as food supply, nesting places, and breeding sites. Improperly discarded appliances, vehicles, bedding and toxic substances involve hazards of fatal accidents, poisonings, suffocation, cuts and other injuries, with accompanying infections, especially on unwary children. In the area of the study there were two main methods of refuse disposal. 25% of the respondents threw the rubbish in the open land while 75% threw into open pits and later burnt.

4.6 Housing

Healthful dwellings provide facilities for safe preparation and storage of food, so that householders can employ sanitary food-handling practices. Feeding in the home is a concern in community health, because nutritional states are closely related to resistance to disease and because contaminated food as a medium through which a number of bacterial, viral, protozoa, and helminthic disease
may be transmitted. Apart from contamination from outside the home setting, domestic exposures are connected with use of non-potable water; poor practices in drying, storing, handling, and preparing food; inadequate cooking; and inadequate cleansing of vessels and utensils. According to a World Bank paper (1980) it is stated that when people live in poor houses located in crowded, insanitary surroundings, communicable diseases spread easily and high mortality and morbidity rates in turn.

 Adequate housing provides structural safeguards against transmission of diseases including space adequate to avoid overcrowding. The design structural characteristics and maintenance of the dwelling affect how well residents are protected against communicable diseases. Dirty floors, material, that encourage the breeding and nesting of disease vectors, and inadequate screening of openings are of concern. Overcrowding, particularly in conjunction with impoverished life styles and inadequate facilities, has been implicated in transmission of tuberculosis, pneumonia, bronchitis and gastro intestinal infections; air borne infections are encouraged when people sleep together in poorly ventilated rooms. Indoor air pollution is one of the causes of chronic respiratory diseases which is estimated to have a total global morbidity of 30 million. Indoor air
pollution is estimated to contribute to approximately 50% of all chronic respiratory diseases. Indoor air pollution is estimated to lead to morbidity and mortality of 15 million and 500,000, respectively annually.

Overcrowding as an aspect of housing condition contributes to high prevalence of tuberculosis. Of the total global tuberculosis morbidity of 25 million, 10% is attributable to overcrowding. It is approximated there are 2.5 million and 100,000 annual cases of morbidity and mortality attributed to tuberculosis which results from overcrowding. (source: Housing--The implication for health. Report of WHO consultation, Geneva 9-15 June 1987).

Biomass fuels (wood, crop residues, manure etc) are used by about half the world's population as the major, often only source of domestic energy. These fuels are mostly burnt under primitive inefficient conditions producing large quantities of indoor pollution which is harmful to health. WHO statistics have shown that acute respiratory infections are one of the major causes of infant mortality in developing countries. Preliminary estimate indicate that as many as 600 to 800 million people are affected by in door air pollution from combustion of biomass fuels and coal. (source: Control of Environmental Health Hazards WHO 1987).
A survey done on the house types showed that a large proportion of the community lived in grass thatched and mud walled houses. 49% of the individuals were living in grass thatched and mud walled houses; 12% sisal poles thatched houses and mud walled; 6% iron sheet roofed and cement plastered walled houses; 33% iron sheet roofed and stone walled houses. Observation made on the distribution of houses, shows that majority of the houses especially grass thatched and mud walled ones were crowded. This was mainly observable in Majani Mingi village and Banita village. (See plate 2). The congestion of the houses and having of the whole family in a single room creates an enabling environment for the spread of infectious diseases.

Plate 2: Congested houses in Majani Mingi village mainly made of grass and mud
Table (v) : House Types

<table>
<thead>
<tr>
<th>House Type</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>grass thatched (roof-grass wall-mud)</td>
<td>49%</td>
</tr>
<tr>
<td>Sisal thatched (roof-sisal poles wall-mud)</td>
<td>12%</td>
</tr>
<tr>
<td>Semi Permanent (roof-iron sheets wall-mud and cement)</td>
<td>6%</td>
</tr>
<tr>
<td>Permanent (roof-iron sheets wall-stones)</td>
<td>33%</td>
</tr>
</tbody>
</table>

Source: Field survey 1992

With the houses in the study area being mainly grass thatched and mud walled; and having no separate kitchens and given that wood fuel is the main source of energy, these create an enabling environment for spread of respiratory diseases. The indoor pollution emanating from wood burnt in the house that acts as a kitchen, sitting room and bedroom is likely to be a major source of respiratory infections.

Adequate sleeping space is defined as two or less persons per room on the basis of previous evidence that this number was associated with low morbidity with respect to rheumatic fever and heart disease. (Anabwani, G.M and Mpanju 1992). Using this measure, since majority of the houses had one sleeping
room, it can be concluded that the workers are not adequately provided with housing for better health. With a single room where cooking and sleeping take place and with an average household size of five, overcrowding is likely to create a conducive climate for the spread respiratory infections. Housing could be one of contributory factor for high prevalence of respiratory problems which rank the second after malaria as the major diseases treated in health facilities.

4.7 Mortality and Education

Mortality rate is one of the health indicators. A low mortality rate is assumed to reflect a good health status of the population and the converse is true. Different diseases tend to have different mortality patterns. The table below on mortality in Kenya shows that infectious and parasitic diseases are a major cause of mortality followed by diarrhoea. Table (i) shows mortality rates for selected diseases 1972, 1982 and 1992.
Table (vi): Mortality Rate for Selected Diseases 1972, 1982 and 1992

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Rates</th>
<th>Cases</th>
<th>Rates</th>
<th>Cases</th>
<th>Rates</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infeco. Diseases</td>
<td>48.06</td>
<td>156</td>
<td>48.43</td>
<td>156</td>
<td>47.6</td>
<td>156</td>
</tr>
<tr>
<td>Respiratory</td>
<td>14.48</td>
<td>47</td>
<td>13.08</td>
<td>41</td>
<td>13.08</td>
<td>41</td>
</tr>
<tr>
<td>Circulatory</td>
<td>8.55</td>
<td>29</td>
<td>8.13</td>
<td>26</td>
<td>8.12</td>
<td>26</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>12.61</td>
<td>41</td>
<td>13.28</td>
<td>42</td>
<td>13.27</td>
<td>42</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>2.30</td>
<td>8</td>
<td>2.5</td>
<td>8</td>
<td>2.55</td>
<td>8</td>
</tr>
<tr>
<td>Digestive sys Dis.</td>
<td>6.35</td>
<td>21</td>
<td>6.34</td>
<td>20</td>
<td>6.34</td>
<td>20</td>
</tr>
<tr>
<td>Disorders</td>
<td>1.30</td>
<td>6</td>
<td>1.87</td>
<td>6</td>
<td>1.96</td>
<td>6</td>
</tr>
<tr>
<td>Cereb Vasc</td>
<td>5.08</td>
<td>16</td>
<td>5.0</td>
<td>16</td>
<td>5.06</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: WHO report on health in Kenya 1989

Estimates of proportion of children dying at one year in the first five years of life for Nakuru district is 57.0 while the national average is 75.5 per 1000 live births. This shows that the proportion of children dying at one year in the first five years for Nakuru district where the area of the study falls is below the national average. In Makongeni location
there is a high rate of death of children below one year. An analysis of deaths registered in Lomolo village by chief's elder (1992) shows that of the 37 deaths registered 23 (62%) were of children of one year and below; 19% were of children above one year to five years; 19% were of people beyond age five. See figure (6) on mortality in Lomolo village.

Figure 6: Deaths in Lomolo village.

This shows that 81% (30) of the total number of deaths that occurred in the village were those of children of five years and below.

The same trend was true of Banita and Majani
Mingi. Death registration obtained from the assistant chief in charge of the two villages shows that 93% of all deaths registered were of children of age five and below; while 7% were of people above five years of age. In these two villages, 44% of all deaths were of children of age one and below.

In Lomolo village, majority of the symptoms of the disease that killed were diarrhoea and vomiting (chief's elder record). In Lomolo village for the respondents who answered that they had lost a member of the family through a disease for the last five years, 43% attributed the cause of the death to diarrhoea. In the whole of the location, for those who had lost members of the family 30% attributed the cause of the death to diarrhoea. This shows that a good proportion of the deaths of children below age five could be due to diarrhoea related diseases.

Ronald and Burkhat (1981) note that studies in Lagos have indicated that level of education among parents are correlated with lower child mortality rates. Thomas Merrick (1976) notes that maternal education accounted for a large share of mortality decline between 1970 and 1976 than any other single factor including access to piped water in urban Brazil. He concluded that:

1) That exogenous variables (education of mother and father) had the greatest effect on the difference in
child mortality and that most of this effect was direct.

2) That access to piped water had significant but secondary impact on the difference in child mortality; accounting for about one-fifth of such differences.

A cross tabulation of respondent's education and whether the respondent had lost a member of the family for the last five years, gave the following results: 49% of the respondents who had primary education had lost at least a family member through a disease. For those who had secondary education, only 14% had lost a family member. (See figure 7 on mortality education relationship)
In attempt to find whether the relationship between education and mortality is statistically significant, a null hypothesis (Ho:) and alternative hypothesis (Hi) were set.

Ho: There is no significant variation of mortality with education;

Hi: There is significant variation of mortality with education.

Testing the hypothesis at significance level of
0.05, the observed chi-square was 6.96 while chi-square expected was 5.99. Since the chi-square observed was greater than chi-square expected, the null hypothesis is rejected and the alternative adopted, that is there a significant variation of mortality with education. This shows that there is a significant variation of mortality with education. The variation was such that as the level of education increased, mortality tended to decline. See figure 8 on mortality variation in selected villages.

In attempt to find whether variation in mortality was statistically significant across the villages studied, two hypotheses were set:

Ho: There is no significant variation in mortality between the villages.

Hi: There is a significant variation in mortality between the villages studied.

Testing the hypothesis at significance level of 0.05, the observed chi-square was 8.53 while the expected chi-square was 9.49.

Decision: Since the chi-square expected is greater than chi-square observed, null hypothesis is accepted. This therefore means at 0.05 level of significance, there is no significant variation in mortality across the villages. This could be explained by the fact that the socio-economic conditions tend to be the same in
all villages. The salary scales used for different cadres of workers especially in villages under Banita group of companies are the same. In all the villages water is not treated and sanitary facilities are generally poor as will be shown later. See figure 8 on variation of death in villages.

Figure 8: Mortality variation in villages

Banita and Athinali villages which had health facilities nearby had lower percentage of cases of death as can be depicted above among the sampled households. This could be because, the health facilities being near and therefore accessible
geographically, any body sick, can seek treatment promptly and therefore avert the danger of the disease becoming more acute and terminal at a later stage.

4.8 Nutrition

Good nutrition has been accepted as one of the prerequisite for good health. Nutritional status vary from one district to another in Kenya. Nutritional survey carried out in 1982 and 1987 by central bureau of statistics ranked Nakuru district in fourth position (1982) and tenth position in 1987 in terms of nutritional stunting. The district had percentage of nutritional stunting above the national average. For instance, while the national average percentage of nutritional stunting was 24% and 19.6% respectively for 1982 and 1987, that of Nakuru district was 34.5% and 24.2% respectively. (rural child nutritional survey 1982 and 1987).

Lotham, M.C. notes that cases of fatality rates for measles, whooping cough and other infectious diseases of childhood are often high in Africa than in industrialised countries because a malnourished child is often overwhelmed by infection whereas well nourished child often can combat it and survive. He notes that malnutrition has its effects in a number of ways. The most important being that malnourished child has reduced ability to resist and to defend
itself against infections. This occurs through reduced antibody formation, lowered Leucocyte response and lessened efficiency of polymorph. Although malnourished children frequently have increased immunoglobulin levels, they often have depleted cell immunity. This is presumably why the malnourished children are easily overwhelmed by infections. He notes farther that immunisation may be less effective in malnourished than in well nourished children'.

Derrick B. Jelliffe and E.F patrice Jelliffe (1989) note that the commonest type of malnutrition in which diarrhoea plays an important part are protein-energy malnutrition (PEM) including the two main severe forms, marasmus and kwashiorkor and vitamin A deficiency. They further note that acute dehydrating diarrhoea is a common condition, which can occur at any age and which causes an estimated 4-5 million deaths each year throughout the world. Young children in the first two years of life are the most commonly and seriously affected particularly in developing countries, where diarrhoea is frequently associated with malnutrition. It is most likely to prove fatal in undernourished children. Diarrhoea itself frequently leads to severe malnutrition owing to low food intake resulting from poor appetite, vomiting and unnecessary stopping of feeding as a means of treatment. The risk of malnutrition increases with repeated attacks of
diarrhoea in already poorly nourished young children.

Child nutritional survey conducted by CBS (1982) found out that "generally higher prevalence of malnutrition by district were associated with higher rates of mortality and morbidity, and with greater percentage of children with uneducated mothers. At district level, mortality was closely associated with nutritional status where sickness rates were average or below average, but relationship was less strong in areas of high morbidity. Areas with high prevalence of malnutrition overlapped substantially with those where malaria was widespread".

Data obtained from maternal child health care (MCH) in Mogotio health centre in 1984, 1991 and 1992 shows that cases of malnutrition are common among children below age five. Cases recorded in the health centre were of severe forms of malnutrition which manifests itself through marasmus and kwashiorkor. Majority of the cases recorded were of kwashiorkor which is a sign of deficiency in protein rich food in the diet of children. The figure shows that there were many cases of malnutrition in 1991 than in 1992. This could be explained by the fact that unlike in 1991, in 1992 the estate employees were allowed to grow beans between the rows of young sisal plants. The beans so harvested could have formed a very important source of protein and thereby leading to lower cases of
kwashiorkor that year. It can also be noted from figure (9) that the largest number of malnutrition cases was recorded in 1984 when there was a major drought in the country. This shows that malnutrition in Makongeni could mainly be due to inadequate food intake especially those that are rich in protein. (See figure 9).

Figure 9: Marasmus and Kwashiorkor cases
These were severe cases of malnutrition. There possibly could be many cases of mild malnutrition. The
year 1984, tended to be the year with the largest number of malnutrition cases. This can be explained by the fact that it was the same year when Kenya experienced one of its worst droughts. Due to this, food had become a scarce commodity. This means therefore most of the families could not meet minimum food requirements for a healthy living, and hence the higher number of malnourished children. The same year recorded the highest mortality rate among children under five years of age. (Source: village health committees). This shows that malnutrition could be one of the underlying causes of death among children below age five. The malnutrition could be due inadequate food intake and lack of proteins. Comparing figure 8 and figure 9, a relationship between mortality and malnutrition emerges; villages with high cases of malnutrition tended to have high mortality rates. For instance lomolo village had the highest percentage of mortality rate from the survey and yet had the highest number of malnourished children in 1984 compared to the other villages. This further, confirms that malnutrition could be one underlying causes of death of children under the age of five.

4.9 Link Between Mortality and Nutrition
As can be seen from figure 10, poverty leads to malnutrition which in turn leads to decreased resistance to diseases. With decreased resistance, high death rates for children result and the cycle repeats itself.

In international Encyclopedia volume 5 highlights malnutrition as widespread and persistent bother in the underdeveloped areas and is responsible for much of the high mortality in these areas, whether by itself or in combination with infectious diseases of various types.

Lotham (1976) notes that in New York city in summer months 1892, the infant mortality rate was 340 per 1000 and diarrhoea accounted for half these
deaths. He notes that measles is a severe disease with a case fatality rate around 15% in many poor countries, because the young children who develop it have poor nutritional status, lowered resistance and poor health. He attributes the difference in the clinical severity and the fatality rates from measles in developed and developing countries to differences in the state of nutrition.

PR Puffer and C.V Serranno note that the intra-American investigation of mortality in childhood showed that of the 35,000 deaths of children under five years of age in ten countries, 57% had malnutrition as either underlying cause of death.

Given that there was a high mortality of children below age five and the fact that malnutrition was common in all villages; and given that high mortality in 1984, coincided with largest number of the malnourished children, it is possible that malnutrition could be one underlying factor for the high mortality of children below age five.

4.10 Education and Sanitation Practices

A study done in Botswana indicated that the method of excreta disposal was strongly correlated with education of the head of the household. A cross tabulation of the level of education of the head of the household and waste disposal method used showed
that of the 42 respondents interviewed who had no formal education, 69% used pit latrine; 31% bush. For those who had primary education 79% used pit latrine and 21% bush as a means of excreta disposal. For those with secondary education 93% used pit latrine and 7% bush. This shows that people with formal education tended to use proper means of human waste disposal method than those without. Use of bush as a means of waste disposal tended to decline as the level of education increased. At the same time increased utilisation of latrine tended to increase with the level of education. This shows that education has some influence on the human faecal disposal. (See figure 11)
Figure 11: Education and Faecal Disposal Method Relationship

On adoption of improved ventilated pit latrine, there was a high adoption rate among those who had at least primary level of education. Out of the households interviewed who had no formal education none used improved pit latrine; of the people interviewed who had primary education 3% of them used improved ventilated pit latrine; while of the people interviewed who had secondary education, 14% of them used improved pit latrine. This shows that educated people are more receptive to new human waste disposal methods than the uneducated. These improved ventilated
pit latrines were individually owned since the estate managements in all the sisal estates do not provide such kind of toilets.

In trying to find whether the relationship between education level and waste disposal method used, was significant, two hypothesis were set up i.e null hypothesis (Ho:) and alternative hypothesis (Hi)

Ho: There is no significant relationship between education level and human waste disposal method used;
Hi: There is a significant relationship between education and human waste disposal method used.

Testing the hypothesis at significance level of 0.05, the observed chi-square was 10.29 and the expected chi-square 12.59.

Decision: Since the expected chi-square is greater than observed chi-square, the null hypothesis is rejected. There is therefore no significant relationship between education level and human waste disposal method used at 0.05 level of significance. This could be attributable to factors like inadequacy of toilets, unhygienic conditions of the toilets could have strong influences which would influence the waste disposal method adopted. This is because even if one is aware of the dangers of improper disposal, with toilets being dirty and being inadequate, he or she might be tempted to use bush. All this, will tend to reduce the strength of education influence on waste
disposal method used. In places where there are no toilets or are inadequate, the educated and uneducated are likely to use bush.

A cross tabulation of the respondents' education and method of the child's stool disposal gave the following results. 75.8% of those respondents who had formal education used proper method of disposal; 24.2% had improper method of child stool disposal. For those who had primary education 75.9% used proper methods child stool disposal method and 24.1% used improper method.

All the respondents who had secondary education used proper methods of child stool disposal. This shows that secondary education has a positive relationship with the proper method of children stool disposal. Testing of the hypothesis that education has a significant relationship with children waste disposal method at 0.05 level of significance using chi-square, showed that the relationship was not significant. This could be because factors such as availability and adequacy of toilets, unhygienic state of public toilets which could reduce the influence education has on waste disposal methods. The inadequacy and lack of toilet facilities could force even those who know the dangers of unhygienic disposal of children stool to use improper methods.

See figure 12 on children's stool disposal method and
level of education of the respondent.

Figure 12: Relationship Between Education and children Stool Disposal Method

Definition of terms
Proper disposal of child's stool is taken to mean disposal in the toilet.
Improper disposal is taken to mean either throwing of the stool in the rubbish pit or outside in the open
5.0 Chapter Five: Water and Sanitation

5.1 Preamble

This particular Chapter assesses the environmental influences on health; particular areas addressed are sanitary situation, water sources and mosquito control, adopted by individuals, estate management and government. Under mosquito control, breeding grounds are identified, control measures undertaken by the people to guard against mosquitoes and the willingness of the people to participate in malaria control campaign are addressed. On sanitation, attempt is made to outline factors affecting utilisation of toilet facilities and general problems facing toilet provision.

5.2 Relationship between Faecal Matter and Diseases

A prime source of biological contamination of water, food and soil is human faeces. Contamination may be in or near the home or may be less direct, as when untreated excreta are introduced into water sources and into food chain, transmitting pathogenic organisms to people at some distance from site of immediate contamination. These hazards are enhanced by crowding whether in slums, periurban settlements or "temporary" camps where excreta disposal are absent, insufficient or deteriorated.
A number of water and sanitation related diseases are spread by:

1) Flies that carry infectious organisms from excreta and contaminate prepared food stuff that are not hygienically covered. The ingestion of such contaminated food stuffs then lead to infection.

2) Domestic water supplies obtained from rivers or unprotected sources that have been polluted with infected human excreta. (source: Sanitation in developing countries 1980)

A world bank publication (1986) note that the main mode of transmission of water and sanitary related diseases is the faecal-oral route. This therefore shows that the attempt to arrest the spread of cholera and typhoid the intervening point is the proper disposal of human faecal matter thereby denying it any access to water for domestic use. Insect and rodent vectors of disease e.g flies thrive well in poorly disposed of solid domestic waste since the refuse form a source of food. It is because of this interrelationship that the study is to investigate the sanitary conditions as an intervening measure in the control of sanitary and water related diseases. Said H.D Chizenga (1980) notes that studies at different levels have shown that well over 60% of the common intestinal diseases in rural areas could be reduced to a minimum with proper disposal of human excreta, and
correspondingly, the remaining 40% could be reduced with safe water supplies and personal hygiene. This therefore means that provision of toilets is an important intervening measure in the control of cholera, typhoid, intestinal worms etc. It is therefore important to provide adequate toilets and ensure that they are utilised. An analysis of methods of faecal disposal showed that 3% of the sampled population used improved ventilated pit latrine; 66% used unventilated pit latrines and 31% bush as a method of waste disposal. (see figure 12). This therefore means there is a danger of infected faecal matter being washed into unprotected water bodies and hence leading to transmission of water borne diseases. Respondents when asked why they used bush, 67 percent attributed it to lack of latrines while 33 percent to dirty and stinky latrines.
5.3 Types of Latrines

The type of toilet facilities provided in Makongeni location are pit latrines. The type of pit latrines provided are external unventilated pit latrines, although, in isolated cases especially among the business community operating e.g in the villages, ventilated improved pit latrines are available. 95% of the respondents who used toilets other than bush, used unventilated improved pit latrines while 5% used ventilated improved pit latrines.
5.4 Factors Affecting Utilisation

For a toilet to yield the service or the purpose it was constructed for and to yield health benefits, good maintenance and convenient location are very important. Also adequacy in terms of number per a given population is very important to avoid congestion and therefore a possibility of the users seeking for alternative methods of faecal disposal which may be unhealthy (bush). A physical count of the toilet facilities provided by the estate management compared with estimated population of the villages, revealed that the villages are inadequately provided with toilet facilities. The same was true in schools.

A sanitation field manual by John M Kalbermatten, DenAnne S. Julius and Charles G. Gunnerson (1980) suggests that one toilet compartment should serve twenty five to fifty people, although it is prudent to take a design figure of twenty five users per compartment.

Kenya's public health act cap 242 section 85(1) stipulates that the owner of every factory, workshop, workplace or other premises where persons are employed or in attendance shall provide such factory, workshop, or other premises as foresaid, and also, where persons of both sexes are or are to be employed or in attendance, with proper accommodation for persons of
each sex, and such owner or occupier shall, in the provision of such latrine accommodation, comply with the following requirements—

a) In factories, workshops, workplace or other premises as foresaid where females are employed or in attendance, he shall provide one water-closet for every twenty-five females or one pail-closet for every fifteen females;

b) In factories, workshops, workplace or other premises as aforesaid where males are employed or in attendance, he shall provide one water-closet for every twenty-five males or one pail-closet for every fifteen females.

Adopting the provision of 25 persons per compartment none of the villages had met the requirement. Taking design requirement of 50 per compartment, only Alphega village had achieved it. Going by the standard used for schools of 30 pupils per toilet compartment, only Lomolo primary school had met the standard. The most under provided school was Sarambee primary school where 80 pupils were required to share one toilet compartment. This is far much below the required standard of 30 pupils per compartment used by the local public health technician.
Table (vii) : Toilet Provided in the Villages by Estate Management

<table>
<thead>
<tr>
<th>Village</th>
<th>Population 1993</th>
<th>(Toilet compartment)</th>
<th>Population/Compartments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majani</td>
<td>5,000</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Iomolo</td>
<td>4,000</td>
<td>55</td>
<td>73</td>
</tr>
<tr>
<td>Athinai</td>
<td>3,500</td>
<td>56</td>
<td>63</td>
</tr>
<tr>
<td>Alphega</td>
<td>3,000</td>
<td>60</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Field survey 1992

Some sections of the villages were lacking toilets completely. A section of Athinai village which was still under construction and part of completed houses occupied, had no latrines. People were using sisal plantation for faecal disposal. (see plate 3)

NB It is assumed that even young children use toilet if proper disposal of their faecal matter is done by the parents in the toilets.

Plate 3: A section of Athinai village where there were no latrines. People were using nearby sisal plantation for faecal disposal
Table (viii): Toilet Facilities Provided in Selected Schools

<table>
<thead>
<tr>
<th>school</th>
<th>(student/pupil)</th>
<th>(toilet compartment)</th>
<th>Pupils/compartment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athinai pry school</td>
<td>402</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>Athinai sec school</td>
<td>187</td>
<td>4</td>
<td>47</td>
</tr>
<tr>
<td>Lomolo pry school</td>
<td>600</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td>Makongeni pry school</td>
<td>431</td>
<td>10</td>
<td>43</td>
</tr>
<tr>
<td>Majani pry school</td>
<td>500</td>
<td>8</td>
<td>63</td>
</tr>
<tr>
<td>Sarambee pry school</td>
<td>160</td>
<td>2</td>
<td>80</td>
</tr>
</tbody>
</table>

Source: Field survey 1992

5.4.1 Location

A latrine should also be sited at some distance convenient from the living quarters to ensure its usage at all times and weather. At the same time it should not be very close to the living area, to avoid the feeling that defecation is not adequately segregated from the rest of the daily living. A conveniently sited latrine ensures its usage at night, during illness, wet and cold weather. Also when toilets are not lit, usage at night is difficult. In all the villages the toilets were sited at periphery of the villages making it difficult for people to use them at night. The people whose houses were at the
centre of the village had no easy access to the toilet facilities. The toilets too are not lit at night. This means that a person without a spot light will not be comfortable to use the facility especially given that they could be dirty. Due to siting of toilets far from the houses, this resulted into a few bathrooms provided by the estate management being used for human waste disposal. In Majani Mingi village the few toilets available were sited far from the village and near the sisal. See plate 4 on latrines sited at the periphery of the village.

Plate 4: Latrine facilities sited at periphery in Majani Mingi village
5.4.2 Education and Latrine Utilisation

Education is one of the most important factors that influence quality of life. A study done in Botswana indicated that the method of excreta disposal was correlated with education of head of household. Both the general knowledge and school education were found to play a role.

In Botswana under a pilot phase of sanitation programme, a special toilet was designed for children under nine years of age remained unused. Education was needed as well. (Heli E. Prett 1985) In Zimbabwe, a TAG consultant found that some women were indeed actively discouraging their children from using latrines because of fear for their safety.

Respondents when asked the possible reasons that could explain why children were not using toilets, 32 percent of the respondents attributed it to lack of training from parents on the need to use toilets; 46% to fear of safety of children; 22% to other factors which included dirty toilets and thereby fearing the possibility of the children stepping on improperly disposed faecal matter.

5.4.3 Privacy

Privacy is important in ensuring that people are comfortable when using a toilet. In Nicaragua, women did not like to use new latrines because the design of the superstructure allowed their feet to be seen.
Privacy is therefore an important factor determining the utilisation of toilet facilities. In all the villages except for Alphega village, problem of superstructure with openings which made a person inside the toilet to be seen from outside was prevalent. The situation was worsened by the fact that some of the toilets did not have doors. See plate 5

Plate 5: A latrine in Athinai village with holes and no doors. Euphorbia tree seen above is supposed to act as a door
5.4.4 Culture

People exposed to education have a faster cultural change than those with no education. At the same time some cultural beliefs which have developed for a very long time cannot be changed within a short time. The fact that 11% of the head of households had at least secondary education; 33% no formal education; 56% primary education means that the head of households are likely to be so much attached to the culture. Heli (1985) notes that in Kenya in some communities separate latrines must be provided for in-laws. According to the local public health technician among the Luos and Luhyas sharing of toilets with in-laws is prohibited. According to the sampled population, Luos constituted 37% of the respondents; Luhyas 34% Kikuyus 21% and other tribes 7%. This shows that the cultural issue cannot be downplayed as a likely factor that affects Toilet utilisation. When respondents were asked why people never used toilets where they are available, 61% attributed non-use to toilets being dirty; 21% to lack of toilets; 12% to cultural beliefs and 6% to other causes other than those mentioned above.
5.5 Other Problems in Latrine Provision

There are a number of constraints faced in the provision toilet facilities in the area of the study. The problems emanate from the community and the estate management. These include:

5.5.1 Lack of adequate provision of toilet facilities: This problem was more acute in the villages under Banita group of companies. The problem of inadequacy of toilet facilities was most acute in Majani mingi village where on average 100 people had to share one toilet compartment, assuming that toilet facilities are equitably distributed. The problem of lack of toilets in the village was most acute in the section of the village where the houses were mainly grass thatched. In this particular section of the village people were defecating in the coffee farm or sisal plants near the village. This is confirmed by the fact that 31% respondents interviewed responded that they used bush as a method of human waste disposal. This problem was not only in villages, but also in schools. While the area public health officer recommends that one toilet compartment should be used by 30 pupils, in Sarambee primary school, one toilet compartment was being used by 80 pupils.

5.5.3 Lack of proper planning and siting of toilet facilities in the schools and villages: The schools and villages are planned and sited without taking into
account essential services that complement a better living and a healthy environment. Some villages are sited in areas that are rocky or areas with loose soils. In areas that are rocky, sinking of pit latrines is made difficult, while in areas of loose soils putting up of the floor is made difficult due to the financial requirement it would entail in terms pit lining. In all the villages there was no adequate space set aside for the provision of more toilet facilities as the population grows. The houses are so much congested especially in Majani Mingi and Banita Machine (a section of Banita village) such that there is no space available for provision of toilet facilities at a distance that is convenient. Due to this phenomena, most of the toilet facilities in the villages are located at the periphery of the villages which make it difficult for the households at the centre to gain easier access to the facilities especially at night. Due to this problem the few communal bathrooms provided, at night are used as urinals and toilets. The problem of siting a village on a rocky ground is experienced in Alphega village, which has made the sinking of toilets difficult. This has forced the management to use power driven machine to sink the toilets. In this particular village, the furthest a pit latrine can be sunk about 30 feet while in the neighbouring village, lomolo, pit
latrines of 40 feet and above can be sunk without involving a lot of monetary costs. In Banita machine a section of Banita village, due to loose ground, the siting of toilet on one side of the village is not possible due to the fact that it would involve a lot of money in terms of ground reinforcement in order to support floor and superstructure.

The schools have not been an exception, since Sarambee primary school is sited on top of the a rock and due to this, it has been difficult to provide toilet facilities to the school. This probably explains why 80 pupils have to share one toilet compartment which is far much below the standard of 30 pupils per toilet compartment.

5.5.4 Community: The community has also given the management of all sisal estates a difficult time in their attempt to provide toilet facilities. Cases of theft and vandalism on the material used to put up the superstructure have been witnessed in all villages and some schools. This involve members of the community stealing doors, iron sheets and timber used in putting up the superstructure. This has been quite a discouragement to the management. The management has to share part of the blame due to poor planning and lack of development control in the villages which has resulted into siting of toilet facilities very far from the users who could protect them from thuggery.
At the same time in villages where the estate management does not provide houses, the workers are forced to steal iron sheets and doors for use in their self constructed houses.

5.5.5 Inequitable distribution of toilets:
Distribution of toilet facilities was also not equitable. The observation made was that in all villages, sections with permanent houses tended to have more toilet facilities than those constructed with grass and mud. In terms of population except for the Alphega village, more people live in grass thatched houses. This shows that the most inadequately served people are those in grass thatched houses.

5.5.6 Finance: The public health technicians lack financial resources to buy materials and equipment (e.g. insecticides) for demonstration purposes to the community and the estate management e.g. demonstrating on the new models of toilets in the market so that the community and the estate management can adopt. There is also lack of finance on the part of the estate management. Sisal industry for a long time has been facing a lot of problems due to low demand for sisal fibre and sisal products in the local and international market. A study by wigglesworth and company January 1992 came out with the findings that the industry is at the verge of collapse. In all villages the estates had sunk pit holes but due to
lack of finance, putting up of the superstructure was difficult.

In most of the villages under the Banita group of companies problem of maintenance of the toilets was quite observable. This was common with toilets constructed using timber and sisal poles. The walls of the toilets had holes which made privacy in the toilet during the use difficult.

5.6 Water

Water is a very basic requirement for survival of human being. "World health organization (WHO) estimates that approximately 80% of all sickness and diseases can be attributed to inadequate water or sanitation. At any given time 500 million people are affected by trachoma, often causing blindness; 200 million people with dracunculosis (guinea worm); and 30 million with onchocerciasis (river blindness). Diarrhoea which kills six million children in developing countries each year, and contributes to the death of up to 18 million people" (impact of water supply and sanitation programmes in developing countries. International drinking water supply and sanitation decade (1980-1990)

J.B Sibiya (1980) notes that "the transmission of water and sanitation-related diseases may be divided into four categories:

(1) Water borne infections e.g typhoid, cholera,
dysentery (bacillary and amoebic), gastro enteris, other diarrhoea diseases, and infectious hepatitis;

(2) water-washed infections e.g skin infections such as scabies, yaws and leprosy and eye infections such as trachoma and conjunctivitis;

(3) water-based infections e.g schistosomiasis and guinea worm;

(4) Water-related infections (some vector borne diseases are caused by vectors that breed in water), e.g onchocerciasis, malaria, filariasis, yellow fever, and human trypanosomiasis.

These quotations show how important water is in the transmission of diseases. In the study area majority of the diseases were water related. Malaria, diarrhoea and skin diseases which are among water related diseases, were among the major diseases treated at the health facilities. (see figure 12)
Figure 12.2: Average Monthly Cases of Diseases Treated

- Malaria: 480 cases
- U.R.T.I: 463 cases
- Skin: 284 cases
- Diarrhoea: 87 cases
- U.T.I: 83 cases
- Malnutrition: 26 cases
- Eye infection: 25 cases
- Intestinal worms: 24 cases
- Chicken pox: 22 cases
- Mumps: 20 cases
- Accidents: 17 cases

Source: Mogotio Health Centre
Water sources are also very important. Protected water sources have been found to be good preventive measures against typhoid and cholera. There are two main sources of water in Makongeni location. These include boreholes and rivers. The rivers that provide water are Molo river and Rongai stream. Athinai and Alphega use water from Molo river; Majani Mingi and Banita use water piped from outside the Location. In all these villages the water is not treated.

Table (ix): Water Sources

<table>
<thead>
<tr>
<th>AREA</th>
<th>SOURCE OF WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athinai</td>
<td>Molo river</td>
</tr>
<tr>
<td>Alphega</td>
<td>Molo river/borehole</td>
</tr>
<tr>
<td>Sarambee</td>
<td>Rongai river</td>
</tr>
<tr>
<td>Majani Mingi</td>
<td>piped water</td>
</tr>
<tr>
<td>Banita</td>
<td>piped water</td>
</tr>
<tr>
<td>Lomolo</td>
<td>borehole</td>
</tr>
<tr>
<td>Kwangombe</td>
<td>Rongai stream</td>
</tr>
</tbody>
</table>


Link Between Water, Sanitation and Diseases in Makongeni Location

As earlier stated in the problem definition the Makongeni location has had cholera and Typhoid outbreak. These two diseases are sanitary and water-
related. The main mode of transmission is through faecal oral route. With poor sanitary conditions already analyzed above, it is possible that human faecal matter already infected could have found its way into the rivers and contaminated the water sources. Household drawing that water could therefore have drawn the water which transmitted the disease.

According to medical practitioners in the area of the study i.e private and those from government health facilities, majority of cholera and typhoid cases were concentrated in areas that used rivers and streams as sources of water. They were therefore concentrated in areas that used water from sources that were unsafe; which could therefore have been contaminated with excreta having infectious organisms.

Data from one private clinic gives evidence that the majority of the cases were concentrated in water sources that were not protected.
Table (x): Typhoid Cases (1992)

<table>
<thead>
<tr>
<th>AREA</th>
<th>cases</th>
<th>water source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athinai/Kwangombe</td>
<td>17</td>
<td>Molo/Rongai rivers</td>
</tr>
<tr>
<td>Alphega</td>
<td>11</td>
<td>Molo river</td>
</tr>
<tr>
<td>Sarambee</td>
<td>11</td>
<td>Rongai river</td>
</tr>
<tr>
<td>Lomolo</td>
<td>1</td>
<td>Borehole</td>
</tr>
<tr>
<td>Majani Mingi</td>
<td>1</td>
<td>piped water</td>
</tr>
</tbody>
</table>

Source: Kampi ya Moto private clinic

Athinai secondary school and Athinai primary school had a total of 16 cases of typhoid while no other schools had any case of typhoid. The same trend was true of cholera as can be seen from (viii). Though data for Athinai village was not available, the fact that Athinai primary school had six cases of cholera shows that the village could have had more cases.

Table (xi): Cholera cases 1987 and 1989

<table>
<thead>
<tr>
<th>Area</th>
<th>Cholera Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphega village</td>
<td>12(1989)</td>
</tr>
<tr>
<td>Athinai village</td>
<td>6(1987)</td>
</tr>
<tr>
<td>Lomolo</td>
<td>n.a</td>
</tr>
<tr>
<td>Athinai pry school</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>6(1987)</td>
</tr>
</tbody>
</table>

Source: Village Health committee and schools
From the distribution of disease cases, it can be concluded cholera and typhoid cases were many in areas that had water sources which are not protected. Athinai, Alphega, Sarambee and kwangombe villages which used water from rivers and streams had therefore majority cases of the two diseases. Though Athinai and Alphega villages were better served with latrine facilities than either Majani mingi or Lomolo, they tended to have more cases of the two diseases. This shows that protected water sources are a better control measure against the two diseases than latrine provision alone.

5.10 Environment and Malaria Prevalence

In all the sisal estates the effluent from the decorticators which a substantial proportion is water, is trapped in lagoons. Around these lagoons, vegetation grows without being cut. These have therefore formed very important breeding and hiding places for mosquitoes. All the other estates except for Athinai, have sunk dams for water storage for use during the dry spell. The sisal leaves also trap water and these form breeding places for mosquitoes. The dams, lagoons, and sisal leaves have formed important breeding grounds for mosquitoes. See plate 6 and 7
Plate 6: One of the dam sunk for water storage in Lomolo village which has become breeding ground for mosquitoes.

Plate 7: Waste water discharge point which acts as breeding ground for mosquitoes.
The knowledge of the population on the possible causes of a disease is important since it gives an insight on the possible way of intervening in control. When respondents were asked the possible causes of high prevalence of mosquitoes; 60% attributed it to availability of stagnant water from where breeding of mosquitoes takes place; 16% to availability of bush around houses which act as sanctuary for mosquitoes; 11% to lack of spraying water bodies by the companies; 4% did not know the cause while 9% attributed it to other causes. (See figure 13)

Figure 13: Reasons for mosquito prevalence
On the personal protection against mosquito bites, a number of methods were used by the respondents. A large proportion of the people used mosquito repellent mainly mosquito coils. Mosquito coils were used by 53% of the households visited; 7% burnt cow dung to repel mosquitoes; 10% burnt herbs from certain plants; 7% used insecticides; 5% covered themselves with blankets; while 18% used other methods. These included burning of ropes, sisal stumps and waste products from decorticators. (See Figure 14)

Figure 14: Protective measures undertaken by households against malaria
There is a strong belief that for a disease control to succeed, local participation is very important. It is also important for the felt need to originate from the beneficiaries themselves. When respondents were asked whether they would heed to the call of participation in malaria control especially the eradication of breeding sites and hiding places for mosquitoes, there was a high positive response; 89% of the respondents gave willingness to participate in providing labour. Only 11% felt that it was the duty of the estate management to drain water and clear the bush. This shows that there is already a felt need on the part of the community. What is lacking is the mobilisation of the community into campaign against the disease.
6.0 CHAPTER SIX

6.1 Findings and Recommendations

This particular Chapter gives the analysis of findings of the study. The chapter will handle the key issues emanating from health facilities, mortality, education, sanitation and control of specific diseases.

6.2 Education

The analysis has so far shown that education is a very important factor in influencing certain variables that affect health of a population. Education has not only been found to influence the faecal disposal method but also had a significant relationship with mortality. On faecal disposal, those who had no formal education tended to use improper methods of human waste disposal e.g bush and throwing of children stool outside or in rubbish pits. Those who had secondary level of education, used proper methods of human waste disposal i.e mainly latrines. Other studies have also shown that parental educational level being positively associated with nutritional status of their children (Christiansen etal 1974). Shueyare etal (1977) found a strong positive correlation between years of school of the head of household and weight for age of children below two years. Education is therefore a very important variable that needs attention if health of the people
is to be improved.

Given that Majority of the people have either attained no formal education or primary education (89%), it will be very important for literacy level of the people to be raised. This can be done through adult education classes and encouragement of school attendance through local leaders and ministry of education.

7.3 Sanitation

The sanitary conditions were found to inadequate or lacking in some parts in all the villages. The few that were available were in poor state; they either had openings in the superstructure or had no doors. This shows that there is a problem of maintenance. The worst hit villages by inadequacy were those under Banita group of companies. In all the villages Majani Mingi was the poorest provided in terms of toilet facilities. In the same village, a large proportion of the population was either using coffee estate or sisal plantations for faecal disposal. In Athinai village, a section of the village (Kamukunji) which was coming up had no toilets and therefore those who had settled in already completed houses, were using bush as a means of faecal disposal. Out of the respondents interviewed 31% used bush as a means faecal disposal. In all the villages, there was no community
participation in sanitation provision. It was the company labourers who were siting, sinking, and putting up the superstructures of toilets.

There was a problem of utilisation of toilet facilities at all times. This was because of poor siting of the toilets which came as a result of poor planning of villages and lack of development control. Some villages were so much congested such that the siting of the toilets at convenient place and distance was indeed difficult. Toilets were therefore sited very far from the houses thereby limiting their utilisation when one is sick, at night and during the rainy season. Lack of toilets, inadequacy and unhygienic conditions of the toilets were the major contributory factors to lack of use of the toilets by the people. For the case of children lack of training by the parents and fear of safety of the children, were the main factors limiting toilet use by the children.

If the public toilets provided by the estate management are to yield health benefits, it will be important therefore to have the following elements that were found missing:

(1) Community involvement: The public or community should be involved from the beginning and at all stages of planning, building and at operation. The involvement of the community could be through village
health committees, women groups, village elders, estate management and public health technicians. A few elected representatives from above mentioned groups could participate in siting, and ensuring that design of toilets is per the wish of the community. They would ensure that toilets are fit for use by the children too.

(2) Awareness creation: It will be important to educate the community on the need and importance of toilet facilities especially the link between excreta disposal and diseases.

(3) Hygiene education: In order to achieve a public impact, latrine building should always be accompanied with hygiene education. The need for hand washing and use of soap should be emphasised as control measures against diarrhoea. Posters in Kiswahili should be placed in latrines explaining the importance of hand washing and reparations.

It will be important to pay a lot of attention to women in sanitation planning because of the fact that women and children are the most frequent users of household sanitation; it is also women who encourage, teach and supervise young children's use of toilet units. Therefore to ensure that the facilities will suit women and be useable by their children, women should participate at the household and community levels in making decisions between technology options.
and such design features as height of pedestals, type of seat, type and size of enclosure, lighting, doors, location, orientation and other details. Paying of attention to women can be done through:

(i) including information by women in the project area in the data to be collected, and using it in planning;

(ii) Assisting women to play an active role in the project particularly in decision making about the technology and design aspects and accompanying education activities.

Given that the children were a problem in the use of toilet, the following should be done to correct the situation:

(a) Mothers be involved in reviewing the latrine technology and design to make sure it is deemed suitable for children use. This will give the mothers confidence in the safety of their children.

(b) Mothers should be educated to encourage, promote and supervise proper use of toilets by their children.

Health clubs should be formed in all schools (only two primary schools had health clubs). Under health clubs, it is hoped that the knowledge on health learnt, or the various activities a pupil is involved can be replicated at home. The clubs should help in promoting skills of pupils so as to prepare them to be health agents. Since sanitation is very poor in
Makongeni location, the clubs should lay a lot of emphasis on sanitation e.g. operation and maintenance of toilet facilities. During parents day, the pupils through songs, and poems could educate the parents on the need to have proper sanitary facilities. Plays by pupils about water, sanitation and hygiene practices could be presented to parents. Special visiting days in a term could be worked out when parents can come to schools and see art or science projects the pupils have done on water and sanitation. It will be essential for all schools to have clean and well maintained latrines as positive example for children. It will be important for health clubs to make the community aware of their activities to avoid cases of the community interfering with the activities of the clubs as was evidenced in Makongeni primary school where leak tins used for washing by the pupils after toilet use were being stolen.

An observation made in Lomolo village and a section of Banita village i.e Banita Gichagi, a good proportion of the people had provided their own toilets. This shows that inspite of the belief that it is the estate management that should provide latrines, People are willing to provide latrines. It will be important therefore, for the local public health technicians to launch or intensify campaign on the need for villagers to provide their own toilets while
at the same time pressurising the estate management to provide toilets.

On housing the study found out that they are in poor state. Most of them were mainly constructed using grass and mud. The houses had poor ventilation. In Banita machine a section of Banita village and Majani mingi village, the houses were very crowded. This made the provision of latrines in convenient places difficult. The following quotation from shelter and Health shows the link of poor housing and poor health. " Small, poorly ventilated dwellings exacerbate problems with communicable diseases spread by aerosol droplets—for instance influenza, tuberculosis, meningitis, all of which are associated with poor housing and overcrowding and upper respiratory infections. In addition, the frequency of all diseases transmitted through direct inter human contact increase dramatically with population density—this is the case for disease noted above and for measles and mumps. Weakened by malnutrition and perhaps other diseases, children in low income settlements often die of measles." Measles was one of the diseases that was killing many children in Athinai and Alphega villages. (source: Village health committee). It is possible that poor state and crowded houses together with malnutrition, could be contributory factors for high death rates in the
villages. It is therefore recommended that the estate management provide workers with good houses which are of a reasonable size and well ventilated.

6.4 Mortality

It was found that there was a high mortality among children below age five. Over 80% of all deaths registered in Lomolo, Majani mingi and Banita villages were of children below age five. The commonest disease killer was diarrhoea. This could be working through diseases like measles, malaria, malnutrition which also have symptoms of diarrhoea. There was a relationship between mortality and malnutrition. The year 1984 registered the largest number of malnourished children (Source: Mogotio health centre) and a large number of deaths of children below age five. Immunisation of children had to be done in the village that year. This shows that malnutrition could be one of the underlying factor for high mortality. Statistical analysis of relationship between education and mortality, showed that there was a significant relationship between mortality and education. Other studies have shown that provision of safe water can reduce mortality of children (Merrick 1976). Limited and impure water supplies, inadequate sanitary facilities, substandard housing together expose youngsters in developing countries to a host of
infectious agents (Erik. E, Frank. R 1976). It will be therefore important for parental literacy level to be raised. Since water used in the location is not treated, safe and adequate water should be provided to the villagers. Proper sanitary facilities and better houses should also be provided to the workers.

6.5 Nutrition

The study found that nutritional problems were prevalent in all villages especially to children under age five. Most of the malnutrition was of very severe form. Statistics from Mogotio health centre showed that marasmus and kwashiorkor were the main diseases related to nutrition. Kwashiorkor had the largest number of cases. This shows a sign of deficiency in protein rich food. This can be explained by the fact that protein being one of the most expensive sources of food, is not within the affordability of the people due to low household income. (average household income of Ksh 800).

To address the nutritional problem, it will be important for the estate management to continue the bean project. For this project to yield the benefits, the following should be done:

1. The estate management should buy bean seeds on the behalf of the workers and do deductions for the cost incurred in workers' salaries. This would ensure
that all workers are in a position to plant beans.

(2) The spraying of sisal plants with chemicals should be done either a few months before or after the harvesting of beans is over. This will ensure that the beans are not overpowered by the chemicals.

(3) The estate management, workers' representatives, health officers and local leaders should have a discussion to do away with accusation and counter accusation between the workers and the estate management as far as bean project is concerned.

(4) Stern actions should be taken against the owners of animals that destroy beans of the workers.

6.6 Disease Control

6.6.1 Typhoid and Cholera

The area of the study has had an outbreak of cholera and typhoid. The data collected from the field and interviews with the health officers, revealed that majority of the cases of both diseases were concentrated in areas that were using water from streams and rivers. In Makongeni location, Athinai and Alphega villages had the largest number of cases of typhoid and cholera. Lomolo and Majani mingi which had protected water sources had few cases. Many studies have shown that protected water supplies (safe water) in a specific area are associated with significantly lower cholera infection rates. (Robert. J. Saunders and Jeremy. J. Warford 1976). Athinai and Alphega were
better provided with toilet facilities than either Majani mingi and Lomolo, but due to lack of protected water supplies they tended to have more cases of the two diseases. This shows that the main mode of transmission of the disease is the faecal oral route. This is supported by world bank publication 1986. A study in Philippines by Alvero and J.C Azurin (1974) found that provision of sanitary facilities for human waste disposal could reduce incidence of cholera by as much as 68%, while provision of safe water supply could reduce it by 73%. Where both toilets and water supplies are provided, the incidence could be reduced by as much as 76%. Though safe water seems to be a very important factor, toilet provision cannot be downplayed. This is because in Malawi an attempt to control and contain cholera was easier in villages with high percentage of toilets than those with few. For the villages with low toilet provision, it was until latrines were increased that a decline in number of cases was noticeable. This therefore means that problem of lack and inadequacy of toilets cannot be given low emphasis as a control measure against water and sanitation related diseases.

Studies have shown that proper disposal of excreta to be more effective and less expensive than vaccinating especially in long term programs for control and elimination of cholera from endemic areas.
Anti-typhoid vaccines that give long lasting immunity has been found actually less effective and more costly in the long run than is the construction of privies (Warford:1976). This therefore means there is need to provide protected water supplies. Improved and protected excreta disposal should also be provided. This should be adequate in number. Health education should accompany it pointing the inherent dangers of improper human waste disposal. Effective control of diseases related to water and sanitation will require ample water, good hygiene and sanitary disposal of excreta. The sanitary disposal of human waste will be necessary to avoid direct contact of water and food with disease causing organisms. A combined approach requiring ample water supplies, hygienic disposal of excreta and education as to the water-use practices and household hygiene. Village health committees, teachers, extension agents, local leaders, health workers, estate management and community should all contribute to the vitally important education. The scenario that has emerged is that there is improper disposal of household solid waste and human waste. To counter unhygienic disposal of human waste, health education campaign that involves the village health committees, health facility based health committees, local leaders, churches, estate management and the community should
be launched. Health education should be mounted which points out the association of decaying rubbish and houseflies on one hand, and food contamination and ill-health on the other. Vigorous campaign pointing out the causal link between unsanitary disposal of human faeces and many diseases including intestinal worms, cholera, typhoid and other diarrhoea diseases should be emphasised.

6.6.2 Malaria

It has been found that there are many water bodies which have stagnant water. These pools of water provide the environment needed by mosquitoes to perpetuate the life-cycle of malaria. It has also been found that the sisal leaves hold water that can allow mosquitoes to breed from it. Bushes near the homesteads and around the dams form good sanctuaries for the mosquitoes especially during the rainy season. The banana leaves do also hold amount of water and mosquitoes breed in them. The success of any Community-Based Disease Control requires the utilisation of existing community structures; full involvement of the community concerned in planning and implementation and establishment of mutual relationship between health professionals and the community members. It will be important therefore during the rainy season for the whole community to be mobilized by the local chief, elders, village health
committee members, health officers from local health facilities to destroy the breeding sites of mosquitoes. The activities carried out should include the draining of stagnant water in ponds, small depressions on the grounds, tins and other containers holding water which can be accessed by mosquitoes. The communities should be mobilised to clear bushes near homesteads in an effort to destroy the resting grounds of mosquitoes. The banana trees grown around homesteads and water bodies, should be pruned to prevent water collecting on the leaves during the rainy season. The leaves of sisal plants that have overgrown near the villages should be cut to prevent them from holding water during the rainy seasons.

It is important to note that if the communities are to participate actively, they must be prepared through health education to make good use of information. It will be important to create awareness in the community through education, about the dangers of stagnant pools of water or swampy areas surrounding the homesteads. Health education to make both patients and their families aware of the risks of malaria and the need to obtain early and appropriate treatment of any fever episode should be stressed.

The estate management should spray the lagoons and dams created to support sisal processing. Bushes around these water bodies should be cut to eliminate
sanctuaries for mosquitoes by estate management.

6.7 Development and Health

Development projects were found to be undertaken without health component being incorporated in them. The dams were sunk by the estate management which became important breeding grounds for mosquitoes. In Aphega village a dam sunk formed a good breeding ground for snails which were transmitting bilharzia in 1987 to 1989 before appropriate control measures were taken.

It will be important for development of whatever kind to be taking the health component into consideration. That is an assessment of the possible impacts of development on health should be done, so that appropriate measures can be undertaken before hand to avert any dangers development might cause. Development projects especially water resources development should be planned with health component. This calls for the estate management to be consulting health officers before sinking of dams. This would ensure that measures are taken in advance to prevent the water bodies turning out to be breeding places for mosquitoes and snails.

Schools and villages should take into consideration the health component in planning, design, and siting of villages and schools to avoid locating of schools and villages in areas that are
rocky thereby making the provision of toilet facilities difficult. This would to some extent help avoid the problems of providing toilet facilities that were encountered in some villages and schools.

6.8 Conclusion:

Most of the health problems in Makongeni location manifest themselves through diseases rooted in the ecology of poverty. Malaria referred to as a disease of underdevelopment and poverty (Malaria conference 1992) is the major disease treated at health facilities. Cholera which is also viewed as a disease of underdevelopment, a flag of poverty and disadvantaged and living testimony of deficiencies in water supplies, sanitation, food safety and public hygiene has also occurred in Makongeni location. (45th world health assembly vol2 no2 1992). Diarrhoea is the second ranked disease treated in the health facilities in the study area. Malnutrition is also treated. The disease patterns show that the health problems in Makongeni location have socio-economic and physical origins. This therefore demands for the health problem to be effectively addressed, it will be important to eradicate the physical and socio-economic origins of diseases. This calls for measures to address poverty and inequality.
To address the health problems of the poor, it will be important for government to acknowledge the needs of the poorest and the most needy groups in the society. The increasing inequalities between the rich and the poor in the society needs to be addressed, to ensure that poor too have access to basic health services. It will be important to learn how to attract the maximum attention to, and a concern for the plight of those in need, and to exert and maintain pressure to win commitment and action on their behalf. This will lead to the plight of the poor like those ones of Makongeni location being considered. It will be important to encourage and teach people to share the responsibility for preventing diseases, promoting good health practices and even some aspects of caring for the sick and dying.

For Malaria control to be successful, it should not viewed as an isolated concern of health worker. Every body should have a contribution. This requires partnership of the community members and the involvement of those engaged in education, environment in general, water supply sanitation and community development in particular. The participation of the local population and their ability to adopt personal protection measures to prevent transmission is an essential element. It is through community participation that health can be seen in a positive
way i.e. every individual, every family, every community must take positive action to reach and maintain the state of physical, mental and social well-being.

The solution to rural health problems must take into account the most effective, cheap and available approach in provision of health care. The concern should move from conventional health care to a more comprehensive approach which should encompass sectors of agriculture, education, housing, environment, transport, water supply and other health-related sectors. The approach which would respond to the health needs of the people is that of Community-Based Health Care. This consists of effective measures in terms of cost, technique and organisations which are accessible to the people. The effectiveness of formal public health services can be enhanced by encouraging rural communities to take responsibilities for meeting their basic health needs.

Health education is important if effective health is to be achieved. The health personnel should spend some of their time organizing, educating, and motivating people to take necessary action to improve and maintain their own health. With proper health education, attitudes can be changed and health status of the community improved by their own actions.
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(44) Are you visited by a health worker?  1) yes  2) no
(45) If yes, how frequent?  
(46) Do you think he/she is of any help to your health care?  1) yes  2) No
(47) Give explanation
(48) Which hospital/health centre do you prefer when:
  children are sick
  when you are sick
(49) What is the distance?  
(50) Is it the nearest hospital/clinic?  1) yes  2) No
(51) If no why don't you use the nearest to your home?  
(52) When did you visit this hospital (mention the nearest) last?
  who was sick?
  What disease?
(53) How long did you wait before treatment?  
(54) Are there private clinics you could have visited?  1) yes  2) no
(55) If yes, explain why you did not go there?
(56) What is the distance in kilometre to the facility
(57) What mode of travel do you take to the health facility?
  1) foot  2) bus/matatu  3) private car  4) others
(58) How much did you pay?
(59) do you find the services given at the health centre adequate?
  1) Yes  2) No
(60) If yes why?
  1) Close to home  2) no delays  3) free
  4) good rates  5) others (specify)
(61) If no, why?  1) too far  2) delays in facility
  3) expensive
  4) low quality services  5) no medicine
  6) others 
(62) What solutions do you perceive for the above problems?
(63) What are the causes of high prevalence of mosquitoes?
  1) bush around houses  2) stagnant water
  3) others 
(64) What methods do you use to guard against mosquitoes?
  1) Burning cow dung  2) burning herbs
  3) mosquito coils
  4) others (specify)
(65) If you are requested to participate in cutting of
APPENDIX 2

DEPARTMENT OF URBAN AND REGIONAL PLANNING UNIVERSITY OF NAIROBI

HOUSEHOLD QUESTIONNAIRE:

(1) Area

(2) Tribe (1) Luo 2) Kikuyu (3) Luhya 5) others

(3) Sex 1) male 2) female

(4) Age

(5) Marital status 1) married 2) single 3) divorced/separated

(6) Level of education 1) none 2) primary 3) secondary 4) university

(7) Religion 1) protestant 2) catholics 3) muslim 4) others(specify)---

(8) household size Number of children

(9) Occupation 1) farming 2) businessmen/women 3) sisal estate employee(specify e.g cutter) 4) teacher 5) Others(specify)---

(10) What is your household income per annum?

(11) Give annual expenditures on the following items 1) education 2) food 3) cloths 4) health 5) transport

(12) The structure of the dwelling unit

Roofing: 1) corrugated iron sheets 2) tiles 3) grass 4) sisalpoles

Walls: 1) stones 2) mud 3) wooden 4) mud/cement plastered

(13) What are your sources of water? 1) river streams 2) borehole 3) community supply 4) lakes/ponds 5) others

(14) Which of the following means of individual human waste disposal do you use? 1) external ventilated latrine (permanent) 2) External unventilated latrine (permanent) 3) Make shift pit latrine 4) water closet 5) bush

(15) If you use bush explain why 1) toilets dirty 2) no toilets 3) feel comfortable in bush 4) Others

(16) Which of the following means of disposal is/are adopted? 1) septic tanks 2) council sewer 3) unemptiable pit latrine others

(17) After going for long call, do you wash your hands? 1) yes 2) No

(18) If yes, do you use soap? 1) yes 2) No

(19) What do you think makes children not use toilets? (1) Lack of training from parents (2) Fear of falling in the squat hole
(3) Others (specify)

(20) What do you think makes people not use toilet facilities?
(1) no toilets (2) toilets dirty (3) Culture (4) others

(21) Where do you bath? 1) in one of the rooms 2) outside at night 3) in the river 4) Bathroom

(22) Do you have a bathroom? 1) yes 2) No

(23) If yes state the quality of the bathrooms 1) permanent 2) temporal 3) semi permanent

(24) What do you do with your refuse? 1) collected by town council 2) delivered by family to a storage tank/transfer point for collection 3) Thrown by family to the roadside/open land/drain or into the open ditches 4) thrown into river 5) Thrown into open pit and later burnt 6) others

(25) Name three diseases which you consider most common in the area

(26) Which medical care did you seek the last time you fell sick?
1) modern 2) indigenous 3) shop medicine 4) self made herbs 5) none

(28) Give reasons why you used the method?

(30) Comment on the quality of treatment offered

(32) Who advised you on the care you should take?

(33) If you suffer again, what medical care would you seek?

(34) Explain why

(35) Have you lost a member of the family in the last five years?
1) yes 2) no

(36) If yes, what was the illness? What medical care was sought?

(37) Do you think his death could have been avoided?
1) yes 2) No

(38) What preventive measures have you taken in regard to this disease?

(39) Which food do you give to children below age 5yrs

(40) Apart from medical care in hospital/clinics, are you aware of other health care services? 1) yes 2) no

(41) If yes which

(42) Do you always consult the medical staff in cases of illness?
1) yes 2) no

(43) If yes where