COMMUNITY LED TOTAL SANITATION IN A NOMADIC COMMUNITY OF SAJILONI LOCATION, KAJIADO COUNTY

BY:

OKUMU JAMES OTIENO

A THESIS SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH (MPH)

MOI UNIVERSITY

OCTOBER, 2015

DECLARATION

DECLARATION BY CANDIDATE

This thesis is my original work and has not been submitted in part or in full to this institution or any other institution for academic purposes or otherwise. No part of this thesis may be reproduced without prior written permission of the researcher and or Moi University.

Signature: ……..… Date: ……..

Okumu James Otieno

SPH/PGH/NC/1024/11

DECLARATION BY SUPERVISORS

This has been submitted for examination with our approval as the University Supervisors.

Signature: ……. DATE: ……..

Dr. Alice Lakati
Amref Health Africa Headquarters
P.O Box 27691-00506
Nairobi, Kenya

Signature ……..…. DATE:

Dr. Charles Walekhwa
Moi University College of Health Sciences
School of Public Health
Department of Epidemiology and Biostatistics
P.O Box 4606-30100
Eldoret, Kenya

DEDICATION

This work is dedicated to my family members; your support, patience, love and encouragement continually strengthens me. To my friends for all the unconditional support they constantly gave me during the entire research process.

ABSTRACT

Introduction: Community Led Total Sanitation is an innovative approach that focuses on behaviour change. It creates awareness on the dangers posed by poor hygiene practices such as open defeacation, poor personal and environmental hygiene and unsafe water usage. Kenya is implementing this approach in 27 sub-counties that have low sanitation standards.

Objective: To assess the adoption of Community Led Total Sanitation approach in a nomadic community of Sajiloni Location.

Specific objectives:

1. To determine latrine coverage in Sajiloni location.
2. To assess household hygiene practices in Sajiloni location.
3. To assess household accessibility to safe water in Sajiloni location.

Methodology: A descriptive cross-sectional study design was adopted. Sajiloni location was divided into nine strata's. Each stratum represented the existing nine villages. The first head of household to be interviewed was picked at random from the household registers provided by the village headmen. Subsequent persons' interviewed were picked after every 4th person in the household register. This was done until 345 heads of households were interviewed. A structured and pre-tested questionnaire complemented with an observation checklist was used to collect data. Data collected was sorted and coded using Epi Info version 3.1. Then after SPSS version 17 was used for analysis. Descriptive statistics was used to analyze data for both continuous and categorical data. This was done by use of measures of central tendency, frequencies and percentages. Chi square test was then used to determine an association between dependent variables and independent variables with level of significance set at $\alpha=0.05$.

Results: Majority (65.8%) of the respondents were female. Slightly above half (59%) of the households reported a monthly expenditure of between Ksh. 5000- Ksh. 10000. A higher percentage (49.1%) had no formal education.

Adoption of CLTS based on latrine coverage was low at 46.2%; of the latrines available 61% needed reconstruction. A small percentage (47.6%) had a hand washing facility next to the latrine and of that only 41.8% had water inside the leaky tin.

Adoption of CLTS based on household hygiene practice found that only 14% heads of households washed their hands with water and a detergent after using latrines and/or after handling children's feaces. Open defeacation sites were present in over half (51.9%) of the households. A higher percentage (71%) of households had litter strewn all over their compounds. Only 20.3% of households had dish racks and of those that provided the racks 21.4% were not in satisfactory condition.

CLTS adoption measured by access to safe water found that most (77.7%) households used water from unprotected shallow wells with 68.1% being less than 2kms away from their water source. The findings further reveal that (91.2%) of the households reported that their daily domestic water consumption was not sufficient. The study reveals that most households were not accessible to water points; with a majority (88%) of the households drawing water from un-protected sources. Most (88.3%) households treat water at home before drinking with 82.6% using chlorine tablets.

Conclusion and recommendation: According to WHO (2010) universal access to safe drinking water and adequate sanitation is a basic human right. However, this study shows that CLTS approach has not registered reasonable gains in helping households in Sajiloni location increase latrine coverage and adopt good hygiene practices but it has improved on safe water use at household level. This study therefore, recommends hygiene education to be taught at all levels of education in an effort to improve CLTS adoption in line with WHO recommendations.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

CHEWs	Community Health Extension Workers
CHWs	Community Health Workers
CLTS	Community Led Total Sanitation
CWSA	Community Water and Sanitation Agency
DALY	Disability- Adjusted- Life- Years
ETEC	Enterotoxigenic Escherichia Coli
KDHS	Kenya Demographic and Health Survey
MDGs	Millennium Development Goals
NGO	Non- Governmental Organization
SIDA	Swedish International Development Agency
SSA	Sub Sahara Africa
UNICEF	United Nations International Children Emergency Fund
UNDP	United Nations Development Programme
VERC	Village Educational Resource Centre
WB	World Bank
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Accessibility to a water source for this study is household that is less than one kilometre from a water source (WHO, 2010).

Head of household for this study, either spouse whether male or female found at home and interviewed.

Functional latrine refers to a latrine with sub and superstructure and that provided service during data collection even if it requires maintenance (UNICEF, 2009).

Jerry can for this study refers to a twenty litre storage container made of polyvinyl chloride material.

Latrine availability is the presence of a latrine within a homestead (UNICEF, 2009).

Open defeacation is the presence of feacal matter in the open ground, such as in the bushes, along river banks, behind homesteads (UNICEF, 2009).

Personal hygiene practice for this study is the use of latrines, washing of hands at critical times, safe water use at all times (UNICEF, 2009).

Satisfactory latrine utilization refers to households with functional latrines and the family disposed the feaces in a latrine, no observable feaces in the inner side of the squatting hole/aperture and the presence of clear foot-path to the latrine that is not covered with grass or other barriers (UNICEF, 2009).

Woredas refers to an administration unit of about twenty thousand people in Ethiopia (Kumie, 2005).

ACKNOWLEDGEMENT

Completion of this research work has been enabled by the tremendous support and guidance received from my lecturers, supervisors, colleagues, friends and family.

Special thanks to Dr. Alice Lakati and Dr. Charles Walekhwa my supervisors who dedicated their time tirelessly, to provide continuous guidance throughout the research process. I would like to pass my sincere gratitude to you.

Acknowledgement and appreciation goes to Mr. Erick Machoki of Kajiado County Department of Health for his patience whenever I consulted him and not forgetting Mrs. Dorcas Omware also of Kajiado County Department of Health for the tremendous support which she gave during data collection.

To all the respondents who provided the information required, the data collectors who travelled long distances under the extreme heat to obtain the data, the chiefs, village elders and Mr. Paul Mwangi for ensuring the vehicle was in good order at all times. All that have played a role that has enabled me write my thesis, I am very grateful to you all.

Finally, I wish to thank my family for their encouragement and moral support which really propelled me to complete this research.

CHAPTER ONE

1.0 Introduction

1.1 Background

Lack of adequate sanitation contributes to occurrence of diseases. This was first noted scientifically in 1842 in Chadwick's seminal "Report on an inquiry into the sanitary condition of the labouring population of Great Britain". The diseases associated with poor sanitation are particularly correlated with poverty and infancy and alone account for about 10% of the global burden of disease (Pruss-Ustun et al, 2008). At any given time close to half of the urban populations of Africa, Asia, and Latin America have a disease associated with poor sanitation, hygiene, and water (WHO, 2009). In order to reverse this trend governments in these continents have adapted the eight Millennium Development Goals (MDGs). One of the MDGs (goal 7) focuses on halving the proportion of people without sustainable access to safe drinking water and basic sanitation.

The declaration of the International Drinking Water Supply and Sanitation Decade launched in the 1980's is an integral part of the global efforts seeking to enhance access to safe water and basic sanitation. This declaration aimed at increasing universal access to clean safe drinking water and basic sanitation. This resolve prompted low-income countries in partnership with donors and international Non-Governmental Organization (NGOs) to implement its provision in accordance with their respective local national contexts (CIRDAP, 2006).

Even though there has been a notable increase in household accessibility to safe water and basic sanitation; unsafe water use and poor sanitation practices still contribute significantly to the burden of disease observed in low-income countries. Sanitation

related diseases account for 7.4 percent of the burden of disease among under-five year old children in Sub Saharan Africa as compared to 2.7 percent globally (Lewin et al, 2001). Thus, the disease burden associated with poor water and sanitation in Sub Saharan Africa is higher than the global average. In fact, several studies have similarly reported that such burden of disease in low income countries accounted for 3.4 percent as compared to a lower rate of 0.2 percent found in high income countries (Ahmed et al, 2011). The socio-economic consequences of this burden of disease negatively impacts on the children's school enrolment and their attendance, in addition to increasing poverty among the populace. Other effects include loss of income and increased demand on the already overwhelmed health care systems of developing countries.

So far, the interventions to address the impact of poor water and sanitation have significantly reduced disease morbidity and mortality, including the number of missed classes among enrolled school children (Freeman et al, 2013). In other words, interventions do exist to efficiently and effectively redress the situation, albeit with some qualification and varying success rate. Such interventions have the added advantage of limiting transmissions in endemic situations as well as in curtailing the spread of such diseases to other areas (Teo, 2012). On the other hand, lack of meaningful and timely interventions tends to lead to the persistence of factors that facilitate and sustain the transmission of water-borne and sanitation-related diseases in families and communities (Pande .S. et al, 2008). According to Okoh et al, (2010) diseases associated with poor water and sanitation are not limited to diarrhea but also include intestinal parasitic infections, soil transmitted helminthic infections, ophthalmic infections, skin and respiratory infections.

Despite continued investments geared towards increasing access to safe water and improved sanitation; poor practices such as limited utilization of sanitary facilities lead to contamination of environments and water sources. A study conducted in Bangladesh reported that the presence of a family latrine does not necessarily increase its utilization. It went further to state that there was no significant reduction in the risk of infection among children in households that owned latrines when compared to children in households without latrines (Ahmed, 1994). This suggests that efforts to increase access to safe water and improved sanitation have to be coupled with strategies to promote appropriate utilization of sanitary facilities. Furthermore, the availability and use of the latrine depends on maintenance practices of the latrines, cleanliness, as well as the quality of housing and household compound (Dumba et al, 2008).

Millennium Development Goal 7 (MDG 7) was adopted to hasten access to safe water and basic sanitation and subsequent utilization. The global commitment to achieving the MDGs was reinforced by the 58th session of the United Nations Assembly, which proclaimed 2005-2015 as the International Decade of Water (Moe, 2006). This resolution implored countries sustained commitment towards achieving MDG 7 through community participation. In response to the global policy strategies, African governments adopted and ratified the 2002 Johannesburg plan of implementation and Agenda 21. These African regional policy strategies are aimed at cutting by half the proportion of people unable to access safe drinking water and basic sanitation.

In this regard, the Kenya policy and implementation strategies included observing global sanitation promotion days at the local level. Kenya has also ratified both the global and regional policies which were localized through appropriate national

sanitation policy of 2007. As part of its plan of action, Kenya is implementing Community Led Total Sanitation approach in 27 Sub-counties that have low sanitation standards in the republic.

1.2 Community Led Total Sanitation Approach

This is an innovative methodology for mobilizing communities to completely eliminate open defeacation, change poor hygiene practices and promote safe water use at household level. It focuses on behaviour change needed to ensure real and sustainable improvements through investing in community mobilization instead of hardware. It shifts the focus from toilet construction for individual households to creation of open defeacation free villages. This is achieved by raising awareness that as long as even a minority continues to defeacate in the open, there is risk of contracting diseases, such as cholera and diarrhea. It therefore aims at triggering the community's desire for change, which then propels them into action and encourages innovation, mutual support, and appropriate local solutions, thus leading to greater ownership and sustainability (Kar, 1998).

In the late 1990's, Water Aid was reviewing its sanitation activities in Bangladesh. The result was not encouraging. They then engaged Kar, a participatory development expert, to investigate the reason and find new ways to address the problem. Kar came to the conclusion that the subsidy scheme failed to generate real demand for sanitation because it was not internalized by the people. Instead of trying to entice people by subsidies, he proposed a disregard to subsidy. He started working on the model, particularly in Rajshahi and Naogaon districts, with a Water Aid partner organization, an NGO called Village Education Resource Centre (VERC). The model involved building on the social capital within a community, through appealing to the inner

strength and self-respect of the villagers. The approach seemed to work. Natural community leaders emerged from the communities. These social leaders became active campaigners for sanitation, with their social campaign the communities began to coalesce. A collective view against the practice of open defeacation, unhygienic practices, and indiscriminate solid waste disposal began to form. Finally, the people took a collective decision to improve on their sanitation status (Barkat A, et al, 2006). The new found confidence led people to recognize their inner social strength, and people started to design hygienic latrines with locally available materials. The community became the unit of operation rather than individual households. People stopped counting latrines and started to pay attention to whether the whole community became clean. This was the most remarkable shift in attitude. Besides, people no longer waited for subsidy or handouts. They confidently built latrines with their own resources, practiced good hygiene behaviour at home, and used safe water at home (Barkat A, et al, 2006).

Adoption of the approach has increased latrine coverage in Bangladesh from 18% in the 1990's to the current coverage of slightly less than 80%. 90 % of the latrines available have been provided by the community without subsidy (BBS, 2005). In recent years, the impact of the approach has drawn significant attention. There is a growing recognition that this approach offers tremendous potential for developing countries to surpass MDG targets for sanitation. This has resulted in this approach spreading from Bangladesh where it originated, first within Asia, and then to other continents, including Africa. This approach has gained ground in Ethiopia, Kenya, Uganda, and Tanzania (Bongerz, 2008).

WHO recommends the following indicators in assessing adoption of the approach; universal household accessibility to safe sanitary facilities such as latrines/toilets; safe household hygiene practices such as washing hands at critical times; household accessibility to safe drinking water which means that the source is less than a kilometre away from its point of use and it is possible to reliably obtain at least twenty litres per member of a household per day.

1.3 Problem statement

According to a desk study carried out by Water and Sanitation Program over 50% of rural households in Kajiado County do not have access to improved sanitation. It is also estimated that poor sanitation costs Kajiado County 542 million Ksh. This includes loses due to access time, premature death, health care costs and productivity. This estimate does not include cost that could be significant such as, water pollution and impact on tourism. The true cost of poor sanitation is therefore underestimated.

Efforts to increase access and coverage to improved sanitation for the rural population do not march the increasing need. This has resulted in the marginalisation of the rural poor, particularly in sanitation provision. The study also shows that 27% of children in Kajiado County are stunted. Unimproved sanitation and a practice such as open defeacation have been linked to low height for age scores in children. Stunted children suffer mortality due to infectious diseases such as diarrhea, pneumonia and measles as well as being more likely to have poorer cognitive and educational outcomes.

In the year 2012, two villages were triggered in Sajiloni location. The public health reports indicate that there is evidence of adoption of only one Community Led Total Sanitation component, which is universal household latrine provision in the two

villages. It was thus expected that triggering in the two villages would spill over to the remaining villages in the location which would ultimately report full adoption of the approach.

1.4 Justification

Access to basic sanitation which includes latrines, hand washing facilities, water for hand washing and drinking is essential for the health and well-being of any individual. Children are the most susceptible to diarrheal diseases with an annual mortality of 2.2 million. This is due to unsafe water, inadequate sanitation and insufficient hygiene. A practice such as open defeacation creates a situation where everyone is exposed to pathogens leading to high incidences of diarrheal diseases; soil transmitted helminthic infections and other feacal-orally transmitted infections (WHO, 2008).

Sajiloni location was chosen as the study site as this is where Community Led Total Sanitation approach was first piloted at in Kajiado County. Even though this approach is being implemented in Sajiloni location the County MOH disease morbidity report (2015) indicates that diarrhoea is the second most prevalent disease in the area. The report further states that children are the most affected.

In Sajiloni, there are no sanitation or sewerage services provided by the national or county government; and there is also chronic water scarcity most of the year. The region is classified as an arid and semi-arid land area. This is a marginalized area in need of special intervention.

Assessing the existing situation in the area will enable acquisition of relevant data from a local perspective, and thus the necessary interventions may be initiated. Information gathered from the study may guide future interventions. The outcome of

the study informed on the current situation in the area and its findings will be shared with the County Department of Health to enable them evaluate the application and implementation of Community Led Total Sanitation approach. Several studies show that adoption of this approach has great potential for contributing towards meeting the millennium development goals, both directly on Water and Sanitation (goal 7), and indirectly through the knock-on impact of improved sanitation on combating major diseases, particularly diarrhea (goal 6), improving maternal health (goal 5), and reducing child mortality (goal 4).

1.5 Research question

What is the adoption status of Community Led Total Sanitation approach in Sajiloni location?

1.6 Objectives

1.6.1 Broad objective

To assess the adoption of Community Led Total Sanitation approach in a nomadic community at Sajiloni location.

1.6.2 Specific objectives

1. To determine latrine coverage in Sajiloni location of Kajiado County.
2. To assess household hygiene practices in Sajiloni location.
3. To assess accessibility of households to safe water.

CHAPTER TWO:

LITERATURE REVIEW

2.1 Community Led Total Sanitation Globally

Practices such as open defeacation, unhygienic behaviour, unsafe water use, and haphazard solid waste disposal are common in South East Asia, Africa and Latin America. They result in environmental degradation which directly affects the health and quality of life of millions of people, especially the poorest, most vulnerable people in these regions. The situation is acute and widespread in much of South East Asia, where a significant proportion of the population bears the burden of disease that is attributed to inadequate access and use of safe drinking water, inadequate sanitation facilities and unhygienic practices (VERC, 2002).

In large parts of Bangladesh, people in both rural and urban areas practice open defeacation. Many people defeacating on both sides of the roads, railway line, or in open fields and bushes are very common scenes in the mornings and evenings in many parts of the sub-continent. All these practices, coupled with a total absence of hygienic behaviour, heavily contaminate the drinking water sources and the environment as a whole, including ponds, other water bodies, and crop land. These practices lead to the spread of diseases such as diarrhea, typhoid, and at times cause cholera epidemics (VERC, 2002).

Millions of dollars are spent every year on Water and Sanitation sector in countries of Asia, Africa and Latin America by a number of international development agencies including, UNICEF, United Nations Development Programmes (UNDP), and World Bank funded sanitation programmes. Additionally, a large number of national and international NGOs are working on water and sanitation with support from donor

agencies. Most agencies working to improve environmental sanitation spends resources on motivating people to construct latrines with subsidies provided at different rates. NGOs train and motivate villagers on good hygiene practices and on ways of treating diarrhea. In Bangladesh, hundreds of NGOs have become engaged in this sector but after thirty years of such efforts it is difficult to find even one hundred villages from amongst 85000 that are 100% sanitized and free from open defeacation sites (Kar, et al, 1998).

NGOs have innovated many ways to motivate people with subsidies and loans to construct latrines. However, even with large amounts of subsidies it has not been easy to convince people to construct latrines and stop open defeacation. There have been many obstacles, such as lack of ownership of land for latrine construction and high cost of building materials. Despite this, NGOs concentrated on building latrines and success was measured on the basis of the number of latrines constructed within a given period of time instead of measuring the extent of open defeacation, which in most cases continued unabated (WELL, 2001).

In the 1990s, access to latrines in rural areas of Bangladesh was less than 15% (BBS, 1996). This was despite many international agencies and NGOs working to improve environmental sanitation by constructing latrines with subsidies provided at different rates. But even after such efforts it was difficult to find 100 villages from amongst 85000 that were totally sanitized and free from open defeacation (Kar K., et al, 1998).This led to a new approach pioneered by Kamal Kar, a social and participatory development consultant in collaboration with Village Education Resource Centre (VERC), Water Aid in Bangladesh and other agencies they concentrated on empowering local people to analyze the extent and risk of environmental pollution

caused by open defeacation and poor hygienic practices. This prompted the local communities to change their unhygienic practices and consequently construct latrines without any external subsidies (Bajrachanja, D. et al, 1998). This community led effort has had a huge impact in parts of Asia particularly in Bangladesh with data available revealing that households with access to latrines has greatly increased from 15% recorded in the 1990s to the current slightly less than 80% (BBS, 2005). It has also shifted the communities focus from actual counting latrines constructed but on behaviour change, i.e. stopping poor practices such as open defeacation, safe solid waste disposal, and unsafe domestic water use.

A study done in Honduras revealed that poor personal hygiene leads to increased prevalence of diarrhea (Huttley et al, 2001). Relationship between hygiene practices and infantile health has also been identified in several investigations like those developed in Democratic Republic of Congo, which revealed an 11% reduction in the incidence of diarrheal diseases in communities where personal hygienic practices were improved (Ashworth et al, 2002). In a study carried out in Honduras feacal contamination was found on 44% of the fingertips of women tested during normal household activities (Trevett, 2003). Other studies have reported similar findings where pathogenic enterotoxigenic Escherichia coli (ETEC) were recovered from mothers and children's hands as in a study carried out in Thailand (Echeverria, 2004). Such studies strongly support the current interest in promotion of hand washing at critical times.

Domestic water supplies are one of the fundamental requirements for human life. Without water life cannot be sustained beyond a few days, and the lack of access to adequate water supplies leads to the spread of diseases. Children bear the greatest

health burden associated with poor water and sanitation (Seidu, 2009). A comparative study on differentials of child health in urban areas of Brazil, Egypt, Ghana, and Thailand showed that environmental factors such as drinking water sources, availability of toilet facilities and housing conditions are strongly associated with childhood diarrhoea (Root, 2001). Another study from the republic of Congo revealed that children coming from households that obtain water from protected sources were less likely to have diarrhea as compared to those who get their water from unprotected sources (Caincross, 2003).

2.2. Community Led Total Sanitation in Africa

At the end of 2004, Water Aid and its partners initiated a Community Led Total Sanitation pilot project in 4 communities in Benue state in north central Nigeria. Over the next year and a half the pilot project was implemented by Water Aid and its local NGO partners the results were encouraging i.e., there was significant increase in latrines constructed and notable improvements in hygienic practices in the target communities. In November 2006 Water Aid conducted an internal evaluation of the pilot project that confirmed the success of the project (Water Aid, 2007).

In August 2007, the project was expanded to cover 24 communities in the states of Benue, Enugu, Ekiti, and Jagawa. Later evaluation of the project revealed that out of a sample of 13 communities the following was noted, of the communities sampled they progressed from a total of 116 latrines before Community Led Total Sanitation was initiated to over 1060 over an eighth month period all unsubsidized. Other key findings included significant improvements in environmental sanitation of communities, better personal hygiene, safe water use at domestic level, safe solid

waste disposal, and a sense of empowerment amongst the community members (Water Aid, 2007).

The Community Water and Sanitation Agency (CWSA), Plan, UNICEF and Water Aid have been piloting Community Led Total Sanitation since 2007 in approximately 237 communities in Ghana in an attempt to scale up hygiene and sanitation improvements. The pilot activities were in the Northern, Upper West, Eastern, Central and Greater Accra Regions. The four organizations set up the pilot exercises independently of each other and adopted slightly different institutional arrangements, drawing facilitators from different local government departments and NGOs. The search for a new approach to sanitation improvements was necessary as previous approaches seemed to have failed.

Out of 51 African countries, Ghana placed 48th with sanitation coverage of 10% .This coverage rate represents achievements made using subsidy based approaches to sanitation improvement under the national community water and sanitation program which has been in operation for more than a decade.

Open defecation practices were common in the country and the three northern regions had 79-81% of their population involved in this practice (Water Aid, 2009).Thirty seven communities with an average population of One Hundred and fifty made up of women and children covering all 14 pilot districts in the Northern Region (NR), Upper West, Central Region (CR), Eastern Region (ER) and Greater Accra (GAR) regions were selected as sample communities for the evaluation. The communities represented approximately 15% of the total communities where Community Led Total Sanitation was being piloted. Key characteristics of the sample included, communities where it was well established, communities where it was at initial stage of implementation,

presence of credit schemes for sanitation and communities where subsidies were provided.

The Evaluation revealed that the projects had led to significant sanitation improvements in more than 200 communities in Ghana which was part of the project area. 60% of the communities visited had access to latrines, clean environments, well maintained refuse pits, and some had hand washing facilities with soap in use next to the latrines. A total of 1857 household latrines were constructed over a period of two years which was very significant and at least 5 communities had 100% coverage of improved sanitation facilities. 69 communities were declared open defecation free. Awareness of faeco- oral transmission routes was very high and safe behavioural practices were very encouraging among the communities where the approach had been promoted (Magala, et al, 2009). In a case-control study carried out in Ghana revealed that mothers who had children less than five years but had no access to latrines had an odds ratio of 17.47 on diarrhoeal morbidity as compared to mothers who had access to latrines. In a case-control study carried out in Zimbabwe revealed that diarrheal morbidity among school going children was 68% lower in communities that had access to latrines than in communities that had no latrines.

Recent evidence highlights the importance of hygienic behaviours, particularly hand washing with soap which has been linked to an almost 50% reduction in rates of diarrhea incidences (Curtis, 2003). In addition, good hygiene practices improve overall health through reduced rates of pneumonia, scabies, skin and eye infections, and influenza. Communities that practice poor hygiene have increased rates of diseases like diarrhea, cholera, typhoid and parasitic infections. These diseases have a strong negative impact on the health and nutrition of children (UNICEF, 2009). The

difference in rates of diarrhea is mainly due to preparation of foods, boiling of drinking water, or personal hygienic practices.

2.3 Community Led Total Sanitation in Kenya

Community Led Total Sanitation was introduced in Kenya in May 2007. From one open defecation free village Kilifi County in November 2007 to one open defeacation free Sub-County of Nambale. This approach is steadily becoming a movement that has great potential in addressing sanitation and hygiene challenges. Some of the villages have been triggered following formal training while others have taken particular interest and self-initiative as a result of the influence of natural leaders and other committed community members from neighbouring triggered villages to adopt the approach (Plan, 2009).

In Kenya, approximately 12% of households have no access to a sanitary facility, which translates to about 5.6 million practice open defeacation. They are almost exclusively rural (KDHS, 2009). A survey carried out in Kajiado County by SIDA in 1996, revealed that only 40 % of the households had access to a sanitary facility with the majority being in urban areas. This could be attributed to several factors, such as reinforced traditional beliefs which relate not only to the practice itself, but also to latrine use. Several studies reveal that most communities in Kenya mistakenly believe that young children's feacal matter is not harmful thus little effort is made to dispose it safely. Other studies further reveal a 64% reduction in diarrheal diseases in places where there was improved sanitation standards (Esrey et al, 1991).

2.4 Conceptual framework

The study has both dependent and independent variables. The dependent variable is affected by the independent variable .The dependent variable for this study was

adoption of community led total sanitation approach by households. Socio-demographic factors and socio-economic factors were the independent variables.

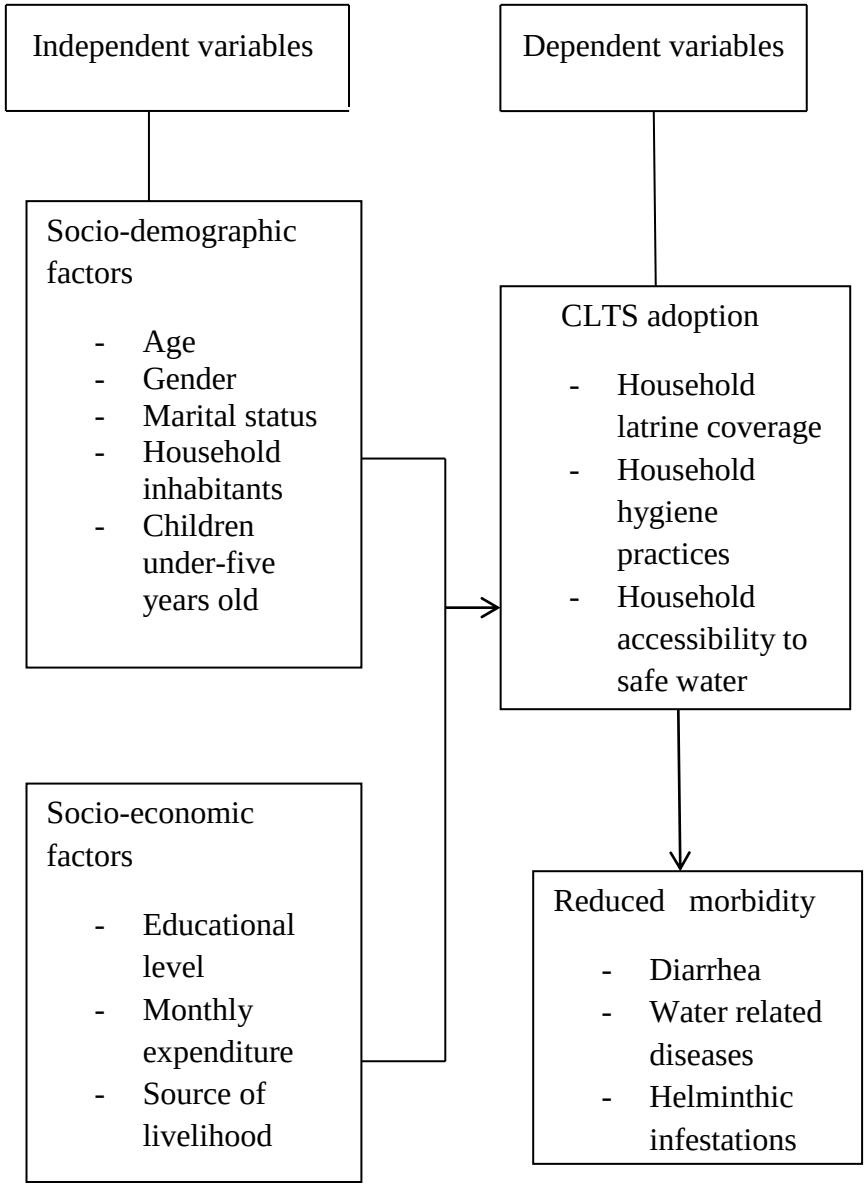

Figure 2.1: Conceptual framework

(Karaone et al., 2012, Allasan, 2009, Dipika et al., 2004)

CHAPTER THREE:

STUDY METHODOLOGY

3.0 Introduction

This chapter presents study area, study design, study population, sample size determination, sampling procedure, methods of data collection, data collection procedure, data analysis, data quality control, limitations of the study and ethical considerations.

3.1 Study area

Kajiado County borders the Republic of Tanzania to the Southwest, Taita Taveta County to the Southeast, Nairobi City to the Northeast, Kiambu County to the North and Narok County to the West. The County covers an area of approximately 21,902.9 Km^2 and is divided into 5 Sub-counties namely: Kajiado North, Kajiado East, Kajiado Central, Kajiado West and Kajiado South. It has five constituencies namely: Kajiado North, Kajiado Central, Kajiado East, Kajiado West and Kajiado South.

Kajiado Central Sub-County covers an area of approximately 5232 Km^2 and is divided into five wards namely: Dalalekutuk, Ildamat, Purko, North Matapato and South Matapato. It has 26 locations including Sajiloni the study area. Sajiloni location is approximately 21 kilometres away from Kajiado town. According to KDHS (2009) report, the estimated household population in the study area is 1529. The major cause of poverty in the area is illiteracy. Other causes include frequent droughts that wipe out large herds of livestock, HIV/AIDs, poor infrastructure and acute water shortage. The most prevalent diseases reported in Sajiloni dispensary are; respiratory infections, diarrhea, skin diseases and eye infections.

3.2 Study population

The study population was heads of households in Sajiloni location. Households were the main sampling frame. The respondents were the head of household or spouse of head of household.

3.3 Study design

A descriptive cross-sectional study design was adopted so as to provide a "snapshot" and understanding of the adoption status of community led total sanitation of the targeted population at that particular point in time (Kombo& Tromp, 2006).

3.4 Sample size determination

The sample size was calculated using the following statistical formula by Cochran (1963) and has also been recommended by Mugenda and Mugenda, (1999) for social sciences.

$$n = (Z_{95})^2 \times (p\ q) / d^2$$

Where:

n = Minimum desired sample size

Z = is the confidence interval at 95% (standard value at 1.96)

p = proportion of the population having the condition of interest (0.5)

q = Proportion of the remaining population calculated by subtracting p from 1(1-p)

d = Level of statistical significance or degree of freedom which is 0.05

Using a confidence level of 95% that corresponds to the normal standard deviate 1.96 and the minimum error set at 0.05, the required sample size is therefore shown below:

$$\text{Sample size desired} = 1.96^2 \times 0.5 \times 0.5/0.05^2$$

$$n = 384 \text{ households.}$$

Actual household heads interviewed were = 345

3.5 Sampling procedure

Sajiloni location was purposively selected because this is where CLTS approach was piloted by the Ministry of Health in Kajiado County. It was divided into nine strata's. Each stratum represented the nine villages namely, Sajiloni, Elarai, Nalepo, Eiti, Olomaiyana, Oseuri, Oltaraja, Iltareto, and Inkiwanchani. A household register was then obtained from the respective village headmen.

3.6 Sampling interval

During this study, the sampling interval was first calculated to determine a fixed and equal interval (*k*) at which the individual household was to be selected. This was calculated as follows:

$K = N/n$

Where *n* is the sample size, and N is the population size.

Using this procedure each element in the population has a known and equal probability of selection. According to the KDHS, (2009) Sajiloni has 1529 households.

Therefore;

1529/384 = 3.98(Rounded off to 4)

The first head of household to be interviewed was picked at random from the household register provided by the village headmen. Subsequent persons' interviewed were picked after every 4^{th} person in the list. This was done until 345 heads of households were interviewed.

3.7 Inclusion and exclusion criteria

The study included heads of households who had been residing in the area for the past two years. This was done because that is the period in which the approach was

initiated in that area. Heads of households that declined to participate in the study were excluded.

3.8 Data collection instruments

3.8.1 Data collection Tools

A structured questionnaire was used to collect information on the household's socio-economic status, socio-demographic characteristics, household latrine coverage, household hygiene practices and accessibility of households to safe water.

An observation checklist was also used to observe environmental conditions and especially sanitation around the household in order to correlate with the information obtained from the questionnaires.

3.9 Piloting

A pilot study was carried out in Iloodokilani location from 24th of September 2014 to 1st of October 2014. This location was selected as suitable for the pre-test because CLTS approach is being implemented in the area and more importantly it is similar in characteristics to the study area. A sample size of 60 heads of households was selected using systematic sampling method. Questionnaires and observation checklists were administered by the principal researcher and assistant. After pre-test of the tools, necessary changes were made upon reviewing results of the pilot study and feedback from the research assistants.

3.10 Data management and analysis

All the questionnaires and observation checklist were collected at the end of each day and checked for accuracy and completeness. Data from both the questionnaire and observation checklist was sorted and coded using Epi Info version 3.1. It was then

entered in SPSS for Windows version 17.0 (SPSS Inc. Chicago, Ill, USA) for analysis. Descriptive statistics was used to analyze data for both continuous and categorical data. This was done by use of measures of central tendency, frequencies and percentages. Chi square test was then used to determine an association between dependent variables and independent variables with level of significance set at $\alpha=0.05$.

3.11 Study limitations

Limitations of the study were;

- The study was also carried out in a nomadic community hence, the study findings might not be the same as findings of a study carried out in a non-nomadic community.
- There was a response rate of 89.9% among eligible men and eligible women targeted in the study. The reason was failure to find individuals at home despite repeated call backs made to the households by interviewers.
- There was a lower response rate among eligible men. This may be as a result of their more frequent absence from home.

3.12 Dissemination plan

Once the thesis is approved study findings will be disseminated to the County health department and the concerned community using structures that are in place, such as community strategy.

3.13 Ethical considerations

The proposal was first submitted to IREC and approval was granted. Then after consent to carry out the study in Sajiloni location was sought from the Deputy County Commissioner and the Assistant Deputy County Commissioner. Upon approval by the Commissioners the Location Chief, Assistant Chiefs and village headmen were

notified in advance of the intended study. Heads of households eligible to participate in the study were interviewed only after providing consent as outlined in the following process:

1. The entire research team involved was trained on the research etiquettes and the research procedures.
2. The heads of households were informed that the project involves local research.
3. Full explanation of the purpose of the research and the procedures involved in the study was given to the heads of households.
4. The heads of households were assured that participation was voluntary and no service was to be denied should they decline to participate.
5. They were informed of the benefits and of any physical and psychological harm to their satisfaction prior to being interviewed.
6. Confidentiality was strictly maintained and all data was secured and only revealed upon a need-to -know basis.

Table 3.1: Operationalization of variables

Concept	**Theoretical definition**	**Operational definition**	**Variables**
Age	Chronological age	Age of an individual	• Age in years
Gender	A grouping of individual as masculine or feminine	same	• Male • Female
Marital status	Condition of being married to person of opposite sex or not married	same	• Single • Married • Divorced • Widowed
Level of education	Highest level of education attained	Highest level of formal education attained by head of household	• None • Primary • Secondary • Tertiary
Latrine coverage	The percentage of households that have a functional pit latrine	same	• None • Ordinary pit latrine • Ventilated improved pit latrine
Household hygiene	Practices that prevent or minimize diseases and spread of infectious agents	same	• Personal hygiene • Domestic hygiene • Public hygiene
Household access to safe water	Household less than one kilometre from a water source.	same	Distance in km • ≤ 1 km • 1-2 km • ≥ 3 km

CHAPTER FOUR:

STUDY FINDINGS

4.0 Introduction

This chapter presents the findings of the study. The findings are presented in four sections. Section 4.1 covers the household characteristics, section 4.2 covers household latrine coverage, section 4.3 presents the findings on household hygiene practices, and section 4.4 presents findings on household accessibility to safe water.

4.1 Household characteristics

The household characteristics of the head of households that were investigated in this study were age of the head of household, gender , marital status, level of education, number of household inhabitants, households with children under five years old, source of livelihood and household monthly expenditure.

4.1.1 Socio-demographic characteristics of respondents

Majority (66%) of the heads of households interviewed were females. The mean age of the heads of households was 37.9 years (SD=9.4). The minimum age of the head of household was 21 years and a maximum age was 59 years. Most (84.7%) of the household heads were married, 7% single, 7% widowed and 1.3% separated/divorced. In addition, (49.1%) had no education, 42.8% primary school, 7.8% secondary and 0.3% had attained tertiary level of education. (Table 4.1 presents a summary of socio-demographic characteristics).

Table 4.1: Socio-demographic characteristics of the respondents

Characteristics	Frequency	Percentage
Gender		
Male	117	34
Female	227	66
Total	345	100
Age (yrs)		
20-24	6	1.6
25-29	96	27.7
30-34	37	11.2
35-39	81	23.4
40-44	27	7.8
45-49	55	15.8
50-54	24	7
> 54	19	5.5,
Total	345	100
Marital status		
Single	24	7
Married	292	84.7
Divorced/separated	5	1.3
Widowed	24	7
Total	345	100
Level of education		
No school	169	49.1
Primary	148	42.8
Secondary	27	7.8
Tertiary	1	0.3
Total	345	100

4.1.2 Socio-economic characteristics of the respondents

The mean number of household inhabitants was 6 (SD=2). A higher percentage (51.4%) of the households had between 6-10 members; 46.8% had between 1-5 members and 1.8% had between 11-15 members. Most (70.1%) had children under the age of five years old. Among the respondents (71.4%) were livestock farmers, 14.5% employed, 13.6% traders and 05% unemployed. The mean monthly household expenditure was Ksh. 7662 (SD=2.701). Majority (59%) had a monthly household expenditure of between Ksh.5001-10000, 26% spent less than or equal to 5000, 14%

spent between 10001-15000 and 1% spent more than 15000 (Table 4.2 summarises the socio-economic characteristics of respondents).

Table 4.2: Socio-economic characteristics of the respondents

Characteristics	Frequency	Percentage
Household inhabitants		
1-5	177	46.8
6-10	162	51.4
11-15	6	1.8
Total	345	100
Households with an under five year old		
Yes	242	70.1
No	103	29.9
Total	345	100
Source of livelihood		
Livestock farmer	246	71.4
Trader	47	13.6
Employed (permanent and casual)	50	14.5
Unemployed	2	0.5
Total	345	100
Household monthly expenditure (Ksh.)		
< 5000	90	26
5000-10000	203	59
10001-15000	48	14
> 15000	4	1
Total	345	100

4.2. CLTS based on household latrine coverage

Only 42.6% of the households had a latrine of any kind. The findings show that 43.4% of the households that owned a latrine provided a ventilated improved pit latrine and the rest owned an ordinary pit latrine. The findings also show that most (63.5%) of the latrines were constructed less than a year prior to this study. The mean duration of latrine ownership was 29 months (SD=10.05). The study further shows that more than half (61%) of the latrines were functional, 27% required maintenance and 12% required rehabilitative works. A higher percentage (70.7%) of the latrines was of semi-permanent structure with floor slabs made of mud. Most of the latrines had no

aperture/squatting hole. Over (93%) of the latrines were located over ten metres away from houses. Most households that owned latrines did not have hand washing facilities placed next to the latrines. The findings further show that (84%) of the latrines were constructed upon advice from health workers, (16%) self-initiated latrine construction. A majority (97.9%) of households that owned latrines used the latrine. (Table 4.3 provides a summary on latrine coverage).

This study shows that (51.2%) of the respondents relieved themselves in the bush. There were varying reasons as to why they practiced open defeacation with (62.5%) citing cost of larine construction , 22.9% availability of open and vast land , 8.3% has been practiced for ages, 5.3% no reason at all and 1% land topography. More than half (59.7%) of households that had an under five year old disposed their children's feaces improperly by throwing it around their compound. Open defeacation sites were observed in 51.9% of homesteads visited. Most (60.5%) of the latrines were satisfactorily utilized with only 13.6% having latrine foot-paths covered with grass. Most (92.7%) of latrine owners always used it, 3.8% rarely used it and 3.5% mostly used it.

Table 4.3: CLTS based on household latrine coverage

Characteristic	Frequency	Percent (%)
Latrine availability		
Yes	147	42.6
No	198	57.4
Total	345	100
Type of latrine		
Ventilated improved pit latrine	64	43.5
Ordinary pit latrine	83	56.6
Total	147	100
Duration of latrine ownership (yrs)		
Less than one year	93	63.5
2-3	37	25.5
Longer than 3	17	11.5
Total	147	100
Functional		
Yes	89	61
No	58	39
Total	147	100
Status of latrine		
Need reconstruction	89	61
Need maintenance	40	27
Needs no maintenance	18	12
Total	147	100
Type of superstructure		
Permanent material	43	29.3
Semi-permanent material	104	70.7
Total	147	100
Frequency of latrine use		
Rarely	0	0
Mostly	3	2.1
Always	144	97.9
Total	147	100
Reason for latrine construction		
Self-initiated	24	16
Advice from family/friends	0	0
Advice from health workers	123	84
Total	147	100
Availability of hand washing facility		
Yes	70	47.6
No	77	52.4
Water available in hand washing facility (n=70)		
Yes	29	41.8
No	41	58.2

4.3 CLTS based on household hygiene practices

The findings further show that majority (61%) wash their hands after using the latrine. Among those only 14% used water together with a detergent. The rest washed hands with water only. Among household that had an under five year old child majority (71%) washed their hands after handling the child's feaces but only 12% used water together with a detergent. Results from the study show that majority (78%) households kept domestic waste uncovered. Two hundred and thirty eight (69%), improperly dumped domestic waste with 71% of households having solid waste strewn all over their compounds. Further findings showed that all households had water storage containers. Most kept their containers clean and covered with lids/covers. Of the 20.3% respondents who had dish racks only 11.6% were in good state of repair. (Table 4.4 presents a summary on household hygiene practices).

Table 4.4: Household hygiene practices

Variable	Frequency	Percentage
Wash hands after using latrine (n=345)		
Yes	210	69
No	135	31
Uses water and a detergent (n=210)		
Yes	29	14
No	181	86
Wash hands after handling under five year old feaces (n=109)		
Yes	77	71
No	32	29
Uses water and a detergent (n=77)		
Yes	9	12
No	68	88
Litter strewn in the compound (n=345)		
Yes	245	71
No	100	29
Water storage containers clean (n=345)		
Yes	261	75.8
No	84	24.2
Water storage containers with lid/covered		
Yes	254	73.5
No	91	26.5
Dish racks (n=345)		
Present	70	20.3
Not present	275	79.7
Condition of dish racks (n=70)		
Satisfactory	55	78.6
Not satisfactory	15	21.4
Method of disposing under five year old feaces (n=242)		
In latrine	98	40.3
Burying	52	21.5
Around home compound	92	38.2
Presence of open defeacation sites (n=345)		
Yes	179	51.9
No	166	48.9
Frequency of latrine use (n=147)		
Rarely	6	3.8
Mostly	5	3.5
Always	136	92.7
Latrine foot path covered with grass (n=147)		
Yes	127	86.4
No	20	13.6

4.4 CLTS based on accessibility of households to safe water supply

Majority (77.7%) respondents got water from shallow wells, 12% from boreholes, 9.6% from water pans and 0.7% from stream/rivers. Slightly less than half 46% of households were less than 2 Kms away from their water source, 31.9% were more than 3 Kms away and 22.1% were less than 1 Km away. The findings show that most (93.2%) paid for water that they used at home. Slightly more than half (56.5%) paid Ksh. 3 per jerry-can. The households that used between 4-7 jerry-cans of water/day accounted for 94.8%, those that used between 8-11 jerry-cans of water/day accounted for 3.4%, while 1.8% used 1-3 jerry-cans /day. The findings further revealed that a majority (91.2%) felt that water they obtained for domestic use was not adequate. However, most of the households treated the water at home before drinking with the preferred mode of treatment being (82.6%) chlorination (82.6%) and (17.4%). (Table 4.12 presents a summary on household water supply and use).

Table 4.5: Household water supply and use

Factors	Frequency	Percent
Distance from water source (n=345)		
< 1 Km	76	22.1
1-2 Kms	159	46
≥ 3Kms	110	31.9
Payment for water (n=345)		
Yes	322	93.2
No	23	6.8
Cost per 20litre jerry-can (Ksh) (n=345)		
≤ 1	0	0
2	140	43.5
≥ 3	182	56.5
Water consumption (20lt jerry-can) (n=345)		
1-3	6	1.8
4-7	327	94.8
8-11	12	3.4
Sufficient water supply (n=345)		
Yes	30	8.8
No	315	91.2
Domestic water treatment (n=345)		
Yes	305	88.3
No	40	11.7
Mode of treatment (n=345)		
Chlorination	252	83
Boiling	53	17

4.4.1 Socio-economic and socio-demographic characteristics associated with CLTS based on latrine ownership

A chi square test was used to find if the socio-economic characteristics and socio-demographic characteristics were significantly associated with CLTS measured by latrine ownership in Sajiloni location. The results are presented in table 4.4 and table 4.5. Gender (X^2(df=1, n=345) =15.851, p=0.001), household monthly expenditure (X^2(df=3, n =345) =29.354, p=0.001) and level of education (X^2(df=3, n =345) = 29.934, p=0.001) were significantly associated with CLTS measured by household latrine ownership. Age (X^2(df=7, n=345) =12.146, p=0.096), marital status (X^2(df=3, n=345) = 3.866, p=0.276), household inhabitants (X^2(df=2, n=345) = 0.915, p=0.177)

households with an under five year old and source of livelihood (X^2(df=1,n= 345) =1.242 , p=0.382) of the head of household were not significantly associated with CLTS measured by latrine ownership.

Table 4.6: Bivariate analysis of relations between socio-economic factors and CLTS based on latrine ownership

	Availability of latrine		
Independent variable	**Yes**	**No**	**Statistical test**
Level of education			X^2 =29.934 df=3 p=0.001
No school	53	116	
Primary	70	78	
Secondary	23	4	
Tertiary	1	0	
Total	147	198	
Source of livelihood			
Livestock farmer	91	155	X^2 =1.242 df=1 p=0.382
Trader	28	19	
Employed	28	22	
Unemployed	0	2	
Total	147	198	
Monthly expenditure (Ksh.)			
≤ 5000	21	69	X^2 =29.354 df=3 p=0.001
5001-10000	90	113	
10001-15000	32	16	
> 15000	4	0	
Total	147	198	

Table 4.7: Bivariate analysis of relations between socio-demographic factors and CLTS based on latrine ownership

	Availability of latrine		
Independent variable	**Yes**	**No**	**Statistical test**
Gender			X^2=15.851
Male	68	63	df = 1
Female	79	135	p=0.011
Total	147	198	
Age (yrs)			
20-24	4	2	X^2 =12.146
25-29	32	64	df=7
30-34	15	22	p=0.096
35-39	45	36	
40-44	11	16	
45-49	21	34	
50-54	9	15	
> 54	10	9	
Total	147	198	
Marital status			
Single	13	11	X^2 =3.866
Married	124	168	df=3
Divorced/separated	3	2	p=0.276
Widowed	7	17	
Total	147	198	
Household with < 5 year old			
Yes	109	133	X^2 =1.834
No	38	65	df=1
Total	147	198	p=0.176
Household inhabitants			
1-5	77	100	X^2 =0.915
6-10	67	95	df=2
11-15	3	3	p=0.177
Total	147	198	

4.4.2 Multivariate analysis using logistic regression

Multivariate logistic regression analysis was conducted to determine the household characteristics significantly associated with household ownership of latrines. The factors that were found to positively and significantly influence latrine ownership were monthly expenditure and level of education of the head of the household. They were included in the logic regression model as shown in table 4.7. A logic model to find out whether household monthly expenditure and level of education were

significant for household latrine ownership was done with a value of '1' denoting owning a latrine and '0' does not own a latrine. The method selects the set of values of the model parameters that maximizes the likelihood function. This means that the method maximizes the probability of the observed data on discrete variables in this case latrine ownership. It was thus established that households with a monthly expenditure of more than 15,000 Kenyan Shillings were five times more likely to own latrines than households that had a monthly expenditure of less than 5000 Kenyan Shillings. Further analysis shows that heads of households who had attained tertiary level of education were four times more likely to own latrines than the ones that had never been to school.

Table 4.8: Multivariate analysis of relations between household characteristics and CLTS based on latrine ownership

Variable	B	S.E.	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
						Lower	Upper
Monthly expenditure (Ksh)							
≤ 5000	-1.49	1.12	1	.001	1.03	1.02	2.01
5001-10000	-2.48	1.24	1	.001	1.10	1.05	2.24
10001-15000	-5.43	1.37	1	.001	3.65	3.23	4.45
>15000	-6.28	1.82	1	.001	5.34	3.74	7.62
Highest educational level of household head							
Never been to school	-1.45	1.01	1	.001	0.11	0.08	1.13
Primary	-2.68	1.25	1	.001	1.32	1.29	2.78
Secondary	-7.45	1.67	1	.001	4.12	3.89	5.46
Tertiary	-8.32	1.80	1	.001	4.35	3.06	6.19

4.4.3 Socio-economic and socio-demographic factors associated with household hygiene practice

4.4.3.1 Hand washing at critical times

A chi square test was carried out to find if the demographic factors and socio-demographic factors were significantly associated with household hygiene practice in Sajiloni location. Gender (X^2 =21.715, df=, p=0.001), household monthly expenditure (X^2 =22.741, df=6, p=0.001 and level of education (X^2 =14.403,df=6, p=0.002) was significantly associated with hand washing at critical times,. Age (X^2 =18.309, df=14, p=0.193), marital status (X^2 =6.018, df=6, p=0.421) and source of livelihood (X^2 =11.715, df=2, p=0.031) were not significantly associated with hand washing at critical times.

4.4.3.2 Presence of open defeacation sites

A chi square test was carried out to find if the socio-demographic and socio-economic factors were significantly associated with presence of open defeacation sites. Household monthly expenditure (X^2 =1.436, df =3, p=0.001) was significantly associated with presence of open defeacation sites. Gender X^2 =1.640, df=1, p=0.200), age X^2 =2.805, df=7, p=0.902), educational level (X^2 =5.633, df=3, p=0.131) were not significantly associated with presence of open defeacation sites.

4.4.3.3 Household water treatment

A chi square test was carried out to find if the socio-demographic and socio-economic factors were significantly associated with household water treatment. Age(X^2 = 21.227, df =7, p=0.003) was significantly associated with household water treatment. Level of education (X^2 =4.953, df=3, p=0.175), gender (X^2 =2.084, df=1, p=0.149), monthly expenditure (X^2 =2.015, df=3, p=0.569) and marital status (X^2 =2.587, df=3,

p=0.460) were not significantly associated with household water treatment. The results are presented in the tables below.

Table 4.9: Bivariate analysis of relations between socio-demographic factors and washing hands with a detergent at critical times

	Washing hands at critical times with water and detergent		
Independent variable	**Yes**	**No**	**Statistical test**
Gender			X^2 =21.715 df=2 p=0.001
Male	8	109	
Female	21	207	
Total	29	316	
Age (yrs)			
20-24	5	1	X^2 =18.309 df=14 p=0.193
25-29	6	90	
30-34	12	25	
35;-39	2	79	
40-44	2	25	
45-49	1	54	
50-54	1	23	
> 54	0	19	
Total	29	316	
Marital status			
Single	7	17	X^2 =6.018 df=6 p=0.421
Married	15	277	
Divorced/separated	2	3	
Widowed	5	19	
Total	29	316	
Level of education			
No education	3	166	X^2 =14.403 df=6 p=0.002
Primary	3	145	
Secondary	22	5	
Tertiary	1	0	
Total	29	316	

Table 4.10: Bivariate analysis of relations between socio-economic factors and washing hands with a detergent at critical times

	Washing hands at critical times with a detergent		
Independent variable	**Yes**	**No**	**Statistical test**
Source of livelihood			X^2 =11.715 df=2 p=0.031
Livestock farmer	5	241	
Trader	7	40	
Employed	16	34	
Unemployed	1	1	
Total	29	316	
Household monthly expenditure (Ksh)			
≤ 5000	4	86	X^2 =22.741 df=6 p=0.001
5001-10000	15	188	
10001-15000	6	42	
> 15000	4	0	
Total	29	316	

Table 4.11: Bivariate analysis of association between socio-economic factors and presence of open defeacation sites

	Presence of open defeacation sites		
Independent variable	**Yes**	**No**	**Statistical test**
Source of livelihood			X^2 =6.432 df=3 p=0.241
Livestock farmer	99	147	
Trader	41	6	
Employed	38	12	
Unemployed	1	1	
Total	179	166	
Household monthly expenditure (Ksh)			
≤ 5000	14	76	X^2 =1.436 df=3 p=0.001
5001-10000	119	84	
10001-15000	42	6	
> 15000	4	0	
Total	179	166	

Table 4.12: Bivariate analysis of association between socio-demographic factors and presence of open defeacation sites

	Presence of open defeacation sites		
Independent variable	**Yes**	**No**	**Statistical test**
Gender			X^2 =1.640 df=1 p=0.200
Male	50	68	
Female	129	98	
Total	179	166	
Age (yrs)			
20-24	3	3	X^2 =2.805 df=7 p=0.902
25-29	49	47	
30-34	17	20	
35-39	21	60	
40-44	19	8	
45-49	50	5	
50-54	20	4	
> 54	0	19	
Total	179	166	
Marital status			
Single	14	10	X^2 =4.842 df=3 p=0.184
Married	152	140	
Divorced/separated	2	3	
Widowed	11	13	
Total	179	166	
Level of education			
No education	107	62	X^2 =5.633 df=3 p=0.131
Primary	69	79	
Secondary	3	24	
Tertiary	0	1	
Total	179	166	

Table 4.13: Bivariate analysis of association between socio-demographic factors and household water treatment

	Household water treatment		
Independent variable	**Yes**	**No**	**Statistical test**
Gender			X^2 =1.640 df=1 p=0.200
Male	50	68	
Female	129	98	
Total	179	166	
Age (yrs)			
20-24	3	3	X^2 =2.805 df=7 p=0.902
25-29	49	47	
30-34	17	20	
35-39	21	60	
40-44	19	8	
45-49	50	5	
50-54	20	4	
> 54	0	19	
Total	179	166	
Marital status			
Single	14	10	X^2 =4.842 df=3 p=0.184
Married	152	140	
Divorced/separated	2	3	
Widowed	11	13	
Total	179	166	
Level of education			
No education	107	62	X^2 =5.633 df=3 p=0.131
Primary	69	79	
Secondary	3	24	
Tertiary	0	1	
Total	179	166	

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The overall objective of CLTS approach intervention is to improve health among residents of Sajiloni location. This intervention aims at improving health through increase in latrine coverage, good household hygiene practices and safe water use. It is generally accepted that adoption of the approach will lead to reduction in sanitation related diseases and water related diseases (Kar, 2000).

5.1 Household characteristics

The study shows that majority of head of households interviewed were female. There was a lower response rate among eligible men. This may be as a result of their more frequent absence from home. A majority of the household heads were married. This suggests that most of the people in the study area were in stable homes.

The most basic demographic characteristic of a household is the number of members it has. Although determination of membership is not always straightforward, in particular, regarding visitors and members who are temporarily absent these considerations are of minor significance for this purpose. Here, members who usually reside in the household were included even if they were temporarily absent. Hence, this study showed that majority (51.4 %) of the respondents had a family size of between 6-10 members.

Economic status of a household is a strong indicator of access to improved sanitation and water (UNICEF, 2005). The economic status of the study population was low in that their mean monthly expenditure was Ksh.7661 (SD=2701) which is much lower

than the World Bank recommended expenditure of 1¼ US dollars (Ksh 150) per person per day.

5.2 Community led total sanitation

5.2.1 Introduction

For a household to be declared as successfully adopted community led total sanitation approach it must have access to a safe and functioning latrine/toilet. In addition, household inhabitants need to practice good personal and environmental hygiene such as relieving oneself in a latrine/toilet; absence of open defeacation sites in their compounds; hand washing at critical times with water and a detergent; and safe disposal of domestic solid waste. Finally, households need to have access to adequate supply of safe water for domestic use. Successful adoption of CLTS in this study was measured by;

1. Adoption based on latrine coverage- presence of a latrine/toilet.
2. Adoption based on household hygiene practices- included absence of open defeacation sites, washing hands at critical times, safe disposal of domestic solid waste, and presence of kitchen dish racks.
3. Adoption of CLTS based on accessibility of households to safe water supply- included source of water, distance to main water source, cost of water, domestic water treatment and daily water consumption.

5.2.2 CLTS based on latrine coverage

The study found that a majority of households did not own latrines. This is similar to a study done in Ethiopia which revealed that only one-third of selected '*woredas'* had latrines (Kumie, 2005) and the Kenya Demographic and Health Survey (KDHS, 2009) report which states that rural Kenya accounts for only one-third of latrines

available in Kenya. Members of households that did not own latrines relieved themselves in surrounding bushes, and even along the seasonal river beds. The feacal matter subsequently contaminates environments and water bodies. This then exposes whole communities to risks of contracting sanitation related diseases/illnesses such as, typhoid, cholera, diarrhea, and intestinal worm infestation.

A higher percentage of the latrines were constructed upon advice from health workers, which is similar to BBS, (2005) report which showed that after introduction of community led total sanitation approach in Bangladesh, household latrine ownership in that country increased six-fold. The findings are also similar to a study that was carried out in Nigeria that showed after its introduction in four communities of Benue state, domestic latrine ownership increased to one thousand and sixty from one hundred and sixteen over a ten-month period (WaterAid, 2007).

Most households that owned latrines had a functional one but with un-cemented floors, which is similar to the Kenya Demographic and Health Survey (KDHS, 2009) which revealed that most rural households in Kenya own ordinary pit latrines with un-cemented floors. The physical state of the latrines makes them difficult to keep clean at all times. While women and children are mostly responsible for cleaning sanitation units they often do so without any training on the use of protective gloves and antiseptics. This poor hygienic practice exposes them to bacterial and several parasitic infections which can act as a catalyst for disease outbreaks.

According to a study by Mbonye, (2004) majority household that owned latrines had no hand washing facility next to the latrine. This is similar in comparison to this study which shows that majority of households that owned latrines did not provide hand washing facilities next to latrines. This suggests that with no hand washing facility

with water next to the latrine, majority of the users did not wash their hands at this critical time. This poor hygiene practice exposes the users to intestinal helminths infestation. The hands, along with human faeces, are the major routes for spreading a variety of intestinal helminths. Even though intestinal helminthic infestation does not necessarily contribute to child mortality it does contribute significantly to morbidity in children less than one year of age. It is generally accepted that, in order to reduce the risks of diarrheal disease transmission, priority should be given to washing hands at critical times. This simple act breaks the chain of faecal-oral transmission and subsequently control and prevents sanitation related diseases/illnesses.

5.2.2.1 Association between latrine ownership and socio-demographic characteristics of respondent

A significant association was observed between latrine ownership and household monthly expenditure. This compares well with (JMP, 2010) report which revealed that the poorest quintile was 270 times more likely to lack latrines than the richest quintile. According to Friej et al (1997) latrine ownership is determined by a household's economic status. In a study carried out by Karaone et al, (2012) the findings revealed that households that earned more than Tsh. 50000 were two times more likely to own latrines than those that earned less than Tsh. 50000. Subsequently, Worku et al, (2006) states that latrine ownership was twice as high for households with an income of 5000 or more Ethiopian Birr per year than households that were earning less than 5000 Ethiopian Birr per year.

A significant association was also observed between latrine ownership and level of education of respondent. According to Karaone et al, (2012) the likelihood of one

who has gone to school owning a latrine is four times more than one who has not gone to school.

5.2.3 CLTS based on household hygiene practices

The study shows that a majority of households practiced open defeacation. This figure is higher than the national average reported in Kenya Demographic and Health Survey (KDHS, 2009) report. Most of the respondents relieved themselves in the open due to the fact that they found it costly to construct a latrine. These finding is similar to Friej et al, (1997) who concluded in his study that latrine ownership is determined by the level of income of a household.

Self- reported usage of latrines by adults who owned latrines was absolute. This finding is similar to a study that was carried out in Lesotho by Daniel et al (2003), which reported 99% adult usage of latrines. However, usage of latrines by children was not encouraging. None of the under five year old children used latrines. In other studies done in Kenya children as young as three years used latrines, but in general most children began at five years and above. The extent of latrine utilization was significantly associated with self-initiated latrine construction. The fact that those people were more exposed to hygiene information in their environment positively favoured latrine utilization in the homes. Knowledge on the dangers of feacal matter and the perceived advantage of using latrines, particularly for girls and women in a community where relieving one-self in the open during the day brings shame are key factors that facilitate latrine use.

Some of the key reasons cited by the household heads as to why under-five year old children were not using latrines were; they were too young to use latrines and the poor state of the latrine. These findings are similar to a study done by Kunie, (2005) whose

findings show that design of the latrine and its state impeded latrine use by under five year olds. This led to a situation where majority of the respondents disposed of under five year old children's feaces in the compound either in bushes surrounding the house or at the back of the house. This behaviour is entirely an unacceptable practice of disposing children's feaces as this leads to contamination of the environments and the water bodies which presents a disease risk.

Unsafe disposal of children's feaces results from a combination of two factors; one is that children's feaces tend to be regarded as mildly unpleasant and not dangerous. This therefore, makes it quite acceptable to dispose it in the yard or garden beside the house. The other is that the physical structure and condition of many latrines make them potentially dangerous to use and difficult to clean if soiled by children. Nuisance of smell and flies associated with latrines result in their construction some distance (tens of metres) away from the house. This makes it difficult to supervise their use by children and makes them less convenient as places for busy parents or relatives to dispose of children's feaces. It is however, becoming apparent that access to a latrine is not the same as adoption of sanitary practices in dealing with human waste. Nor is access to a latrine the same as its hygiene use and adoption of other hygienic practices.

Hand washing in the study population appeared to be the exception rather than the rule, though hand washing with water only was more common. A minority washed their hands with water and soap after using the latrine and/or after handling child's feaces. According to Biran et al (2005) a tiny study population in Kyrgyzstan washed their hands with water and soap after using the latrine, after handling child's feaces and after cleaning feaces from children's potty. In a comparative study carried out in Ghana by Asenso-Mensah (2002) reveals that majority of the respondents did not

wash their hands with water and soap after using the latrine. A similar study carried out by Choya (2012) reveals that 42.2% of mothers whose children suffered from diarrhea did not use any sort of detergent after handling children's feaces or after using latrines. This was the case even though epidemiological investigations show that even in the absence of latrines; diarrheal morbidity can be reduced with adoption of improved hygienic behaviours such as hand washing at critical times with water and soap (Shahid et al, 1996). Several studies also show that hand washing education and soap availability results in global reduction of between 30%-48% in diarrheal disease prevalence and morbidity reduction of between 27%-89% (WHO, 2009).

Poor solid waste disposal practices incorporate throwing domestic, industrial as well as medical waste anywhere. In this study majority of household had solid waste scattered indiscriminately in their compounds, which compares favourably to study that was done in Uganda where majority of women threw domestic solid waste anywhere around the homestead and the remaining used a pit dug within the compound (Mbonye, 2004). Similarly, in a study done in Ghana majority of women threw domestic waste anywhere near the homestead. This situation leads to environmental pollution and unaesthetic conditions that is a good breeding ground for flies which are reservoirs of infective agents. This also exposes the public to serious health hazards and in particular children as they play around contaminated areas.

5.2.4 CLTS based on accessibility of households to safe water supply

Provision of water for human domestic use can be used as a fundamental example of water security. Survival is not possible without consuming water in some form, but sufficient water for survival alone is far from adequate for a tolerable or healthy life. Increasing volumes of water for diverse domestic uses benefits both personal and

family life, livelihood and human health (Moriarty, 2004). The third target under MDG goal no.7 that deals with environmental sustainability seeks to improve access to sustainable water and improved sanitation (UN, MDG 2012).

Like most developing countries, Kenya does not have a high population of those with access to potable water. A high percentage use water from unprotected sources mainly ponds, dams, shallow wells, streams/rivers. This translates to 18.3 million people without access to potable water (KDHS, 2009). However, this study shows that majority of the households got water from shallow wells. A high percentage did not have access to a water source, hence limiting the amount of daily water intake by household members. The study shows that the farther a household was to a water source the less amount of water that household consumed per day. This is similar to Grey et al (2007) whose findings showed that daily water consumption of a household was determined by among other factors distance to a water source.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

6.1.1 Objective 1: To determine latrine coverage

The study concludes that household latrine ownership in Sajiloni location is low; it further reveals that households with lower monthly expenditure and those that had heads with lower educational level were less likely to own latrines than those that had a higher monthly expenditure.

6.1.2 Objective 2: Assessment of household hygiene practices in Sajiloni location

Conclusions from the study were that generally majority of households were not practising good hygiene. Majority of households had open defeacation sites present in their compounds. A smaller proportion washed hands with a detergent at critical times, such as after visiting the latrine or after handling their child's feaces. Lastly, only a smaller proportion of households did not have waste indiscriminately disposed of in their compounds.

6.1.3 Objective 3: Assessment of accessibility of households to safe water

The study concludes that a high proportion of households in Sajiloni location were not accessible to a water source with a majority getting their water from unprotected shallow wells. Inaccessibility to water source limited the daily water intake per person per household with majority having insufficient supply to cater for their daily needs.

6.2 Recommendations

6.2.1 Programme level

Home visits needs to be scaled up by the public health personnel. Health education should also be stepped up on the risk to human health caused by unsafe hygiene

practices both at home and in public. The study further recommends hygiene education is taught at all levels of education.

6.2.2 Policy level

The study recommends the government and other partners to develop strategies to improve the socio-economic status of the residents of Sajiloni location, for example education of both boys and girls need to be scaled up. This is important because this study shows that education level of head of household was significantly associated with hygiene practices in that household.

6.2.3 Future Studies

The researcher recommends a similar study to be carried out in a non-nomadic community across Kenya. This will determine if the findings can be applied more broadly across the country.

REFERENCE

Ahmed, Abdulhamid, Al- Mekhlafi Hesham (2011). *The burden of moderate-to-heavy soil-transmitted helminthic infections among rural Malaysian aborigenes: an urgent need for an integrated control Programme.* Parasitic Vectors.

Ahmed, Faruque. (1994). Clemens John. *Family latrines and paediatric shigellosis in rural Bangladesh: benefit or risk?* Int J Epidemiol. 23: 856-862.

Allasan, Seidu, (2009). .*Abandoning open defeacation-Comparison and adaptation of social change.*

Ashworth, A., Haggerty P.A., Kalengaie M., Kirkwood B.R., Manun'ebo M.N. 63(2002). .*Influence of demographic, socioeconomic and environmental variables on childhood diarrhoea in rural area of Zaire*. Journal of Tropical Medicine and Hygiene, 97, 31-38.

Asenso–Mensah, A.O Awoyemi, & E.N.L Browne (2002).*The influence of environmental sanitation practices and hygiene on the incidence of diarrhoea*. AFR.J.CLN.EXPER. MICROBIOL 10(1):56-63.

Bartram, J. (2008). *Background, Growth and Impact of Regional Sanitation Meetings the Best of Sanitation: Synthesis and Outcomes of the Regional Sanitation Conferences*. Available from: http://www.worldwaterweek (Accessed September 2012).

Barkat, A & Sabina. N (2006). *Barriers in poor people's access to public health facilities in Bangladesh, Dhaka*.

Bangladesh Bureau of Statistics, UNICEF, National Sanitation Secretariat (2005). *Bangladesh Demographic and Health Survey report.*

Bangladesh Bureau of Statistics, UNICEF, National Sanitation Secretariat (2010). *Bangladesh Demographic and Health Survey report*.

Bajrachanja, D, Kar, Khan, M. & Mudgal, A, (1998). *Report of the Participatory Evaluation of VERCs Rural Safe Water Supply and Environmental Project; consultancy report for water aid Bangladesh, Dhaka.*

Belo, S, Rampao H, Goncalves L, Gracio MA. (2005). *Prevalence, behavioural and social factors associated with Schistosoma intercalatum and geohelminth infections in Sao Tome and Principe.* Parassitilogia.47:227-231.

Biran, D, Dikassa L, Mock N, Magnani R, Rice J, Abdoh A, Mercer D, Bertrand W. (2005). *Maternal behavioural risk factors for severe childhood diarrhoeal disease in Kinshasa, Zaire*.

Choya M, Akinyemi KO, Oyefolu AO, Opere B, Otunba-Payne VA, Oworu AO (2012). *Escherichia coli in patients with acute gastroenteritis in Lagos, Nigeria.*

CIRDAP (2006). *Proclamation of the international drinking water supply and sanitation decade.*

Clasen, T.F, Barreto ML, Norman G, Pedley & Lanata CF (2010). *Interventions to improve disposal of human excreta for preventing diarrhoea*.

Curtis, V. *Caincross* S. (2003). *Effect of washing hands with soap on diarrhoea risk in the community: a systematic review*. Lancet Infect. Dis. 3 (5): 275-819.

Daniel, Rose, Feachem RG. (2003). *Measuring the impact of water supply and sanitation investments on diarrhoeal diseases*.

Dar, O.A, Khan M.S. (2011). Millennium development goals and the water target: details, definitions and debate. Trop Med Int Health May; 16 (5): 540-4.

Demedeme, N.L. Nutsugah, P. (2009). *Evaluation of community led total sanitation (CLTS) in Ghana*.

Dumba, R, Koronel Kema, Innocent Semali, Serafina Mkuwa, Ignatio Kagonji1, Florence Temu, Festus Ilako, Martin Mkuye (2008). *Factors affecting the utilization of improved ventilated latrines among communities in Mtwara Rural District, Tanzania.*

Esrey, S.A. (1996). *Water, waste, and well-being: a multi country study*. Am. J. Epidemiology 143(6): 608-623.

Esrey, S.A, Potash J.B, Roberts L, Shiff C (1991) .*Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma*. Bulletin of the World Health Organization, 69:609–621.

Echeverria, P, Potash J.B, Roberts L, Shiff C (2004). *Potential sources of enterotoxigenic Escherichia coli in homes of children with diarrhoea in Thailand*. Bulletin of the World Health Organization, 65,207–215.

Freeman, M.C, Clasen T, Brooker SJ, Akoko DO, Rheingans R (2013). *The impact of a school-based hygiene, water quality and sanitation intervention on soil-transmitted helminth reinfection*: A cluster-randomized trial. Am J Trop Med Hyg 89: 875–883. doi: 10.4269/ajtmh.13-0237.

Friej, A, Kore Molbark, Henrik Jensen and Peter Aaby (1997). *Risk factors for diarrheal disease incidence in early childhood*: A community cohort study from Guinea Bissau.

Graham, P.M Root (2001). *Sanitation, Community Environments, and Childhood Diarrhoea in Rural Zimbabwe*. J. Health Popul NUTR 2001Jun; 19(2); 73-82.

Grey, P, Schmidt W.P, Caincross S.: *Household water treatment in poor populations: is there enough evidence for scaling up now?* Environ Sci Technol 43:986-92.

Huttley S., Morris S., Pissani V. (2001). *Prevention of diarrhoea in young children in developing countries*. Bulletin of the World Health Organization.75 (2), 163-174.

Hunter, P. R., Caincross S, Valdmanis V. (2001). *Waterborne diseases. Emerging Infectious Diseaes*.7 (3), 544–545.

Kar, K., Ahmed, K.A, Saha and Yesmin (1998). *Self -Mobilized Water and Sanitation Programme in Bangladesh-a community empowerment approach*. Consultancy report for Water Aid Bangladesh, Dhaka.

Karaone Smith, John D Snyder, Michael Maison (2012). The magnitude of the global problem of acute diarrheal disease: a review of active surveillance.

Kamau, N. (2009*). Healthy places, healthy people: community-led-total sanitation at work.* Available online at http://www.communityledtotalsanitation.org/country/kenya.

Kajiado District Strategic Plan (2010-2015).

Kenya National Bureau of Statistics (2010). Kenya Demographic and Health Survey Report 2008-2009.

Kumie, R., & Mitike, G (2005). *Prevalence of acute and persistent diarrhea in North Gondar zone, Ethiopia*. East Africa Med J, Aug, 2001 78 980: 44-48.

Lewin, Simon, & Norman Rosana, (2001). *Estimating the burden of disease attributable to unsafe water and lack of sanitation and hygiene in South Africa in 2000*. S Afr Med J. (2001); 97:755-762.

Macro NBOSNTaI. Tanzania Demographic and Health Survey (2010).

Magala, J.M, and Roberts, L (2009). .*Evaluation of strategy for scaling up community led total sanitation in Ghana: final report*. New York, NY, USA, UNICEF.

Matthew, C. Freeman, CE O'reilly, M Ravani, J Migele, A. Mwaki. (2012). Epidemiology and Infection, *The impact of a school-based safe water and hygiene programme on knowledge and practices of students and their parents: Nyanza Province, western Kenya.*

Mbonye, A.K, Wamalwa J.F, Nanyunja M, Opiyo A, Makumbi I, Aceng J.R. (2004 Sep). C*holera disease outbreak in west Africa-lessons from Uganda*. Afr Health Sci. 14(3):495–501.

Mock, N.B, Sellers T.A, Abdoh A.A, Franklin RR (1993). *Socioeconomic, environmental, demographic and behavioral factors associated with the occurrence of diarrhea in young children*. Soc. Sci. Med, 1993; 36(6): 807-816.

Moe, Christine, Rheingans. (2006). *Global challenges in water, sanitation and health.* J Water Health (2006); 4 Suppl 1: 41-57.

Moriarty, L, Stanton B.F, Clemens J.D. (2004). *An educational intervention for altering water-sanitation behaviours to reduce childhood diarrhea in urban Bangladesh*. Am J Epidemiol 125:292-301.

Murray, Christopher, Lopez Allan. (1997). *Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study*. Lancet. 1997; 349: 1436-1442.

Okoh, Anthony, Sibanda Thulani Gusha Siyabulela. (2010). *inadequately treated waste water as a source of human enteric viruses in the environment*. Int J Environ Res Publi Health. (2010); 7:2620- 2637.

Otieno, P.V (2010). *Against the odds: how manera became the first ODF village in Homa Bay*.

Pande, S., Kenan Okurut, Robinah Nakawunde Kulabako, Jonathan Chenoweth, Katrina Charles. *(2008). assessing demand for improved sustainable sanitation in low-income informal settlements of urban areas*: A critical review.

Petra Bongartz (IDS) (2008).*CLTS sharing and learning workshop report*.

Plan (2011). *Those practices common in North, South and Central Vietnam that hinder the successful adoption of Community led total sanitation strategy*.

Plan Kenya (2009*). The shit fire burns on in Kenya*. Available online at http://www.community led total sanitation.org/resource/shit-fire-burns-Kenya (Accessed December, 2012).

Pruss-Ustun A, Bos R, Gore F, Bartram J (2008). *Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health*.

Roberts, L, Fewtrell L, Kaufmann RB (2001). *Keeping clean water clean in a Malawi refugee camp*: a randomized intervention trial. Bulletin World Health Organization.79, 280–287.

Shahid, N., Greenough W, Samadi A, Huq M, Rahaman N. (1996). *Hand washing with soap reduces diarrhoea and spread of bacterial pathogens in a Bangladesh village*. J Diarrhoeal Dis Res; 14:85-89.

Sustainability issues in rural water supply in Asia. CIRDAP Dev. Dig. (1988) Mar ;(71):20-2.

Teklemariam, S., Getaneh T, Bekele F. (2000). *Environmental determinants of diarrhea morbidity in under-five children*. Keffa-Sheka Zone. Southwest Ethiopia. Ethiop Med J, 2000; 38(1): 27-34.

Teo, C.G. (2012). *Fatal outbreaks of jaundice in pregnancy and the epidemic history of hepatitis E. Epidemiol Infec*. (2012) May; 140(5): 767-87.

The Child Health (2005). Millennium Development Goal; *what water, sanitation, and hygiene can do for child health in Kenya*.

Timaeus, I.M, Lush L. (1995). .*Intra-urban differentials in child health*. Health Trans Rev, 1995; 5:163-190.

Trevett, A. F. (2003). *The public health significance of drinking water quality deterioration in rural Honduran communities*. PhD thesis. Cranfield University, UK.

UNICEF. (2006). Progress for Children: *A Report Card on Water and Sanitation.* Number 5, September 2006. Available from: http://www.unicef.org/publications/files/Progress_for_Children_No._5__English.pdf (Accessed September 2010).

UNICEF. (2009). *Water, Sanitation and Hygiene*. Available from http://www.unicef.org/wes/index.html (Accessed October 2012).

Victoria, C.G, Huttly S.R, Fuchs S.C & Olinto M.T.A (1997). *The role of conceptual frameworks in epidemiological analysis: A hierarchical approach*. Int. J. Epid. (1997); 26(1):224 -227.

Village Educational Resource Centre (VERC), (2002). *Shifting millions from Open Defeacation to Hygienic latrine, Dhaka*: Dhanshiri printing and publishing Co.

Water Aid Ghana (2007). Monthly update from Ghana. *Gozakope constructs its first latrine in 100 years*. Asero Ghana, Water Aid. Available online at http://www.communityledtotalsanitation.org/resourcegozakope-constructs-its-first-latrine-over-100-years(Accessed December, 2012).

WELL (Resource Centre Network for Water, Sanitation and Environmental Health), (2001). *Bangladesh environmental health seeking study*.

WHO/UNICEF (2010). *Global Water Supply and Sanitation Assessment Report.* World Health Organization, Geneva.

WHO (2008).*World health report 206*. World Health Organization, Geneva.

WHO (1986). The International Drinking Water and Supply Decade. Review of regional and global data. Offset Publ. (1986); (92): 130.World Health Organization, Geneva.

Worku R, Girma Regase, Bishaw Deboch (2006*); Environmental determinants of diarrhea among under-five children in Nekemte town, Western Ethiopia*.

Appendix 1: Formal Approval

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

MOI UNIVERSITY
SCHOOL OF MEDICINE
P.O. BOX 4606
ELDORET

Reference: IREC/2013/124
Approval Number: 0001045

28th August, 2013

APPROVED
28 AUG 2013

Okumu James Otieno,
Moi University,
School of Public Health,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Mr. Okumu,

RE: FORMAL APPROVAL

The Institutional Research and Ethics Committee have reviewed your research proposal titled:-

"Community Led Total Sanitation in a Nomadic Community a Case if Sajiloni Location, Kajiado County".

Your proposal has been granted a Formal Approval Number: ***FAN: IREC 1045*** on 28th August, 2013. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 27th August, 2014. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc	Director-	MTRH	Dean -	SOM	Dean -	SON
	Principal-	CHS	Dean -	SPH	Dean -	SOD

Appendix 2: Workplan

ITEM	ACTIVITY	TIMEFRAME	PERIOD
1.	Recruitment and training research assistants	2 weeks	September 9th – 23rd September 2013
2.	Piloting of research tools	1week	September 24th – 1st October 2013
3.	Data collection	4 weeks	October 14th – 11th November 2013
4.	Data analysis and report writing	6 weeks	November 18th – 30th December 2013
5.	Thesis mock defence	1 day	13th August 2014
6.	Submission of thesis for marking	-	11th September 2014
7.	Main thesis oral defence	1 day	17th September 2015
8.	Submission of final copy of complete thesis	1 day	20th October 2015

Appendix III: Budget

No		**QUANTITY**	**UNIT**	**RATE**	**AMOUNT(Ksh)**
1.	Printing papers	5	No.	700/=	3500/=
2.	Pencils	5	No.	10/=	50/=
3.	Notebooks	5	No.	100/=	500/=
4.	Folders	5	No.	150/=	750/=
5.	Erasers	5	No.	20/=	100/=
6.	Typing ,printing, binding	1	Item	15000/=	15000/=
7.	Transport	1	Item	10000/=	10000/=
8.	Allowances	5	No.	5000/=	25000/=
9.	Statistician	1	No.	20000/=	20000/=
10.	Training cost	1	No.	10000/=	10000/=
11.	IREC fees	1	No.	1000/=	1000/=
12.	Dissemination cost	1	No.	10000/=	10000/=
10.	Contingencies 10% of total	-	-	-	8690/=
11.	**Total**				**95590/=**

APPENDIX IV: Consent Form

MOI UNIVERSITY COLLEGE OF HEALTH SCIENCES / MOI TEACHING AND REFERRAL HOSPITAL

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC) INFORMED CONSENT FORM (ICF)

Study Title: COMMUNITY LED TOTAL SANITATION IN A NOMADIC COMMUNITY OF SAJILONI LOCATION, KAJIADO COUNTY

Name of Principal Investigator(s): Okumu James Otieno

Co- Investigators: 1. Manei Nanyu 2. Joseph Kintamwuas Kasere

Name of Organization: School of Public Health, Moi University P.O box 3900 Eldoret, Kenya. Tel. 053-43001-8/43620

Name of Sponsor: Self sponsored

Informed Consent Form for: Heads of households in Sajiloni location.

This Informed Consent Form has two parts:

• Information Sheet (to share information about the study with you)

• Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the signed Informed Consent Form

Part I: Information Sheet

Introduction:

Hallo, my name is …….. . During the past three years the Ministry of Health has been implementing a sanitation approach which your household may have benefited in or benefited from. You have been selected as a key informant to participate in this study. I would like to ask you a few questions in

relation to Community Led Total Sanitation. We will not take much time. The information you provide will be treated with utmost confidentiality. Your name will not appear anywhere in the report. Your responses cannot be traced back to you because they will be combined with the responses of others to establish common trends.

Your participation in this study is voluntary. You can choose to take part or not to. Also, if you do not want to answer a certain question, please inform me and I will stop immediately. If after data collection you choose to quit, you can request that the information provided by you be destroyed under supervision, and thus not used in the research study.

The purpose: To assess the adoption status of Community Led Total Sanitation approach location. The study data collection period is two weeks.

The possible benefits: to the community are that, the findings will inform policy makers and implementers on strategies to use that will lead to successful implementation of the approach. This in the long term will improve the sanitation standards in the area and subsequently reduce disease morbidity among the community members.

Participation in this study is voluntary and no payment or gift will be offered to the participants.

Certificate of consent:

Would you like to participate in the study? (If yes, ask the participant to sign or put thumb print below)

I have read or been read to and understand the above and agreed to participate freely in this study.

…… …….. ……

Name of participant Signature/thumb print Date and Time

…… ……...….

Name of representative/witness Relationship to subject

…….. ……..... ……

Name of person obtaining consent Signature Date

……... …… ……

Name of investigator Signature of investigator Date

If respondent has refused to participate, thank him/her for their time and leave the household.

Thank you for accepting to participate in the survey.

APPENDIX V: Questionnaire

This questionnaire is to collect data for purely academic purposes. All information will be treated with strict confidence. Do not put your name or identification on this questionnaire. Answer all questions as indicated by either filling in the blank or ticking the option that applies.

Name of interviewer……..……..…….

Division …… Location…… Village……..……

Household Number……. Date ……..

Part A: Socio-demographic and Socio-economic information

1. Gender: Male……..…

   Female…….

2. Marital status:

   a) Single……..…

   b) Married……...

   c) Divorced……..…

   d) Widow/er……..

3. Highest educational level of head of household

   a) Never been to school…….……..…

   b) Primary…….…….……

   c) Secondary……..……...……

   d) Tertiary…….……..…….....

4. How many people live in your household? .....

5. Do you have children under the age of five years living in your household?

   a) Yes …….. b) No…….

6. What is your main source of livelihood?

   a) Trading ……

   b) Salaried employment……..……..……..

   c) Casual employment……

   d) Farmer……..…….…….....

7. How much do you spend in a month? .....

8. Age (yrs)……

PART B: Latrine coverage and utilization

1. Where do you relieve yourself in the homestead?

   a) In our latrine/toilet…….…….…….

   b) Use neighbours latrine/toilet……...……..

   c) In the bush…….....

   d) Others (specify)…….……

2. When did you construct the latrine? .....

3. Where you advised by anyone to construct the latrine?

   a) Yes……. b) No……..

4. Who advised you to construct the latrine?

   a) Health workers……..

   b) Family/friends……

   c) Self- initiated……....

   d) Local administration……..

5. Were you forced by anyone to construct latrine?

   a) Yes ……. b) No……

6. Who forced you to construct latrine? .....

7. How often do you use the latrine?

   a) Rarely……..……...……

   b) Mostly……..……...…….…….……...

   c) Always……..……..…….……...…….

PART C: Household hygiene practices

8. Why do you relieve yourself in the bush?

   a) Costly to construct a latrine……...……

   b) Land is vast and open……..

   c) Soil is hard to excavate……...……

   d) Has been practiced for ages……....……

   e) No reason at all……...……..……..

9. Does everyone in the household use the latrine?

   a) Yes…… b) No…….

10. If No response who does not use the latrine?

   a) Under five year olds…….

   b) Children……..……

   c) Elderly…….……

11. Why don't they use latrines? .....

12. How do you dispose children's feaces?

   a) In latrine……..…...…….

   b) Burry it……..……..

   c) Throw it out in compound……..……

13. Do you wash your hands after visiting the latrine or handling child's feaces?

   a) Yes…… b) No…….

14. What do you use to wash your hands after visiting latrine or helping the child to defeacate?

    a) Water only…….

    b) Water and soap…….…….

    c) Water and sand……..……

PART D: Household water supply and use

15. What is your major water source?

    a) Boreholes ……..……

    b) Water pans ……..……..

    c) Streams/rivers……..……..

    d) Shallow wells……..……..

    e) Olkejuado water supply company…….……

16. How far are you from the water source? .....

17. Do you pay for the water?

    a) Yes ……. b) No……..

18. How much do you pay for the water? .....

19. How many (20lt) jerry-cans of water do you use per day? .....

20. Is the water able to satisfy your daily needs? .....

21. Do you make the water safe for drinking at home? .....

    a) Yes……. b) No…….

22. How do you make the water you use at the household safe for drinking?

    a) Boiling…..

    b) Chlorination…….…….…..……

    c) Others (specify)…….....

APPENDIX VI: Observation Checklist

This observation checklist is to collect data for purely academic purposes. All information will be treated with strict confidence.

1. Availability of latrine/toilet
    a. Yes……..
    b. No……
2. Type of latrine
    a. Ordinary pit latrine…….
    b. Ventilated Improved Pit latrine…….
    c. Others (specify)……..
3. State of latrine
    a. Functional…….
    b. Non-functional…….
4. Type of superstructure
    a. Permanent material…….
    b. Semi -permanent material……
    c. Others (specify)……
5. Type of floor material
    a) Cemented …….
    b) Mud …….
    c) Others (specify)…….
6. Presence of latrine hole cover
    a) Yes …….. b) No……..
7. Approximate distance latrine is located from house…….

8. Presence of hand washing facility next to latrine

   a) Yes …… b) No……..

9. If Yes, does it have water in it

   a) Yes…… b) No…….

10. Observe for presence of latrine foot-path covered with grass

    a) Yes……. b) No…….

11. Observe for presence of latrine utilization

    a) Yes……. b) No……

12. Observe for presence of open defeacation site

    a) Yes……. b) No……

13. Observe for presence of waste storage containers

    a) Yes……. b) No…….

14. Does it have a cover/ lid

    a) Yes…… b) No……

15. Observe for strewn solid waste in compound

    a) Yes…….. b) No…….

16. Observe for presence of water storage containers

    a) Yes……. b) No…….

17. Is it clean?

    a) Yes…….. b) …….

18. Does it have a cover/ lid?

    a) Yes……. b)……

APPENDIX VII: Map of Kajiado County