THE EFFECTS OF COMMUNITY HEALTH STRATEGY ON SANITATION INDICATORS IN THARAKA NITHI COUNTY, KENYA

CORNELLIUS MUSEMBI MUENDO (BSC. EVH)
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OCTOBER, 2017
DECLARATION

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

Signature: ____________________ Date______________________________

Muendo, Cornellius Musembi

Department of Community Health

Supervisors:

This thesis has been submitted with our approval as University Supervisors.

Signature: ____________________ Date______________________________

Dr. Isaac Mwanzo

Department of Community Health

Kenyatta University

Signature: ____________________ Date______________________________

Prof. Mohamed Karama

Centre for Public Health Research

Kenya Medical Research Institute – Nairobi
DEDICATION

I dedicate this thesis to my parents, Mr. David Muendo and Mary Mumbua for their unconditional love, support and inspiration.
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ABBREVIATIONS AND ACRONYMS

AIDS: Acquired Immunodeficiency Syndrome
AMREF: African Medical and Research Foundation
APHIA: AIDS, Population and Health Integrated Assistance
CDC: Centre for Disease Control and Prevention
CDHS: County Director of Health Services
CECM: County Executive Committee Member
CHA: Community Health Assistant
CHAO: County Health Administration Officer
CHEW: Community Health Extension Worker
CHC: Community Health Committee
CHIS: County Health Information System
CHS: Community Health Strategy
CHU: Community Health Unit
CHW: Community Health Worker
COH: Chief Officer of Health
CSO: Civil Society Organization
DHIS: District Health Information System
FBO: Faith Based Organization
HBC: Home Based Care
HCBC: Home and Community Based Care
HMIS: Health Management Information System
HIS: Household Interview Schedule
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>ICCM</td>
<td>Integrated Community Case Management</td>
</tr>
<tr>
<td>IMR</td>
<td>Infant Mortality Rate</td>
</tr>
<tr>
<td>JMP</td>
<td>Joint Monitoring Programme</td>
</tr>
<tr>
<td>KII</td>
<td>Key Informant Interview</td>
</tr>
<tr>
<td>KDHS</td>
<td>Kenya Demographic and Health Survey</td>
</tr>
<tr>
<td>KMHFL</td>
<td>Kenya Master Health Facility List</td>
</tr>
<tr>
<td>KNBS</td>
<td>Kenya National Bureau of Statistics</td>
</tr>
<tr>
<td>KUERC</td>
<td>Kenyatta University Ethics Review Committee</td>
</tr>
<tr>
<td>LLTNs</td>
<td>Long Lasting Mosquitoes’ Treated Nets</td>
</tr>
<tr>
<td>MNCH/FP</td>
<td>Maternal, Newborn and Child Health and Family Planning</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>MoH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MoP</td>
<td>Ministry of Planning</td>
</tr>
<tr>
<td>MOPHS</td>
<td>Ministry of Public Health and Sanitation</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science, Technology and Innovation</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NHSSP II</td>
<td>Second National Health Sector Strategic Plan</td>
</tr>
<tr>
<td>PHC</td>
<td>Primary Health Care</td>
</tr>
<tr>
<td>PHO</td>
<td>Public Health Officer</td>
</tr>
<tr>
<td>PSO</td>
<td>Private Sector Organization</td>
</tr>
<tr>
<td>SDGs</td>
<td>Sustainable Development Goals</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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</tbody>
</table>
TB: Tuberculosis
TNC: Tharaka Nithi County
UFMR: Under-Five Mortality Rate
USSR: Union of Soviet Socialist Republics
WASH: Water, Sanitation and Hygiene
WHO: World Health Organization
OPERATIONAL DEFINITION OF TERMS

Community Health Strategy implementing site: A Community Health Strategy implementing site constituted a sub-location hosting a fully functional community Health unit for a period of more than three years prior the data collection.

Functional community Health unit: A community Health units was classified as fully functional if it encompassed a body of trained Community Health Volunteers, trained community Health assistants, held monthly dialogue days, held quarterly action days and had a community health information system.

Improved sanitation facility: This is a sanitation facility that hygienically separates human excreta from human contact. According to WHO, improved sanitation facilities include water closet/pour flush, ventilated improved pit (VIP) latrine, pit latrine with a slab and compositing toilet.

Non-Community Health Strategy implementing site: A non-Community Health Strategy implementing site referred to a sub-location where no attempts had been instigated to establish a community Health unit, selected within the same sub-county with the selected Community Health Strategy implementing site.

Sanitation: Sanitation generally involves the provision of facilities and associated hygiene promotion activities for safe collection, transport and disposal of human wastes, including and not limited to faeces and urine.

Sanitation Indicators: These are variables designed to measure the performance of sanitation related interventions. According to WHO, access to adequate sanitation can be
measured by reviewing the availability of standard pit latrines, toilets, and hand wash facilities, among other high impact indicators

**Sanitation Knowledge:** This is the facts, information and skills acquired by the households regarding the provision of facilities and associated hygiene promotion activities for safe collection, transport and disposal of human wastes including and not limited to faeces and urine.
ABSTRACT

In 2006, Kenya developed and adopted Community Health Strategy as a means of enhancing community access to Healthcare services. Although there has been scientific evidence that community based health approaches are effective in delivering specific health services, there has been little effort to examine the performance of the Kenya’s Community Health Strategy against sanitation indicators. This analytical cross-sectional study was therefore designed to evaluate the effects of Community Health Strategy on sanitation indicators within Tharaka Nithi County. A total of 394 primary respondents, including 196 respondents from the Community Health Strategy implementing sites and 198 respondents from the non-Community Health Strategy implementing sites were randomly selected for household interviews. The study also gathered information through focused group discussions and key informant interviews. A $p$ value of less or equal to 0.05 ($p \leq 0.05$) was considered to be statistically significant. The study revealed statistically significant differences between Community Health Strategy implementing sites and the non-implementing sites. For instance, the study found out that 58.6% of households in the Community Health Strategy implementing sites owned improved sanitation facilities compared to 40.6% households in the non-implementing sites, $\chi^2 = 10.994$, df=1, $p<0.001$. Likewise, 43.9% of households in the Community Health Strategy implementing sites had handwashing facilities compared to 12.1% of the households in the non-implementing sites, $\chi^2 = 49.359$, df=1, $p<0.001$. The Community Health Strategy implementing sites also recorded a low diarrhoeal prevalence (15.1%) compared to 25% of households in the non-implementing sites $\chi^2 = 8.542$, df=1, $p=0.003$. The significant differences of sanitation indicators in favour of Community Health Strategy implementing sites demonstrates that Community Health Strategy is a suitable approach in delivering sanitation related indicators. The study therefore underscores the need for the Tharaka Nithi County Government and implementing partners to provide all the community based sanitation services through the existing framework of Community Health Strategy.
CHAPTER 1: INTRODUCTION

1.1 Background to the Study
The organization of health care services is paramount to improving access, coverage and quality of services provided by any Government all over the world (Berman, 2000). Globally, health care services are provided at different levels and by different types of providers. In most countries, the community is designated as the first level of care while the highest referral hospital becomes the highest level of care. The premise of the community being the first level of care is traceable to 1978 at an International Conference on Primary Health Care held at Alma-Ata, USSR. The declarations at the Conference called upon all Governments, the development partners and the global community to dedicate their efforts towards protecting and promoting health and wellbeing of their citizens through a system that encourages full participation of the communities. All the WHO member states agreed on an urgent need to strengthen healthcare services offered at the first level of contact with individuals, the family and the community (WHO/UNICEF, 1978). Since 1978, most of the countries across the globe have embraced health care systems and programmes focused on addressing health related issues on a bottom up approach rather than a trickle down fashion.

The Government of Rwanda, for instance has established a system of care organized into five levels starting from the community, health posts, health centres, district hospitals and referral hospitals (Republic of Rwanda, 2013). Other countries that have embraced a healthcare system with levels of care starting from the community include Thailand, Philippine, Brazil, Nigeria and India among others. Generally, the community health services aims at preventing diseases, promoting health and creating appropriate demand
for health services. Most important, the community services guarantees the right and duty of the citizens to participate individually and collectively in the planning and implementation of their health care.

In Kenya, health care service provision is organized hierarchically based on a six-tier system that comprises the community, Dispensaries, Health centres, Primary referral facilities, Secondary referral facilities and Tertiary referral facilities. The community services (level 1) is comprised of all community based preventive and demand creation activities organized around the Community Health Strategy (CHS), while levels 2 to 6 units ordinarily provide health facility based services focused on curative, corrective and rehabilitative care (MoH, 2014). The system is functionally designed to ensure that the basic healthcare services are handled at the primary components and then graduates with complicated cases being referred to higher levels of healthcare.

![Figure 1.1: Organization of Health Service Delivery System in Kenya](image)

Source: Kenya Health Policy 2014 – 2030
The provision of community health services is anchored on Community Health Strategy (CHS) as stipulated in the strategy for community health services policy document (2014 – 2019), the second National Health Sector strategic plan of Kenya – NHSSP II (2005-2010) and the Kenya Health policy (2014 – 2030). The CHS is a structured approach in which households and communities usurp a central role in health and health-related matters within their households and communities (MoH, 2006). The strategy operates through a community health unit (CHU) serving a population of 5000 people in about 1000 households. In most cases, a CHU constitutes a sub-location except where the size of the population or area of the sub-location calls for sub-divisions resulting into more CHUs.

The CHU is run by community health assistants (CHAs), previously known as community health extension workers (CHEWs). Each CHA is assisted by two or more Community Health Volunteers (CHVs) who link the CHAs to the households from which the CHVs come from. Leadership and governance oversight for each CHU is provided by a community health committee (CHC) made up of 9-13 members (MoH, 2014). According to the quality standards for community Health services, the CHVs and CHAs works as a team to ensure safe and efficient promotive, preventive and basic curative services at the household level and in line with the set standards (MoH, 2015). The CHU is connected to other levels of health care system through a link health facility. The units are functionally designed to provide a continuum of care including Water, Sanitation and Hygiene services; Community Nutrition services; Integrated Community Case Management (ICCM) services; Maternal, Newborn and Child Health and Family
Planning (MNCH/FP) services; HIV and AIDS, TB and Malaria services; and Non-Communicable Diseases’ services (MoH, 2013).

1.2 Problem statement

Improved sanitation and hygiene are elemental for enjoyable and honourable status of living. In respect to the value attached to good sanitation and hygiene, the global community has on historic conventions committed to invest in improving sanitation and hygiene indicators. The landmark worldwide targets to increase the proportion of households with access to improved sanitation were initially set in the year 2000 under the Millennium Development Goals (MDGs). The MDGs aimed at reducing by half the proportion of households without access to adequate sanitation. The targets have since been restated under the Sustainable Development Goals (SDGs), where the global community have committed to attaining universal coverage of improved sanitation facilities and end open defeacation by 2030. In spite of these milestone commitments, more than 2.4 billion people worldwide still lack access to improved sanitation facilities (WHO/UNICEF, 2015).

Kenya, just like many developing countries experiences unprecedented levels of poor health indicators. More importantly, the Country is not on track to attaining MDG target on sanitation. At the current trend, scientific data prospects that Kenya will attain the sanitation target in the subsequent century (UNICEF/WHO, 2014). Consequently, the GoK devised and adopted Community Health Strategy (CHS) in the year 2006 as the vehicle to reversing the unacceptable disease patterns (MoH, 2006). However, Tharaka Nithi County (TNC) has continued to be impoverished by poor sanitation related health indicators in spite of the much protracted efforts in the implementation of CHS. Indeed,
an analysis of TNC disease patterns and trends indicate that sanitation related diseases and conditions bear a comparably higher burden of the causes of ill health. The Intestinal worms, Diarrhoea and Typhoid are rated amongst the top 15 causes of morbidity and mortality within the County (DHIS2, 2016). This corroborates the KDHS findings that denoted a high diarrhoea prevalence rate of 20.5% in children under age five years compared to a National average of 15% in the same age group (KNBS, 2014). The County has also suffered sporadic episodes of cholera outbreaks in the last ten years with the latest cases being reported in April 2016 (DHIS2, 2016). Poor sanitation practices are associated with low height for age scores in children. Certainly, 32.9% of children under age five years in TNC are stunted compared to 26% Nationally (KDHS, 2014).

The worsening indicators are highly confounded by poor infrastructural support and households’ behavioural practices. In particular, the County is characterised by low coverage of sanitation facilities and poor uptake of key sanitation practices. Indeed, the latrine coverage fluctuates around 76%, way below the national target of 96% latrine coverage (TNC, 2013). Additionally, it is estimated that 3.8% of the residents of TNC defeacate in the open, and only 32.8% have access to improved sanitation facilities (Sophie & Pascal, 2013). The use of shared sanitation facilities is also unfavourably higher at 27.8% compared to the National estimates of 26% (World Bank Group, 2012). Moreover, 35.6% of households use unimproved sanitation facilities compared to 31% Nationally (WHO/UNICEF, 2015). Apparently, the County is ranked position 21 out of 47 Counties in terms of availability and use of standard sanitation facilities (World Bank Group, 2014).
An assessment conducted by the Kenya’s Ministry of Health to estimate the economic burden of poor sanitation indicated that TNC losses Ksh. 191 million each year as a result of diseases and conditions related to poor sanitation (World Bank Group, 2014). The estimates included losses due to access time, premature death, health care costs and productivity.

1.3 Justification
This study comes at a backdrop of concerted investments in community based health initiatives. Since the Alma – Ata declaration of 1978, countries all over the world have significantly invested in community based health models in view to improving the status of health care. In fact, an analysis of healthcare systems indicates that some of the community based programmes implemented using the principles of PHC are comparable to some community focused initiatives administered by the colonial medical authorities (Miriam, 1998).

In Kenya, Community Health Strategy is a major milestone and a flagship project positioned to facilitate the attainment of key health targets, including improving sanitation status as indicated in the sustainable development goals and the vision 2030. Article 43 (1) (b) of the Constitution of Kenya 2010 grants all Kenyans a right to reasonable state of sanitation. TNC Government has committed into using CHS in her quest to addressing worsening sanitation indicators. However, in spite of the high value attached to the CHS, there exists a relatively little scientific evidence that the Strategy is effective in addressing priority health indicators across all life cohorts. Moreover, there are a few studies that have investigated the performance of community based initiatives in delivering sanitation services world over. This study was therefore designed to
evaluate the performance of the Kenya’s CHS against its strategic objectives of reversing sanitation indicators. It is anticipated that the findings from this study will form a good basis for informed decision making by the Government and all other actors promoting sanitation and hygiene initiatives within TNC. Ultimately, there will be improvement on sanitation related indicators through better approaches, policies and practice amongst all stakeholders.

1.4 Research Questions

i. What is the difference in the availability and use of sanitation facilities between Community Health Strategy implementing sites and non-Community Health Strategy implementing sites in Tharaka Nithi County?

ii. What is the disparity in the uptake of key sanitation and hygiene practices amongst households within Community Health Strategy implementing sites and non-Community Health Strategy implementing sites in Tharaka Nithi County?

iii. What is the difference in sanitation knowledge between households within Community Health Strategy implementing sites and non-Community Health Strategy implementing sites in Tharaka Nithi County?

iv. What is the difference in diarrheal prevalence amongst households within Community Health Strategy implementing sites and non-Community Health Strategy implementing sites in Tharaka Nithi County?
1.5 Hypothesis

H₀ 1: There is no difference in sanitation indicators between Community Health Strategy implementing sites and non-Community Health Strategy implementing sites within Tharaka Nithi County.

1.6 Objectives

1.6.1 Broad Objective: To determine the effects of Community Health Strategy on sanitation indicators in Tharaka Nithi County

1.6.2 Specific Objectives:

i. To assess the availability and use of sanitation facilities amongst households within Community Health Strategy implementing sites and non-Community Health Strategy implementing sites within Tharaka Nithi County.

ii. To assess the uptake of key sanitation and hygiene practices amongst households within Community Health Strategy implementing sites and non-Community Health Strategy implementing sites within Tharaka Nithi County.

iii. To determine the levels of sanitation knowledge of households within Community Health Strategy implementing sites and non-Community Health Strategy implementing sites within Tharaka Nithi County.

iv. To establish the prevalence of diarrhoeal amongst households within Community Health Strategy implementing sites and non-Community Health Strategy implementing sites within Tharaka Nithi County.
1.7 Significance and Analytical Output

The findings of this study will benefit the community, programme implementers and the policy makers at large. At the community level, information appertaining to the coverage of community health units can be used to lobby for more resources to roll out Community Health Strategy in more sub-locations within Tharaka Nithi County. Also, the study has substantially provided new facets in the existing body of knowledge regarding the suitability and performance of Community Health Strategy. Moreover, the results would inform diligent apportionment of limited resources and support amongst different Health targeted initiatives. For instance, with the results pointing to improved sanitation indicators in Community Health Strategy implementing sites, it is anticipated that the Government and stakeholders would scale up their financial allocations and support to the Community Health Strategy in view to achieving much more impact. Lastly, the overall intention was to test the performance of the Community Health Strategy in addressing sanitation indicators in view to improving the practises and approaches used by different Sanitation services’ providers for reduced sanitation related disease burden.

1.8 Limitations and Delimitation

The most critical limitation for this study was the collection of information from different communities with somehow different cultural values and beliefs. This had a potential to biased responses influenced by social desirability and perceptions. Although attempts were made to match the community health implementing sites with their respective comparison sites in terms of socioeconomic characteristics, the study could not attain a perfect match with homogenous cultural values and beliefs.
The study was also delimited by the use of a sampled population as opposed to a census design. In addition, the use of a descriptive cross-sectional study design to compare Community Health Strategy implementing sites and the non-implementing sites at a point in time was circumstantial. It is more desirable to conduct a pre-test – post-test experimental study design to ascertain the effects of a programme on the targeted indicators. However, a pre-test study had not been done prior to the implementation of Community Health Strategy in Tharaka Nithi County and therefore the pre-test – post-test experimental design could not be feasible.

1.9 Conceptual Framework
The data collection, analysis and presentation was guided by a conception of variables, apparently gathered from literature review and highly attributed to improved sanitation services.

![Conceptual Framework Diagram]

Figure 1. 2: Conceptual Framework

Source: Adapted from Water Aid, 2011.
The above diagrammatic presentation (figure 1.2) illustrates the interplay of key sanitation related indicators that were expected to have been influenced by the implementation of Community Health Strategy. CHS functions through established CHUs, mostly covering a sub-location. The strategy focuses on increasing the coverage and use of improved sanitation facilities, increasing the coverage and use of hand wash facilities, improving solid and liquid waste management through establishing proper disposal sites and increasing households’ knowledge on proper sanitation practices. Improvement of these indicators would momentarily reduce diarrhoeal prevalence.
CHAPTER 2: LITERATURE REVIEW

2.1 History of Community Health Strategy

The Community Health Strategy is an approach of healthcare service provision primarily organized at individual, family and community levels (MoH, 2014). The strategy is anchored on the principles of Primary Health Care (PHC). The importance of implementing PHC as an overriding health priority was underscored at a landmark International Conference held at Alma-Ata from September 6 to 12, 1978 (WHO/UNICEF, 1978). During the Conference, more than 3000 delegates from 134 Governments and 67 International Organizations from all over the world adopted the Primary Health Care (PHC) strategy as a priority approach for ensuring universal health coverage by the year 2000. The concept of PHC is founded on a platform of empowering the individual households and the community to effectively take up their role as a pivotal pillar in health development. Principally, the PHC and particularly the community centred approach emerged from a backdrop of disappointment from the dominant medical models.

In Kenya, the Ministry of Health has demonstrated resolute efforts towards the implementation of PHC as declared at Alma-Ata. The MoH has implemented several community focused programmes including the Home Based Care Programme (HBC) and Home and Community Based Care (HCBC) Programme. However, the major breakthrough in the implementation of the community component in PHC was the enactment of a policy document to guide the implementation of community health services. In 2006, Kenya developed and adopted Community Health Strategy (CHS), a new approach aimed at improving health indicators through actively engaging
communities in managing their own health (MoH, 2006). Since then, the Government and other development partners in the Health sector including civil society organizations (CSOs) have supported the initiative through establishing and operationalizing Community Health Units (MoH, 2014). According to the Kenya Master Health Facility List, the Ministry of Health together with development partners have established 2944 community Health units across Kenya hitherto (MoH – KMHFL, 2015). Among this number, only 28 CHUs have been established in Tharaka Nithi County.

2.2 Overview of the Community Health Strategy
In the recent past, Countries worldwide have prioritised on implementing community Health based strategies as their preferred models in disease prevention and control initiatives. Although the strategies employed by different countries may bear different names, the principles of implementation are more or less the same (UNICEF, 2010). In Kenya, Community Health Strategy (CHS) establishes a Community Health Unit (CHU) as the first level of care targeted to serve a catchment population of 1000 households. A CHU has an established package of services that are basically delivered by CHVs with direct technical and logistical support from the CHAs. The services are provided through house to house visits, public barazas, community dialogue days and community action days (MoH, 2013).

The strategy was hatched in the Kenya’s second National Health Sector Strategic Plan (NHSSP II: 2005-2010) and operationalised in 2006 through a policy document entitled “Taking the Kenya Essential Package for Health to the Community: A Strategy for the Delivery of Level One Services” (MoH, 2006). Notably, the strategy underpins an approach of healthcare service provision, where the determinants of health are addressed
through people’s participation at the community level (MoH, 2014). Essentially, the
strategy functions through empowering households to increasingly utilize healthcare
services, and gradually realize their rights to reasonably highest standard of healthcare
services as enshrined in the Kenyan Constitution (Republic of Kenya, 2010).

In general, the implementation of community health based approaches has been
associated with significant successes in most Countries all over the globe. For instance, a
Brazilian family Health programme implemented using the principles of Community
Health Strategy led to reductions of 5.4 per 1000 in child mortality as compared to sites
not covered by the programme (Romero et al., 2009). Elsewhere, a study conducted to
evaluate a Community based distribution (CBD) programme that engaged community
based agents (CBAs) to administer contraceptives in Tanzania reported a significant
increase in contraceptive use and knowledge in areas served by the CBAs (Janowitz et
al., 2000). In Uganda, community based volunteers engaged to distribute invermectin
treatment at household level to treat river blindness excelled in service provision over the
Government employees (Katabarwa & Richards, 2001).

In Kenya, the pioneer Community based model (referred as Community Based Primary
Health Care) project was implemented in Kakamega district from 1974 to 1982 under the
support of Ministry of Health. According to Were (1984), the project provided new ideas,
mechanisms and approaches that could lead to improved Health care across all life
cohorts (Were, 1984). Similarly, an appraisal report for community-based Maternal and
new born care intervention package in Busia County implemented using the community
health approach pointed to a significant increase in essential Maternal and Neonatal care
practices in the intervention sites. The study demonstrated an increase in antenatal care
attendance from 39% to 62%, deliveries by skilled birth attendants from 31% to 57% and exclusive breastfeeding from 20% to 52% (Wangalwa, 2012). Another assessment commissioned by Great Lakes University of Kisumu to test the implementation of a model designed for comprehensive Primary Health Care based on Community Health Strategy found improvements in governance and management of the health care system, service delivery and health indicators in areas covered by the project (Buong et al., 2013).

A holistic evaluation of the performance of the full package of the Kenya’s Community Health Strategy pointed to improved indicators in areas where the Government and partners had rolled out Community Health Strategy. The assessment indicated an increased proportion of households with latrines (87.7%) in the Community Health Strategy implementing sites compared to coverage of 84.4% in the non-Community Health Strategy implementing sites. The study further revealed that 78.6% of the respondents in Community Health Strategy implementing sites practiced proper handling of children stools as opposed to only 73.5% of their counterparts in the non-Community Health Strategy implementing sites. There was also a significant difference of more than 5.7% on domestic water treatment in favour of Community Health Strategy implementing sites (UNICEF, 2010).

2.3 Availability and use of sanitation facilities
Sanitation facilities are essentially amenities provided for safe disposal of human wastes including faeces, urine, garbage and wastewater. Inadequate provision and utilization of sanitation facilities is a major cause of preventable morbidities and mortalities worldwide (WHO, 2015). At the household level, sanitation facilities may broadly be categorised into those that are designed to contain human faeces and urines and those
meant for safe disposal of “non-human” wastes. Although the domestically generated “non-human” wastes such as garbage and wastewater may not contain such large amounts of pathogenic organisms like faeces and urine, they also pose a risk to public health by attracting disease vectors such as houseflies, mosquitoes and rats. Mostly, the solid waste generated at the household level is largely organic, with little inorganic materials. Owing to the composition of the wastes, and with due regard to the environmental considerations, composting and burying are the most appropriate methods of disposing solid wastes at the household level. However, studies have established that the commonly used methods to dispose household level solid wastes is dumping the wastes openly at the backyard gardens or burning in the open space. This indiscriminate method of disposing solid wastes poses eminent hazards to the environment and health risks to human beings and other living organisms (The Open University, 2016). Indeed, a study conducted to assess household solid waste management systems in Kenya observed that improper disposal of domestic wastes results into health hazards and impacts negatively to the environment (Omambia & Ogonya, 2015).

The human faeces and urine contain large amounts of pathogenic microorganisms, and are considered the most harmful waste products of human body metabolism (Charles, 2009). Insanitation disposal of human faeces and urine is associated with environmental degradation and high incidences of intestinal infections and helminth infestations, including cholera, typhoid, amoebiasis, dysentery and diarrhoea, hookworm, schistosomiasis and filariasis. In addition, empirical evidence points to a strong relationship between unimproved sanitation and low height for age scores in children. To avert the risks to environment and human health, the WHO recommends that all human
faeces and urines should be disposed in improved sanitation facilities (WHO/UNICEF, 2012). Improved sanitation facilities are those that can hygienically separate faeces and urine from human contact, and they are used by members of one household only. As a rule, improved sanitation facilities include all types of toilets flushing to sewer systems or septic tanks, ventilated improved pit (VIP) latrines, pit latrines with a slab, and composting toilets. Consequently, “unimproved” sanitation facilities are considered to include public or shared latrine (toilets used by more than one household), toilets flushing elsewhere (not into a pit, septic tank, or sewer), pit latrines without slab, bucket latrines, hanging toilets and open defeacation (UNICEF/WHO, 2015).

The proportion of households that have access to sanitation facilities is generally sub-optimal in many parts across the world. In 2010, World Health Organization estimates pointed to more than half of the population living in developing countries to be lacking access to even a basic toilet (WHO, 2010). Accordingly, barely 40% of the world population had access to improved sanitation facilities (Baum R, et al, 2013). The problem of access to improved sanitation facilities is more pronounced in sub-Saharan Africa. For instance, more than half (52.1%) of the Ethiopian population still use unimproved sanitation facilities with 35.6% practicing open defeacation in 2014 (Abebe et al., 2015). The situation is equally worse in Kenya. The World Health Organization’s Joint Monitoring Programme estimates indicated that only 30% of Kenyan population had access to improved sanitation in 2015. It was also revealed that 27% of Kenyans used shared sanitation facilities, while 12% defecated in the bushes or open grounds (WHO/UNICEF, 2015). In Tharaka Nithi County, only 76% of the population have access to basic sanitation facilities (MoP, 2013). In spite of this poor coverage, a
countrywide evaluation of Community Health Strategy conducted in 2010 revealed that amongst all the services offered under Community Health Strategy initiatives, hygiene and sanitation components were relatively more comprehensively covered compared to the other package (UNICEF, 2010).

2.4 Uptake of key sanitation and hygiene practices
Water Supply and Sanitation Collaborative Council (2010) defines Sanitation services as the provision of facilities and associated hygiene promotion activities for safe collection, transport and disposal of human wastes. This implies that adequate sanitation cannot be attained without addressing hygiene issues. Hygiene basically involves the practice of observing personal and environmental cleanliness. Essentially, the high impact sanitation and hygiene practices include proper hand washing, regular bathing and laundering, safe disposal of waste and proper use of toilets (MOPHS & MOE, 2009). The center for diseases control and prevention (CDC) recommends that hands should be washed as frequently as possible but in all times before preparing food, before eating, after using the toilet and after changing diapers or cleaning up a child who has defecated. Proper hand washing entails use of soap and clean running water. In cases where soap and water is not available, it is advisable for people to use an alcohol-based hand sanitizer that contains at least 60% alcohol for cleaning hands (CDC, 2015). According to WHO, the process of washing hands with soap should be systematic and requires that a person wet hands and apply soap, rub each palm over the back of the other hand, rub between the fingers on each hand, rub the hands with the fingers together, rub around each of the thumbs, rub in circles on the palms, rinse with clean running water and dry the hands in the air (WHO,
Proper hand washing using soap and in all critical times is associated with a 48% reduction of the risk of acquiring diarrhoeal diseases (Cairncross et al. 2010).

Safe disposal of domestic wastes and proper use of toilets are also other very important aspects of preventing and controlling the transmission of sanitation and hygiene related diseases. In fact, poor handling and disposal of domestic wastes is a leading source of environmental pollution and eventually provides habitable conditions for the growth of pathogenic microorganisms (Boadi & Kuitunen, 2005). Besides the ordinary solid wastes generated at the domestic level, children faeces are commonly mishandled and poorly disposed. The children faeces are considered to be safely disposed when the child is assisted to use an improved sanitation facility or the faeces of very young children is put or rinsed into an improved sanitation facility. Based on this definition, studies have estimated that more than 50% of the global population do not dispose children faeces properly (World Bank Group, 2015). Kenya is not perfect either. The Kenya National Demographic and Health Survey (2014) revealed that 83% of children less than five years have their faeces disposed safely (KNBS, 2014).

Conventionally, it is not possible to avert sanitation related diseases and ill health by providing adequate sanitation facilities alone without paying attention to improving hygiene standards. Despite the significance of hygiene in diseases prevention, various studies have pointed to poor uptake of sanitation and hygiene practices globally. For instance, only 19% of the world’s population is estimated to wash hands with soap after visiting toilets or changing babies diapers (Freeman et al., 2014). Consequently, inadequate hand washing was estimated to have resulted into a global disease burden of more than 297000 deaths in the year 2012 (Prüss et al., 2014).
2.5 Households knowledge on Sanitation and Related Health Issues

Knowledge is one of the essential elements in effective sanitation interventions. Ordinarily, sanitation services should focus on providing the required infrastructural support and creating the appropriate knowledge and attitude on why and how to use the infrastructure for sustainable health benefits (Water Aid et al., 2013). Certainly, the global problem of poor sanitation status is compounded by the gaps between the households’ knowledge and the desired practices (Job, 2014).

The households’ knowledge on sanitation basically entails the facts, information and skills acquired by the households regarding safe collection, transport and disposal of human wastes and the resulting diseases, in case of poor practices. The import of correct knowledge on acquiring the desired outcomes in sanitation interventions has been demonstrated in various studies. The Kenya National Demographic and Health Survey (2014) for example found out that more than 50% of children whose mothers had formal education were most likely to have their last stool disposed-off safely (KNBS, 2014). This notwithstanding, wrong perceptions and incorrect information about sanitation and related health issues is a common phenomenon across the world. In fact, Zuwena Plata (2015) in his analysis on the global practices in the management of children faeces noted that the perception that children’s faeces are less offensive and less harmful than those of adults is too common in a number of countries (Zuwena, 2015). However, the reality is that children faeces are equally as much a health risk as adult faeces. In Kenya, statistics have indicated that efforts to eradicate open defecation are seriously hindered by wrong perceptions and myths regarding children faeces. In most cases, the children faeces are
disposed openly together with garbage or left behind to be eaten by dogs due to caregivers’ perceptions that children faeces are harmless (MOH, 2016).

### 2.6 Diarrhoeal prevalence

Diarrhoea is a disease condition associated with ingestion of pathogenic microorganisms that are most often found in human faeces. Accordingly, the WHO estimates that more than 88% of diarrhoea cases are as a result of poor sanitation and hygiene practices (Bartram & Cairncross, 2010). Other risk factors associated with diarrhoea include chronic infections, medications, endocrine functions, anxiety, and food allergy, among others. According to WHO, a person is classified as suffering from diarrhoea if they pass three or more loose or liquid stools per day (WHO, 2015). Although diarrhoea is a disease of all ages, empirical evidence indicates that children under the age of five years are more affected than everyone else. In fact, studies have estimated that children living in the low-income countries experience on average three episodes of diarrhoea every year (WHO, 2015).

Diarrhoea bears a significant portion of disease burden, and it is the most important of the faeco-oral diseases worldwide. Time trends observed over a period of ten years from 2000 to 2010 revealed that diarrhoea is responsible for a global disease burden of approximately one million deaths of children under age five years annually (Liu et al., 2012). In addition, diseases associated with poor sanitation have been found to kill more children globally than AIDS, malaria and measles combined, while diarrhoea is the leading single biggest killer of children in Africa (Black, 2010). In Kenya, diarrhoea is associated with 17,100 deaths of children under five years annually, out which 90% is linked to poor water, sanitation and hygiene (World Bank, 2012). Consequently,
sanitation experts estimate that improving sanitation would reduce the global burden of diarrhoeal diseases by one third (Bartram & Cairncross, 2010). Other interventions that can significantly reduce diarrhoeal incidences include provision of improved water supply, household water treatment and safe storage, and hygiene education (WHO, 2015).
CHAPTER 3: MATERIALS AND METHODS

3.1 Research Design
Analytical cross-sectional study design was used to concurrently examine the study variables amongst the Community Health Strategy implementing sites and the non-Community Health Strategy implementing sites. A Community Health Strategy implementing site constituted an administrative sub-location in which a functional community Health unit had existed for more than three years, while a non-Community Health Strategy implementing site constituted a sub-location where no efforts had been instituted whatsoever to establish a community Health unit. An appropriate non-Community Health Strategy implementing site was selected to reflect unique characteristics of the Community Health Strategy implementing site but, at a relatively far distance (outside 5km radius) to control for spill over effects. In addition, attempts were made to match the Community Health Strategy implementing sites and their respective comparison sites amongst the non-Community Health Strategy implementing areas. The selection of the comparison sites put into account the socio-demographic characteristics, cultural practices, economic dynamics, geographical factors, livelihood characteristics and population density of the respective Community Health Strategy implementing site.

3.2 Study Variables

3.2.1 Dependent Variables
The dependent variables in this study were coverage of sanitation facilities, coverage of hand washing facilities, available methods of disposing solid wastes, state of open defeacation, status of sanitation related knowledge and status of diarrhoea Prevalence.
The study had conceptualised that the state of each of these variables was likely to be influenced by the implementation of Community Health Strategy. These variables were measured in line with the national standards as defined here below;

**Coverage of sanitation facilities:** This was calculated as a percentage based on the total number of households with sanitation facilities (both improved and unimproved facilities) within a Community Health Strategy implementing site or non-Community Health Strategy implementing site divided by the total households within the same site.

**Diarrhoea Prevalence:** This was measured based on the WHO definition of diarrhoea, defined as the passage of three or more loose or liquid stools in a day (WHO, 2009). The study recorded stool frequency based on a fourteen day recall period and then applied this definition to calculate diarrhoea prevalence in children aged five years and below.

**Coverage of handwashing facilities:** The handwashing facilities included any water facility installed inside or immediately after a sanitation facility and dedicated solely for purposes of washing hands after visiting the sanitation facility. The coverage was calculated as a proportion of all the households with handwashing facilities compared to the total households within a particular administrative sub-location.

**Solid waste disposal methods:** The approaches deployed by the respective households to manage any domestic garbage or refuse. The households were appraised on the basis of the method they used to dispose their domestic wastes, whether composting, burying, burning or indiscriminate dumping, among others.

**Open defecation sites:** Open defecation was defined as defecation in fields, forests, bushes, bodies of water or any other open spaces.
Knowledge: This entailed the examination of any facts, information and skills acquired by the households about sanitation related matters and conditions. The households were asked a set of knowledge questions, each aligned to possible correct answers on which the respondents were scored.

3.2.2 Independent Variables
The independent variables of this study were Community Health Strategy implementing sites and Non-Community Health Strategy implementing sites. The effect of CHS on sanitation indicators was measured by comparing the state of the indicators in the CHS implementing sites and the non-CHS implementing sites.

3.3 Study Site
The study was conducted in Tharaka Nithi County (TNC). TNC is one of the 47 counties in Kenya and covers an area of 2,662.1 Km²; including the shared Mt Kenya forest estimated to have 360Km². The area borders Embu County to the South and South West, Meru County to the North and North East, Kirinyanga and Nyeri Counties to the West and Kitui County to the East and South East (MoP, 2013). The county is sub-divided into four administrative sub-counties including Tharaka North, Tharaka South, Chuka Igambang’ombe and Maara sub-counties. However, data was collected in Maara (Magutuni and Nkangani sub-locations) and Chuka Igambang’ombe (Kathatwa and Kanyakini sub-locations) sub-counties, based on purposive sampling.

3.4 Target Population
Tharaka Nithi County has a total population of 365,330 residents as per the 2009 population and housing census. The population was projected at 406,604 (198,612 males
and 207,992 females) in 2015. This population is segregated in different groups that includes the population below five years constituting 13.13% of the total population, the population under 15 years forming 37.92% of the total population, the adults (24-59 years) constituting 46% and the elderly representing 8% of the total population, among others. The total number of people in the workforce was 202,887 representing 55.5% of the total population. Moreover, the county has 88803 households. This includes 10282 households in Tharaka North sub-county, 17111 households in Tharaka South sub-county, 28151 households in Maara sub-county and 33259 households in Chuka Igambang’ombe sub-county (KNBS, 2009).

3.5 Selection Criteria

3.5.1 Inclusion Criteria
The study included all the residents of Tharaka Nithi County based on their willingness to participate, age and period of stay in the County. In particular, the respondents were adults aged eighteen years and above, had to be residents of Tharaka Nithi County, able and willing to provide informed consent and able and willing to provide information based on the data collection tools.

3.5.2 Exclusion Criteria
Conversely, the study excluded those found to be critically ill or those that denied or not able to give informed consent. In addition, the study never interviewed a household that had not lived in the County for at least three years prior the study.

3.6 Sample Size determination
The following formula was used to calculate the sample size;

\[ n = \frac{D \times (Z_{\alpha} + Z_{\beta})^2 \times (P_1 (1 - P_1) + P_2 (1 - P_2))}{(P_2 - P_1)^2} \], (Robert Magnani, 1997)
Whereby;

n = required minimum sample size per study round

D = design effect, which provided a correction for the loss of sampling efficiency resulting from the use of clusters, this was set at 1.3, based on the estimates of design effect for similar characteristics in the 2010 Community Health Strategy evaluation report (UNICEF, 2010)

P1 = the estimated level of an indicator measured as a proportion at the time of the first survey or for the non-Community Health Strategy implementing area (P1 was estimated at 0.328 in consideration of the population with access to basic sanitation in Tharaka Nithi County – MOH, 2014)

P2 = the expected level of the indicator either at some point in the future or for the programme (Community Health Strategy implementing sites) area, such that the quantity (P2 – P1) is the size of the magnitude of change desired for detection. The sample size was calculated with an intention to capture a difference of 10 percentage points in the critical indicators (e.g. latrine coverage) for each of the Community Health Strategy implementing sites areas.

Zα = the Z-score corresponding to the degree of confidence with which it is desired to be able to conclude that an observed change of size (P2 - P1) would not have occurred by chance (α is the level of statistical significance, set at 1.645 at 95% significance level), and

Zβ = the z-score corresponding to the degree of confidence required to detect a change of size (P2 – P1) if one actually occurred (β is the statistical power, estimated at 0.840 at 80% statistical power)
These parameters yielded a sample size of 373.5 respondents. This was rounded to 400 households, and distributed in a ratio of 1:1 amongst the Community Health Strategy implementing sites and non-Community Health Strategy implementing sites. This translated into 100 households in each of the Community Health Strategy implementing sites (Magutuni and Kathatwa CHUs) and non-Community Health Strategy implementing site (Nkangani and Kanyakini sub-locations).

3.7 Sampling Techniques
A purposive sampling was used to select two Community Health Strategy implementing sites and two appropriate non-Community Health Strategy implementing sites within Tharaka Nithi County. The selected Community Health Strategy implementing sites included Magutuni CHU in Maara sub-county and Kathatwa CHU in Chuka Igambang’ombe sub-county, while the non-Community Health Strategy implementing sites included Nkangani sub-location and Kanyakini sub-location in Maara and Chuka Igambang’ombe sub-counties respectively. The selection of the CHS implementing sites and the non-CHS implementing sites was based on the dynamics of Tharaka Nithi County and in particular the differences in socio-demographic characteristics, cultural practices, economic standing and geographical factors. Also, the selection took into consideration the households’ livelihood characteristics and population density.

Simple random sampling was used to identify the households’ level respondents from both the selected Community Health Strategy implementing sites and the non-Community Health Strategy implementing sites. In this case, household registers (MOH 513) were used to compute the study population for the Community Health Strategy implementing sites, while the projected housing and population census report of 2015 and
sub-chiefs population registers (where appropriate) guided the study population in the non-Community Health Strategy implementing sites. The key informants, including the participants of the focused group discussions were purposively selected taking into account their knowledge and exposure on community health services.

3.8 Research Instruments

3.8.1 Household interview schedules (HIS): Household interview schedules were administered on selected households to assemble the communities’ knowledge, practice and uptake of selected sanitation indicators.

3.8.2 Key informant interview schedule (KII): Key Informant Interviews were conducted using a structured schedule for the principal people involved in Community Health Strategy. The selection of the informants took into account their knowledge about the community and their role in the implementation of the Community Health Strategy. Considerations were also given to the organizations they work for, whether Government or Non-Governmental Organizations and their role in the organization. Based on this consideration, the study listed all the potential respondents under the various categories and randomly selected 15 respondents, from all of all categories. However, some categories like the heads of some key Government departments had only one officer and in such the occupier of these offices were directly enlisted without the need of sampling. The 15 selected respondents included the CECM for Health services, County Director of Health services, Chief Officer of Health, County Health administrative officer, one sub-county medical officer of Health, one sub-county Community Health Strategy coordinator, four community health assistants, two APHIA Plus field officers, one
AMREF Kenya field officer and two Plan international Community Health Strategy coordinators.

3.8.3 Focused Group Discussions’ guide (FGDG): Focused group discussions were held with Community Health Volunteers (CHVs) in the case of the Community Health Strategy implementing sites and with the Community Own Resource Persons (CORPs) in the case of the non-Community Health Strategy implementing sites. The participants of each FGD were selected based on their willingness to participate and their continued involvement in community services. The participants were selected with an intention of holding one FGD in each of the study area. All the legitimate participants were first listed and a simple random sample taken where the potential participants were found to be more than ten in number. In this regard, four FGDs (two in the Community Health Strategy implementing sites and two at the non-Community Health Strategy implementing sites), each comprised of 6-10 participants were conducted.

3.9 Validity
In order to obtain valid measures and findings, the study relied on randomly selected primary respondents, pre-tested the data collection tools, employed triangulation in data collection through a combination of different data collection methods, relied on a reasonably large sample size, deployed qualified and experienced research assistants, trained the research assistants and shared the study proposal and findings with experienced technical officers for their critique and inputs.

3.10 Reliability
The reliability in this study was assured through a detailed and clear documentation of the study processes. In particular, the study has comprehensively documented the research
design and its implementation, strategies for ensuring trustworthiness of the study, operational details of data gathering and reflective appraisal of the study process.

3.11 Data Quality Measures
Data quality and assurance constituted an indispensable component of this study. In this regard, the study deployed experienced research assistants and adequately trained them on data collection requirements, pre-tested the data collection tools, provided quality support supervision to the research assistants, edited the completed data collection tools while in the field and monitored data entry by randomly verifying for correct entries in at least 10% of the completed data tools.

3.12 Data Collection Techniques
Data collection from primary respondents was organized in units embodying one community health implementing site or a sub-location in the case of a non-Community Health Strategy implementing site. In this case, the research assistants first established the total number of households within every unit. All the households within every unit were listed separately and assigned a numerical value based on the order of appearance in the list. A random number generator application (software) installed in the smart phones of the research assistants was then used to randomly identify the participating households. In every selected household, an appropriate respondent was examined based on the established eligibility criteria. In cases where consent was denied, the study team thanked the concerned household and proceeded to the next selected household.

3.13 Data Analysis
The study generated both quantitative and qualitative data. Quantitative data gathered from the household level respondents’ was analysed using computer software (IBM
SPSS, version 20) and MS Excel (version 2010). The sample characteristics were
described using frequencies and percentages, while a chi-square test was used to infer the
sample characteristics at the population level. A $p$ value of less or equal to 0.05 (i.e. $p \leq 0.05$) was considered to be statistically significant. The qualitative information, mostly
gathered from the key informants and focused group discussions was analysed manually
using thematic network analysis technique. The interpretations of the data were shaped
based on the source and the themes emerging from the coded transcripts.

3.14 Logistical and Ethical Considerations
The ethical and scientific merits of this study were guaranteed through a multiplicity of
processes and deeds. Firstly, the study proposal was subjected for review by the Kenyatta
University Department of Community Health and independently by the Kenyatta
University Ethics Review Committee (KUERC) prior to data collection. In addition, the
study was authorized by the Graduate School of Kenyatta University, the National
Commission for Science, Technology and Innovation (NACOSTI) and the Tharaka Nithi
County Government. Moreover, the participation to the study was purely voluntary and
the right to deny consent or withdraw from the interview was properly communicated to
all the participants. Informed verbal and written consent was appropriately obtained from
all the respondents prior to any engagement. Aside from seeking informed consent, all
the information from the research participants was handled with ultimate confidentiality.
Individual names and other personally identifiable information were not recorded in any
way. The priority was to uphold the dignity of all the research participants, handle them
with utmost respect and ensure they were protected from undue study risks. Lastly, the
study deployed qualified and experienced research assistants in view to promoting compliance and avoid unwarranted breach of ethical entitlements.
CHAPTER FOUR: RESULTS

4.1 Socio-demographic Characteristics of the Study Respondents

The study engaged 394 primary respondents, 196 respondents from the Community Health Strategy implementing sites and 198 from the non-Community Health Strategy implementing sites. This represented a response rate of 98.5%, measured against the desired sample size of 400 respondents.

In all the respondents, 42.1% were household heads, 45.7% were spouses to the household heads, 9.6% were children aged eighteen years and above, 1.8% were relatives to the household head while 0.8% were other people within the household. Moreover, 43.4% of all the respondents were males while the rest (56.6%) were females. Majority (65%) of the respondents were married, 13.5% were single, 9.6% separated, 1.8% divorced and 0.5% cohabiting.

The community was generally (99.5% of the households) religious, with the majority (93.9%) professing the Christian faith, 5.6% Islamic faith and 0.5% being non-believers. The average household size was four (4) persons. Most of the respondents (42.1%) had attained the primary education, 34.8% had attained secondary education, and 18% had not attained the basic primary education, while 4.9% reported to have attained post-secondary education. The main source of household income was farming (31.5%), followed by business (12.4%) and employment 12.2%. However, the majority (43.9%) of the households did not have any form of employment.

Apparently, the study had matched for social-economic characteristics and therefore, there were no significant differences in occupation status between the Community Health
Strategy implementing sites and the non-Community Health Strategy implementing sites ($\chi^2 = 1.496, \text{ df}=4, p=0.827$). The following table summarises the socio-demographic characteristics of the respondents.

Table 4.1: Socio-demographic Characteristics of the Study Respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
<th>Frequency - CHS implementing sites</th>
<th>Frequency - Non-CHS implementing sites</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship to the household head</td>
<td>Head of the household</td>
<td>99</td>
<td>67</td>
<td>42.1%</td>
</tr>
<tr>
<td></td>
<td>Spouse/Partner</td>
<td>84</td>
<td>96</td>
<td>45.7%</td>
</tr>
<tr>
<td></td>
<td>Parent(Son/Daughter)</td>
<td>10</td>
<td>28</td>
<td>9.6%</td>
</tr>
<tr>
<td></td>
<td>Relative</td>
<td>3</td>
<td>4</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>0</td>
<td>3</td>
<td>0.8%</td>
</tr>
<tr>
<td>Sex (n=394)</td>
<td>Males</td>
<td>99</td>
<td>72</td>
<td>43.4%</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>97</td>
<td>126</td>
<td>56.6%</td>
</tr>
<tr>
<td>Marital status (n=394)</td>
<td>Single, never married</td>
<td>21</td>
<td>32</td>
<td>13.5%</td>
</tr>
<tr>
<td></td>
<td>Currently married</td>
<td>141</td>
<td>115</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>Separated</td>
<td>19</td>
<td>19</td>
<td>9.6%</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>3</td>
<td>4</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>12</td>
<td>26</td>
<td>9.6%</td>
</tr>
<tr>
<td></td>
<td>Cohabiting</td>
<td>0</td>
<td>2</td>
<td>0.5%</td>
</tr>
<tr>
<td>Religion (n=394)</td>
<td>Christian</td>
<td>117</td>
<td>193</td>
<td>93.9%</td>
</tr>
<tr>
<td></td>
<td>Muslim</td>
<td>17</td>
<td>5</td>
<td>5.6%</td>
</tr>
<tr>
<td></td>
<td>Atheist</td>
<td>2</td>
<td>0</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Level of education (n=394)</td>
<td>None</td>
<td>36</td>
<td>35</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Primary level</td>
<td>91</td>
<td>75</td>
<td>42.1%</td>
</tr>
<tr>
<td></td>
<td>Secondary level</td>
<td>61</td>
<td>76</td>
<td>34.8%</td>
</tr>
<tr>
<td></td>
<td>Tertiary (College)</td>
<td>7</td>
<td>11</td>
<td>4.5%</td>
</tr>
<tr>
<td></td>
<td>Tertiary (University)</td>
<td>0</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>1</td>
<td>0</td>
<td>0.3%</td>
</tr>
<tr>
<td>Main Occupation (n=394)</td>
<td>Unemployed</td>
<td>84</td>
<td>89</td>
<td>43.9%</td>
</tr>
<tr>
<td></td>
<td>Employed (Skilled)</td>
<td>14</td>
<td>12</td>
<td>6.6%</td>
</tr>
<tr>
<td></td>
<td>Employed (unskilled)</td>
<td>10</td>
<td>12</td>
<td>5.6%</td>
</tr>
<tr>
<td></td>
<td>Self-employed (Business person)</td>
<td>22</td>
<td>27</td>
<td>12.4%</td>
</tr>
<tr>
<td></td>
<td>Farmer</td>
<td>66</td>
<td>58</td>
<td>31.5%</td>
</tr>
</tbody>
</table>
4.2 Availability and use of Sanitation facilities

4.2.1 Access to Sanitation Facilities

Access to sanitation facilities was examined through probing the respondents to know where they defecated during the last time they wanted to defeacate. Those who defecated in any form of a toilet were considered to have access to sanitation facilities whereas those who defecated in the bush or open ground were considered as lacking access to sanitation facilities. The study showed that a majority of 96.2% households had access to sanitation facilities – whether shared, public or private. There was no significant difference between those who had access to sanitation facilities between the Community Health Strategy implementing sites and non-Community Health Strategy implementing sites. 96.9% of households in the Community Health Strategy implementing sites and 95.5% of households in the non-Community Health Strategy implementing sites reported to have used a toilet during the last time they defeacate ($\chi^2 = 0.593$, df=1, $p=0.441$).

Table 4.2: Comparison of Access to Sanitation Facilities

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Those who used a toilet the last time they wanted to defeacate</td>
<td>96.9%</td>
<td>95.5%</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Those that defeacated in the open the last time they wanted to defeacate</td>
<td>3.1%</td>
<td>4.5%</td>
<td></td>
</tr>
</tbody>
</table>

4.2.2 Availability of any Method of Sanitation Facility

The study assessed the availability of sanitation facilities by seeking to know whether the household owned any form of a latrine or toilet. The results as indicated in table 4.3 show that 85.5% of households owned some form of a sanitation facility – whether improved or not. Comparably, the study did not find a statistically significant difference on the
households that owned sanitation facilities between the two sites. 87.8% and 83.2% households in the Community Health Strategy implementing sites and non-Community Health Strategy implementing sites respectively owned some form of a sanitation facility ($\chi^2 = 1.609, \text{df}=1, p=0.205$).

Table 4.3: Comparison of availability of any form of a Sanitation Facility

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households that owned any form of a sanitation facility</td>
<td>87.8%</td>
<td>83.2%</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Households that did not own any form of a sanitation facility</td>
<td>12.2%</td>
<td>16.8%</td>
<td></td>
</tr>
</tbody>
</table>

4.2.3 Availability of Improved Sanitation Facilities

The availability of improved sanitation facilities was examined by observing the available toilets in all households and indicating whether they were improved or not. A significant majority of 58.6% of households in the Community Health Strategy implementing sites had improved sanitation facilities compared to 40.6% of households in the non-Community Health Strategy implementing sites ($\chi^2 = 10.994, \text{df}=1, p=0.001$).

Both the focused group discussions and the key informant interviews supported these findings. Most of the key informants associated Community Health Strategy with improved coverage of standard and hygienic sanitation facilities. For instance, some key informants had this to say about CHS, “the outcomes of Community Health Strategy are evidently pronounced in areas such as provision of user friendly and clean sanitation facilities, distribution of LLTNs and defaulter tracing”.


### Table 4.4: Comparison of the availability of Improved Sanitation Facilities

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households that owned improved sanitation facilities</td>
<td>58.6%</td>
<td>40.6%</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Households that did not own improved sanitation facilities</td>
<td>41.4%</td>
<td>59.4%</td>
<td></td>
</tr>
</tbody>
</table>

### 4.2.4 The Type of Ownership of the Sanitation Facilities

The study further sought to examine the type of ownership of the available sanitation facilities. The respondents were asked to state whether the sanitation facility they owned/used was private, shared or public. The results pointed to a statistically significant difference between the households that had access to private (one household), shared (more than one household) and public sanitation facilities. More households (67.5% of households) in the Community Health Strategy implementing sites used a private sanitation facility compared to 48% of households in the non-Community Health Strategy implementing sites ($\chi^2 = 15.334$, df=1, $p<0.001$).

### Table 4.5: Comparison of the ownership of Sanitation Facilities

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households that owned a Privately used sanitation facility</td>
<td>67.5%</td>
<td>48%</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Households that owned/used a shared sanitation facilities</td>
<td>32.5%</td>
<td>52%</td>
<td></td>
</tr>
</tbody>
</table>

### 4.3 Uptake of Key Sanitation and Hygiene Practices

#### 4.3.1 Availability of Handwashing Facilities

The study examined the availability of designated facilities for washing hands after visiting sanitation facilities by asking whether there was a place for washing hands, and
seeking to be shown where available. Comparably, there was a significant difference in the availability of handwashing facilities between the Community Health Strategy implementing sites and non-Community Health Strategy implementing sites. Whereas 43.9% of households in the Community Health Strategy implementing sites had handwashing facilities, only 12.1% of the households at the non-Community Health Strategy implementing sites had designated areas for washing hands ($\chi^2 = 49.359$, df=1, $p<0.001$). Sentiments from several key informants reinforced the fact that CHS implementing sites had registered high coverage of handwashing facilities. For instance, the Chuka Igambang’ombe Community Health Strategy coordinator had this to say about the effects of Community Health Strategy, “the Community Health Strategy is a very effective approach in delivering community based sanitation services. The strategy has led to increased provision of simple handwashing facilities in most of the households within Kathatwa sub-location. Similar sentiments were echoed by the Public Health officer in charge of Maara sub-county.

Table 4.6: Comparison of the Coverage of Handwashing Facilities

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of households with</td>
<td>43.9%</td>
<td>12.1%</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>hand washing facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of households without</td>
<td>56.1%</td>
<td>87.9%</td>
<td></td>
</tr>
<tr>
<td>hand washing facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3.2 Uptake of selected Hygiene Practices

The uptake of selected hygiene practices was examined in the context of how household members washed their hands and where they disposed their domestic wastes. On how the household members washed their hands, respondents were asked whether they had soap
or something else that they used for washing hands. In both sides, a significant majority of the households used soap when washing hands. More households (78.1%) reported using soap for washing hands in the CHS implementing sites compared to non-CHS implementing sites (61.6%); a chi square test showed that this difference was significant ($\chi^2 = 12.656, df=1, p<0.001$). Similarly, the key informant interviews pointed to increased uptake of sanitation and hygiene practices in areas covered by community health units.

For instance, a project officer from APHIA Plus kamili stated as follows, “Sanitation and hygiene services are fairly covered by the Community Health Volunteers. Consequently, we have witnessed increased uptake of certain practices like handwashing with soap, proper solid waste management and improved cleanliness in the households. In this regard, I wish to appeal to the Government to ensure that the Community Health Volunteers are fully supported to sustain these efforts and more importantly, be able to provide the complete package of the essential community health package.

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of households that used soap for washing hands</td>
<td>78.1%</td>
<td>61.6%</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Proportion of households that did not use soap for washing hands</td>
<td>21.9%</td>
<td>38.4%</td>
<td></td>
</tr>
</tbody>
</table>

The respondents were also asked to explain how they disposed the domestic wastes generated from their households. The results indicated that majority (40.6%) of the households disposed their domestic wastes through composting, followed by open burning (26.4%), burying (22%) and crude dumping (11%). However, there was a statistically significant difference between the CHS sites and non-CHS implementing
sites on the recommended environmentally friendly methods (composting and burying) of
domestic waste disposal. Whereas 73% of households in the Community Health Strategy
implementing sites either composted or buried their domestic wastes, only a paltry 52.5%
of the households in the non-CHS implementing sites practiced waste composting or
burying ($\chi^2 = 17.584$, df=1, $p<0.001$). The others practiced either crude dumping or open
burning of wastes. Open burning and crude dumping pose a major health hazard to the
households.

![Graph Showing Methods used by Households to Dispose Solid Waste](image)

**Figure 4.1: Graph Showing Methods used by Households to Dispose Solid Waste**

In addition, the study examined the general cleanliness of the households by observing
for the presence of solid waste piles at the respondents' compound. About half (57.1%) of
all the households did not have solid waste piles in their compounds. However, there was
a statistically significant difference on the households’ cleanliness between the
Community Health Strategy implementing sites and non-Community Health Strategy
implementing sites. Whereas 54% of households in the non-Community Health Strategy
implementing sites had solid waste piles in their compounds, the situation was fairly good
in the Community Health Strategy implementing sites with only 31.6% of households found to have solid waste piles in their compound ($\chi^2 = 20.190, \text{df}=1, p<0.001$).

![Observation of Solid Waste Piles in Households](image)

**Figure 4.2: Graph Showing the Status of General Cleanliness in Households**

### 4.3.3 Methods Used to Dispose Children Faeces

The study assessed the methods used to dispose children faeces in households that reported to have children less than five years. The respondents were probed to explain how they disposed children faeces with particular emphasis on the last bout of defeacation. The results showed that a majority of 82.2% of households (86.3% in the Community Health Strategy implementing sites and 76.8% in the non-Community Health Strategy implementing sites) dropped the children faeces in the toilets, buried or washed and discharged as grey water. The remaining 17.8% (13.7% in the CHS implementing sites and 23.2% in the non-CHS implementing sites) disposed their children faeces in the open fields, in the garbage or even left it unattended. The observed disparities between
the Community Health Strategy implementing sites and the non-Community Health Strategy implementing sites were not statistically significant ($\chi^2 = 1.959, \text{df}=1, p=0.162$).

### Table 4. 8: Methods used to Dispose Children Faeces

<table>
<thead>
<tr>
<th>Response</th>
<th>Respondent Category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Community Health Strategy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>implementing sites</td>
<td></td>
</tr>
<tr>
<td>Dropped into toilet, buried or washed and discharged as grey water</td>
<td>86.3%</td>
<td>82.2%</td>
</tr>
<tr>
<td></td>
<td>Non-Community Health Strategy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>implementing Sites</td>
<td></td>
</tr>
<tr>
<td>Disposed in the open ground, as solid waste/garbage, washed away and</td>
<td>13.7%</td>
<td>17.8%</td>
</tr>
<tr>
<td>water discharged outside or did nothing/left it there</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4.4 Households’ Knowledge on Sanitation and Related Health Issues

#### 4.4.1 Households’ Knowledge on the Critical Times of Washing Hands

The households’ knowledge on sanitation and health was examined in the contexts of the basic facts about the critical times of washing hands, steps of washing hands, types of sanitation related diseases and basic facts on sanitation related disease prevention. Knowledge on the critical times of handwashing was generally poor in both communities but slightly better in CHS implementing sites at 23% compared to the non-CHS implementing sites at 15.2%. The observed difference was statistically significant ($\chi^2 =3.896, \text{df}=1, p=0.048$). The focused group discussions held with Community Health Volunteers also underlined the importance of Community Health Strategy in creating awareness on handwashing at the four critical times. The CHVs explained how they had passionately educated most of the households on the ways and critical times of washing hands. These are words from one of the CHVs, “Whenever I visit any household within
my area of service provision, I have always taught them about handwashing at the four critical times.”

Figure 4.3: Households’ Knowledge on the Critical Times of Washing Hands

4.4.1 Households Knowledge on the Steps of Washing Hands

The study also examined the households’ knowledge about the recommended steps of washing hands by asking the respondents to demonstrate how to wash hands. The study observed that 39.1% of all the households (51.5% in the CHS implementing sites and 26.8% in the non-CHS implementing sites) correctly undertook more than four steps of washing hands. However, a majority 60.9% of the households (48.5% in the CHS implementing sites and 73.2% in the non-CHS implementing sites) could not undertake either of the steps or undertook less than four steps. These findings pointed to a highly statistically significant differences on the knowledge of handwashing steps amongst the households’ within the Community Health Strategy implementing sites and non-Community Health Strategy implementing sites ($\chi^2 = 25.368$, df=1, $p<0.0001$).
4.4.2 Households Knowledge on Types of Sanitation Related Diseases

The households’ knowledge on sanitation related diseases was measured by asking and probing the respondents to mention some of the diseases associated with poor sanitation. The purpose was to gauge the respondents against the number of sanitation related diseases they could state correctly. The results indicated that a majority of 56.9 % of households (57.7% in the Community Health Strategy implementing sites and 56.1% in the non-Community Health Strategy implementing sites) knew more than three types of diseases while the remaining 43.1% (42.3% in the Community Health Strategy implementing sites and 43.9% in the non-Community Health Strategy implementing sites) knew either none or less than three types of the sanitation related diseases. The results did not indicate any significant differences amongst the households within CHS implementing sites and non-CHS implementing sites ($\chi^2 = 0.102, \text{df}=1, p=0.750$).
4.4.3 Households Knowledge on the Basic Facts of Human Faecal Matter

The study examined the households’ perceptions on human faeces by asking them a knowledge question on the harmfulness of the adults’ faeces as compared to those of children. A significant majority of 90.8% of households in the CHS implementing sites correctly stated that children faeces were equally harmful as those of adults compared to 79.8% of households in the non-CHS implementing sites ($\chi^2 = 9.525, \text{df}=1, \text{p}=0.002$). The following table illustrates these findings:

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of households that correctly stated that children faeces are equally harmful as those of adults</td>
<td>90.8%</td>
<td>79.8%</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Proportion of households that thought children faeces are less harmful than those of adults</td>
<td>9.2%</td>
<td>20.2%</td>
<td></td>
</tr>
</tbody>
</table>

4.5 Diarrhoea Prevalence

4.5.1 Estimated Diarrhoea Prevalence

The study sought for information about diarrhoea in children less than five years for the period within two weeks prior to the household interviews. Apparently, diarrhoea was reported in 15.1% of children within the Community Health Strategy implementing sites and 25% of children in the non-Community Health Strategy implementing sites. However, 10% of the legible households could not remember whether their children experienced diarrhoea or not. These results pointed to a statistically significant difference on the diarrhoea prevalence amongst households.
within CHS implementing sites and those in the non-CHS implementing sites ($\chi^2 = 8.542$, df=2, $p=0.003$). Both the focused group discussions and the key informant interviews supported these findings. During one of the focused group discussions at Magutuni community health unit, the lead community health volunteer explained how she had witnessed decline of diarrhoea cases within the areas under the jurisdiction of Magutuni community health unit. These were her words, “This community health unit (Magutuni CHU) was started in 2009 by the Ministry of Health with financial support from the APHIA Plus Kamili. Today, it’s almost six years and I can confidently tell you that the diarrhoea cases have drastically dropped in our sub-location as a result of our efforts (Community Health Volunteers). We only need to be supported with community unit kit fully stocked with basic drugs and diarrhoea will be a thing of the past in this community.”

![Figure 4.5: Reported Diarrhoea Cases within two Weeks Prior to the Study](image)
4.5.2 Knowledge on Diarrhoea Prevention

Lastly, the study assessed the households’ knowledge on diarrhoea prevention by asking the respondents to mention some of the ways of preventing diarrhoea. Majority of the households (95%) correctly stated at least one method of diarrhoea prevention. However, there was a statistically significant difference on the knowledge appertaining diarrhoea prevention amongst the households within CHS implementing sites and those in the non-CHS implementing sites. Whereas 97.4% of households in the CHS implementing sites knew at least one method of diarrhoea prevention, 92.9% of their counterparts in the non-CHS implementing sites had proportionately equivalent information. Similarly, 2.6% of households in the CHS implementing sites and 7.1% of households in the non-CHS implementing sites could not correctly mention a single method of diarrhoea prevention ($\chi^2 = 4.384$, df=1, $p=0.036$). The following table illustrates these findings;

Table 4.10: Comparison of the Households’ Knowledge on Diarrhoea Prevention

<table>
<thead>
<tr>
<th>Category</th>
<th>CHS Implementing Sites</th>
<th>Non-CHS Implementing Sites</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of households that knew at least one method of diarrhoea prevention</td>
<td>97.4%</td>
<td>92.9%</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Proportion of households that didn’t know any method of diarrhoea prevention</td>
<td>2.6%</td>
<td>7.1%</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 DISCUSSION

The Kenya’s Community Health Strategy (CHS) was developed in 2006 and aims at enhancing the community access to health care in order to improve their health status through reduced disease burden and improved education performance (MoH, 2006). Currently, Tharaka Nithi County has a total of twenty eight (28) functional community health units against a target of one hundred and sixty four (164) sub-locations, this translated into 17% coverage (MoH, 2015). This study has investigated the effects of the CHS on the availability and use of sanitation facilities, uptake of key sanitation and hygiene practices, sanitation knowledge and changes on Diarrhoea prevalence.

5.1.1 Availability and use of sanitation facilities

The study showed that a significant majority of households in the CHS implementing sites had improved sanitation facilities compared the non-CHS implementing sites. The findings, especially for the non-CHS implementing sites are in concurrence with the Water and Sanitation Programme assessment report that estimated that about 32.8% of Tharaka Nithi population had access to improved sanitation in 2014 (World Bank Group, 2014). The significant difference on improved sanitation facilities in favour of Community Health Strategy implementing sites can be attributed to the efforts of Community Health Volunteers (CHVs). During house to house visits, CHVs educate communities on the importance of sanitation facilities with a key focus to promoting the construction and use of improved sanitation facilities. A Nationwide assessment of the Community Health Strategy similarly indicated a significant increase of the households with improved sanitation facilities in areas where Community Health Strategy had been
rolled out compared to where there were no community health units, $\chi^2 = 8.225$, df = 1, p = 0.004 (UNICEF, 2010).

Likewise, the CHVs encourage the use of privately owned sanitation facilities, and as a result the Community Health Strategy implementing sites also recorded a highly statistically significant coverage of privately owned sanitation facilities compared to non-CHS implementing sites. The study showed that 67.5% of households in the CHS implementing sites used a private sanitation facility compared to 48% of households in the non-CHS implementing sites. Improved and privately owned sanitation facilities are easily accessible, user friendly and generally clean.

The study also found out that 87.8% of the households in the CHS implementing sites and 83.2% of households in the non-CHS implementing sites respectively owned some form of a sanitation facility – whether improved or not. Although the difference was not statistically significant, the results were a reflection of an evaluation of Community Health Strategy conducted in Kenya in 2010 (UNICEF, 2010) that pointed to an increased proportion of households with latrines (87.7%) in the CHS strategy implementing sites compared to 84.4% in the non-CHS implementing sites. The lack of significant differences in the ownership of any form of sanitation facility can be explained by the widespread implementation of community led total sanitation (CLTS). Unlike Community Health Strategy, CLTS strictly prohibits the community natural leaders from prescribing or marketing any form of sanitation facility for the households. Also, and probably due to the CLTS, the study did not find statistically significant differences between households that had access to some form of a sanitation facility. There were 96.9% households in the CHS implementing sites and 95.5% households in
the non-CHS implementing sites that reported use of any form of a sanitation facility in their last time of defeacation. In centrally, a WHO survey estimated that more than half of the population living in developing countries lack access to even a basic toilet (WHO, 2010).

5.1.2. Uptake of key sanitation and hygiene practices

The coverage of handwashing facilities was found to be significantly high in areas where Community Health Strategy had been rolled out. Indeed, 43.9% of households in the Community Health Strategy implementing sites had handwashing facilities compared to 12.1% of households in the non-Community Health Strategy implementing sites. In their study, Freeman et al estimated that 19% of the world’s population practice hand washing with soap (Freeman et al., 2014) which closely compares with our findings, particularly at the non-CHS implementing sites. The disparity between the CHS implementing sites and the non-CHS implementing sites can be owed to the organized efforts of Community Health Volunteers. During the house to house visits, CHVs assist households on simple technical matters like installation of handwashing facilities, and where necessary invite the area public health technicians for assistance. In addition, the CHVs train households on how to install simple handwashing facilities and how and when to wash hands. Primarily, the CHVs are required to promote handwashing with soap as the only most effective and inexpensive way to prevent diarrhoea diseases. Accordingly, the study also established that 78.1% of households in the CHS implementing sites practiced handwashing with soap compared to 61.6% of households in the non-Community Health Strategy implementing sites.
There also existed highly significant differences on waste management practices, with more households within CHS implementing sites practicing proper household waste management than in the non-CHS implementing sites. Overall, 73% of households in the CHS implementing sites either composted or buried their domestic wastes compared to 52.5% of the households in the non-CHS implementing sites. The results revealed in the non-CHS implementing sites are comparable to the estimates by The Open University (2010) that showed that a slightly less than half of the population rely on indiscriminate dumping of domestic wastes or burning in the open space (The Open University, 2016). In the CHS implementing sites, CHVs conduct house to house visits where they instil good waste management practices and provide technical support on controlled generation, collection, storage and disposal of domestic solid wastes. As a result, the households within CHS implementing sites were found to rely more on environmentally friendly (composting and burying) methods of managing wastes than those within non-CHS implementing sites. The study also found 31.6% of households with visible solid waste piles within CHS implementing sites compared to 54% of households in the non-CHS implementing sites. The focus of the Community Health Strategy is to promote sanitation at the household level through among other ways, empowering each and every individual to a clean and conducive home environment devoid of breeding sites for disease vectors such as flies, rodents and other insects of public health importance.

The successes of CHS were also exhibited on the households’ management of children faeces. Majority of households (86.3%) in the CHS implementing sites disposed the children faeces safely as compared to 76.8% in the non-Community Health Strategy implementing sites. Similar results were reported by the Nationwide Community Health
Strategy evaluation report (UNICEF, 2010) that found out that 78.6% of respondents in CHS intervention sites practiced proper handling of children faeces as opposed to 73.5% of households in the non-intervention sites. The results are also consistent with the findings by the Kenya National Demographic and Health Survey (2014). The survey (KNDHS) indicated that 83% of children less than five years have their faeces disposed in sanitation facilities (KNBS, 2014). Other studies across the globe have also highlighted some levels of unsafe disposal of children faeces, even among households with improved sanitation facilities (WSP, 2015).

5.1.3 Households’ Knowledge on Sanitation and Hygiene
Overall, the households in the CHS implementing sites demonstrated higher knowledge on matters related to sanitation and hygiene. For instance, 23% of households in the CHS implementing sites knew all the four critical times of washing hands compared to 15.2% of households in the non-CHS implementing sites. Significant differences were also noted in the masterly of steps of washing hands. More than half (51.5%) of the households in the CHS implementing sites correctly demonstrated more than four steps of washing hands compared to 26.8% of households in the non-CHS implementing sites. Undoubtedly, the differences on the levels of knowledge in the basic concepts of sanitation and hygiene promotion came as a result of actively and effectively involving and enabling households to increase their control over their environment and health through established CHS structures. The CHS workforce deploys multifaceted approaches in eradicating water, sanitation and hygiene related diseases, primarily encompassing awareness creation, technical support and social mobilization.
The CHS has also established mechanisms of building the technical capacity of Community Health Volunteers who in turn empower their communities through house to house health education. Accordingly, the households within CHS implementing sites also demonstrated higher knowledge on the characteristics of human faeces. The study established that 90.8% of households in the CHS implementing sites correctly stated that children faeces and adults faeces were equally harmful compared to 79.8% of households in the non-CHS implementing sites. Were (1984), also found improved levels of household knowledge on health related matters in Kakamega district after rolling out the pioneer community based primary health care project, that by large was implemented using CHS principles (Were, 1984).

5.1.4 Diarrhoea Prevalence
The study revealed statistically significant differences on the prevalence of reported diarrhoea cases amongst the CHS implementing sites and the non-CHS implementing sites. The households within CHS implementing sites reported to have experienced relatively low diarrhoea prevalence (15.1%) compared to the households within non-CHS implementing sites (25%). Virtually, diarrhoea infections thrive under poor hygienic conditions primarily through ingesting water or anything contaminated with human and animal faeces. The CHS is structured to improve household sanitation and hygiene practices through household focused microteachings, supply of water treatment chemicals and promotion of proper food and water handling techniques. Consequently, the lower diarrhoea prevalence recorded in CHS implementing sites is undoubtedly a reflection of the purposed outcome of Community Health Strategy. The empirical association is further reinforced by the fact that CHS implementing sites have also recorded high
coverage of sanitation facilities, high coverage of handwashing facilities and good uptake of some hygiene promotion activities like proper disposal of solid and liquid wastes, hand washing with soap and higher sanitation and hygiene related knowledge. This findings support that of the National evaluation of the Community Health Strategy (UNICEF, 2010) that found out that 21.6 percent and 42.2 percent of the children under five in the CHS intervention and comparison sites respectively had diarrhea.

5.2 CONCLUSIONS
Generally, the study has documented statistically significant improvement in most of the assessed sanitation related indicators in areas where the Community Health Strategy has been rolled out. Evidently, CHS has positively impacted on the availability and use of improved sanitation facilities, uptake of key sanitation and hygiene practices, levels of sanitation knowledge and diarrhoea Prevalence. The findings vindicate the scientific and National conviction that Community Health Strategy is an integral part of a successful health care system. This has certainly corroborated the necessity by the Tharaka Nithi County Government and the National Government’s focus on strengthening the implementation of CHS in the quest of addressing sanitation and other Health related indicators.

5.2.1 Availability and use of improved sanitation facilities
There was evidence that Community Health Strategy implementing sites have a statistically significant higher coverage of improved sanitation facilities and privately owned sanitation facilities as compared to the non-Community Health Strategy implementing sites. The CHS implementing sites also registered a higher number of households with access to any form of a sanitation facility.
5.2.2. Uptake of key sanitation and hygiene practices
The study has established significant differences in the uptake of sanitation and hygiene practices, with the households within Community Health Strategy implementing sites recording relatively better indicators. The CHS implementing sites recorded higher coverage of handwashing facilities, a higher proportion of households that used soap to wash hands, higher proportion of households that managed their domestic wastes properly, higher proportion of households that safely disposed children faeces and a small proportion of households with solid waste piles.

5.2.3 Levels of sanitation knowledge
A significant majority of households within CHS implementation sites had a better understanding of the basic facts about sanitation and hygiene as compared to the non-CHS implementing sites. For instance, the CHS implementation sites documented a higher proportion of households that knew all the four critical times of washing hands, a higher fraction of households that knew more than four steps of washing hands, a higher proportion of those who knew more than three diseases related to sanitation and a higher percentage of households that knew that children faeces were equally harmful as those of adults.

5.2.4 Diarrhoea Prevalence
The study provided recent supporting evidence that Community Health Strategy is an effective approach in reducing diarrhoea prevalence at the household level. The diarrhoea prevalence was found to be low in the Community Health Strategy implementing sites compared to the non-implementing sites.
5.3 RECOMMENDATIONS
1. Tharaka Nithi County department of Health should endeavour to provide all the community based sanitation activities through the existing framework of Community Health Strategy.

2. The policy makers, both at Tharaka Nithi County Government and the National Government should ensure that all the community based approaches aimed at improving health indicators are designed in conformity with the structures established under the Community Health Strategy.

3. The Tharaka Nithi County Government should focus on establishing more community health units and position them as channels for creating household demand for increased uptake of desirable sanitation and hygiene practices.

4. The Tharaka Nithi County Government together with development partners should put in place mechanisms to harness the full potential of the households empowered with sanitation knowledge, preferably through continuous engagements and providing a platform for leveraging other community based developmental services on Community Health Strategy.

5. Although the Community Health Strategy implementing sites recorded low diarrhoea prevalence than the non-implementing sites, it was evident that the prevalence was generally high and unacceptable. Tharaka Nithi County Government should therefore strengthen the capacity of Community Health Strategy workforce to fully intervene in the prevention and control of diarrhoea infections at the household level. For instance,
the County can avail adequately equipped community health kits to all the Community Health Volunteers.

Further Research

Although the study has documented striking benefits of Community Health Strategy in delivering sanitation services, there is need to conduct more comprehensive studies to examine the performance of the CHS on delivering other community based programmes such as TB programme, malaria interventions, Maternal New-born and Child Health services, among others.

In addition, there is need to conduct studies and explicitly establish the underlying reasons why there were no statistically significant differences in some indicators such as the availability of any form of sanitation facility and the knowledge on basic facts of sanitation related diseases. This may help in updating the Community Health Strategy policy to include additional elements that can yield better results.
REFERENCES


Cairncross, S., Hunt, C., Boisson, S., Bostoen, K., Curtis V., Fung IC., & Schmidt P. (2010). Water, sanitation and hygiene for the prevention of diarrhoea. London School of Hygiene & Tropical Medicine, Department of Infectious & Tropical Diseases, London, UK.


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WHO (2008), The global burden of disease, Switzerland.


APPENDICES

Appendix 1: Household Questionnaire

HOUSEHOLD QUESTIONNAIRE

Study Topic: The Effects of Community Health Strategy on Sanitation Indicators in Tharaka Nithi County, Kenya.

Introduction

This study aims to test the performance of the Kenya’s Community Health Strategy against its strategic objective of improving sanitation indicators in Tharaka Nithi County. The findings will provide a basis for informed decision making by the Government and all other actors promoting sanitation and hygiene initiatives within Tharaka Nithi County. Ultimately, there will be improvement on sanitation related indicators through evidence based investments, better approaches and practice amongst all the stakeholders.

Instructions to the Interviewer

The person interviewing MUST read the consent form to the respondent and obtain informed consent prior to asking any questions. The entire interview MUST be conducted in confidence.

Interviewer Code.........  Sub-Location..................  Village:..............................
Date today (dd/mm/yy)....../....../.......  Start time..........  End Time..............

Section 1: Social Demographic Characteristics

Q. 1: What is your relationship to the head of this household?

<table>
<thead>
<tr>
<th>Codes</th>
<th>Possible responses</th>
<th>Tick as appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Head of the household</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spouse/Partner</td>
<td></td>
</tr>
</tbody>
</table>
3. Parent (son/daughter) 
4. Relative 
5. Others (specify) _________________________________

**Q. 2: What is your sex**

1. Male 
2. Female

**Q. 3: What is your current marital status?**

1. Single, Never married 
2. Currently married 
3. Separated 
4. Divorced 
5. Widowed 
6. Living with a partner (cohabiting)

**Q. 4: For how long have you lived in this household (yy/mm)? __________**

**Q. 5: What is the total number of persons living in this household? __________**

**Q. 6: Amongst the above number of persons living in this households, kindly tell me how many are in the following age brackets**

1. Under One year (≤ 12 months) 
2. Between 12 and 59 Months 
3. 6 – 12 years 
4. 13 – 18 years 
5. 18 – 24 years 
6. 25 – 34 years 
7. Above 35 years

**Q. 8: What level of education did you/have you completed?**

1. None
<table>
<thead>
<tr>
<th>Q. 9: What is your religion?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q. 10: What is your main occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Section 2: Sanitation Indicators

<table>
<thead>
<tr>
<th>Q. 11: The last time you wanted to defeacate, where did you defeacate? Probe if necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q. 12: Observing for open defeacation sites. The interviewer should tactfully observe for possible open defeacation sites both within and outside the compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q. 13: Does this household own a Toilet?</th>
</tr>
</thead>
</table>

| 2  | Primary level   |
| 3  | Secondary level |
| 4  | Post-secondary (Any College) |
| 5  | Post-secondary (University)    |
| 6  | Others (Specify) ______________ |

| 67 |
1. Yes, if yes ask to be shown the toilet. THEN GO TO Q. 14
2. No

**Q. 14: What kind of toilet does your household use? Interviewer to observe**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pit latrine without slab/open pit/No vent pipe</td>
</tr>
<tr>
<td>2</td>
<td>VIP/pit latrine with slab</td>
</tr>
<tr>
<td>3</td>
<td>Water closet/Pour flush</td>
</tr>
<tr>
<td>4</td>
<td>Open air/bush/field</td>
</tr>
<tr>
<td>5</td>
<td>Others (Specify)</td>
</tr>
</tbody>
</table>

**Q. 15: Is the toilet private (one household), shared (more than one household) or public?**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Private (one household)</td>
</tr>
<tr>
<td>2</td>
<td>Shared (more than one household)</td>
</tr>
<tr>
<td>3</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Q. 16: Observations about toilet: Interviewer to circle for all observations.**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visible fecal residues on the floor, wall or door</td>
</tr>
<tr>
<td>2</td>
<td>Visible used anal cleansing material (e.g. toilet paper)</td>
</tr>
<tr>
<td>3</td>
<td>The toilet smells bad</td>
</tr>
<tr>
<td>4</td>
<td>The toilet is generally clean</td>
</tr>
</tbody>
</table>

**Q. 17: Are there small children living in this household (5 years old or younger)?**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes, GO TO Q: 18</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>

**Q. 18: The last time [name of youngest child] passed stools, where were the faeces disposed? The Interviewer should NOT READ OUT, just probe**

<table>
<thead>
<tr>
<th></th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dropped into toilet facility</td>
</tr>
<tr>
<td>2</td>
<td>Disposed in the yard (open ground)</td>
</tr>
<tr>
<td>3</td>
<td>Buried</td>
</tr>
<tr>
<td>4</td>
<td>Disposed into solid waste/garbage</td>
</tr>
<tr>
<td>5</td>
<td>Washed away, water discharged as grey water</td>
</tr>
<tr>
<td>6</td>
<td>Washed away, water discharged outside</td>
</tr>
<tr>
<td>7</td>
<td>Did nothing/left it there</td>
</tr>
</tbody>
</table>
Q. 19: I would very much like to see how the members of your household wash their hands; would you kindly show it to me? *Interviewer to circle whether the respondent undertook any of the following requirements*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Used of Soap</td>
</tr>
<tr>
<td>2</td>
<td>Wet hands and apply soap</td>
</tr>
<tr>
<td>3</td>
<td>Rub each palm over the back of the other hand</td>
</tr>
<tr>
<td>4</td>
<td>Rub between the fingers on each hand</td>
</tr>
<tr>
<td>5</td>
<td>Rub the hands with the fingers together.</td>
</tr>
<tr>
<td>6</td>
<td>Rub around each of the thumbs</td>
</tr>
<tr>
<td>7</td>
<td>Rub in circles on the palms</td>
</tr>
<tr>
<td>8</td>
<td>Rinse and dry the hands</td>
</tr>
</tbody>
</table>

Q. 20: Is there a place for washing hands? *Interviewer to observe*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes, if yes ask to be shown</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>

Q. 21: Do you have soap or something else that you use for hand washing in your household? *If yes Probe*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Yes, soap</td>
</tr>
<tr>
<td>3</td>
<td>Yes, ash</td>
</tr>
<tr>
<td>4</td>
<td>Yes, sand</td>
</tr>
<tr>
<td>5</td>
<td>Yes, others (Specify) __________________________</td>
</tr>
</tbody>
</table>

Q. 22: When do you think it is important for a person to wash his/her hands? *(Interviewer: Circle for all mentioned - do NOT read out the answers. Encourage by asking anything else after a reply.)*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>Before eating</td>
</tr>
<tr>
<td>2</td>
<td>Before preparing food</td>
</tr>
<tr>
<td>3</td>
<td>After visiting a toilet</td>
</tr>
<tr>
<td>4</td>
<td>After changing a baby’s diapers</td>
</tr>
<tr>
<td>5</td>
<td>Don’t know</td>
</tr>
</tbody>
</table>
Q. 23: How do you dispose the domestic waste (solid waste) generated in this household?

<table>
<thead>
<tr>
<th></th>
<th>Others (specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In a composite pit</td>
</tr>
<tr>
<td>2</td>
<td>Burry in the field</td>
</tr>
<tr>
<td>3</td>
<td>Burning</td>
</tr>
<tr>
<td>4</td>
<td>Crude dumping/Indiscriminate dumping</td>
</tr>
<tr>
<td>5</td>
<td>Others (Specify)</td>
</tr>
</tbody>
</table>

Q. 24: Do you have solid waste piles around your compound? *Interviewer to observe*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>

Q. 25: What are some of the diseases that can be associated with poor sanitation?

<p>| | |</p>
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<tbody>
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<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Q. 26: Has any child (< 5 years) in this household had unusual Diarrhoea signs (passed more than three loose/watery/bloody stools per day) for a few days in the last two weeks?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Don’t Know</td>
</tr>
</tbody>
</table>

Q. 27: In your own opinion, tell me whether the following statement is true or false; *Child’s faeces is less harmful than that of an adult.*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>True</td>
</tr>
<tr>
<td>2</td>
<td>False</td>
</tr>
</tbody>
</table>

Q. 28: How can diarrhea be prevented in your household?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Washing hands</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Using a latrine</td>
</tr>
<tr>
<td>3</td>
<td>Boiling water before drinking</td>
</tr>
<tr>
<td>4</td>
<td>Don’t know</td>
</tr>
<tr>
<td>5</td>
<td>Others (Specify)</td>
</tr>
</tbody>
</table>

Thank you.
Appendix 2: Focused Group Discussion Guide

FOCUSED GROUP DISCUSSION GUIDE

Group code: ______________________ Date: ______________________
Venue:____________________________

Introduction

Thank you for agreeing to share with us your experiences as Community Health Volunteers/Community Health Resource Persons. The information gathered from you will be used only for the purposes of ascertaining the effects of Community Health Strategy on sanitation indicators within Tharaka Nithi County.

Thank you.

Guiding Questions

1. Have you heard of Community Health Strategy?

2. How have you been involved in Community Health Strategy?

3. What do you like best about the Community Health Strategy?

4. What do you think of the Community Health Strategy in terms of addressing sanitation related indicators?

5. What are some ways that the Community Health Strategy implementation sites are different from the non-implementation sites in relation to sanitation practices?

6. What else can you say about the Community Health Strategy?
Appendix 3: Key Informant Interview Schedule

KEY INFORMANT INTERVIEW SCHEDULE

Designation of Respondent: ____________________  Date: ________________

Introduction

Thank you for agreeing to take part in this study as a key informant. The information gathered from you will be used only for the purposes of ascertaining the effects of Community Health Strategy on sanitation indicators within Tharaka Nithi County.

Thank you.

Guiding Questions

1. How have you been involved in Community Health Strategy?

2. Think back over all the years that you've been involved in the implementation of Community Health Strategy and share with us of any notable experience.

3. What do you like best about the Community Health Strategy?

4. What do you think of the Community Health Strategy in terms of addressing sanitation related indicators?

5. What are some ways that the Community Health Strategy implementation sites are different from the non-implementation sites in relation to sanitation practices?

6. What else can you say about the Community Health Strategy?

7. Is there anything else you can add?
Appendix 4: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title: The Effects of Community Health Strategy on Sanitation Indicators in Tharaka Nithi County, Kenya

Introduction
My name is Cornellius Musembi Muendo. I am a graduate student at Kenyatta University, school of Public Health, working with my faculty supervisors, Dr. Isaac Mwanza in the Department of Community Health, and Prof Mohamed Karama from Center for Public Health Research in Kenya Medical Research Institute. I am planning to conduct a research study, which I invite you to take part in.

You are being invited to participate in this study because you have been identified as a suitable respondent through a scientific process involving random sampling of all the households within this sub-location.

Purpose
The purpose of this study is to establish whether there are any differences in sanitation indicators amongst communities that have rolled out community health strategy compared to those that are yet to adopt the strategy. Community Health Strategy is an approach of healthcare service provision that aims at building the capacity of households to not only demand services from all providers, but also to know and progressively realize their rights to equitable, good quality health care as provided for in the Constitution of Kenya. The strategy is anchored on a developmental approach, where the determinants of health are addressed through peoples’ participation at the community level.

Procedures
If you agree to be in this study, you will be asked a number of questions centered on the household characteristics and sanitation matters. The interview will take approximately 30 mins. Your participation to this study is limited to the interview session only. However, you are entitled to commend on any matter appertaining the design and the procedure of this study, either now or at any future date in the course of this phase of data collection.

During the interview, you will be asked a total of 28 questions that will take approximately 25 mins. After the question session, you will be requested to walk with the interviewer around your household compound where he/she will observe how you manage your solid and liquid waste. The walk will take around 5 mins.

Study time
Study participation will take approximately 30 minutes.

Benefits
There are no direct benefits to you as a result of participating in the study. However, it is hoped that the information gained from the study will form a good basis for informed decision making by the Government and all other actors promoting sanitation and hygiene initiatives within Tharaka Nithi County. This would ultimately translate into the improvement of sanitation related indicators through better approaches, policies and practice amongst all stakeholders.

**Risks/Discomforts**
There is a likelihood that some of the questions may make you uncomfortable or upset, but you are free to decline to answer any questions you do not wish to or to quit the interview at any time.

**Breach of confidentiality:** As with all research, there is a chance that confidentiality could be compromised; however, we are taking precautions to minimize this risk.

**Confidentiality**
The raw data from this study will be handled with ultimate confidentiality. In case we publish the findings of the study, individual names and other personally identifiable information will not be used. To minimize the risks to confidentiality, you will not be required to provide your name in any of the data collection tools. In addition, the data collection tools will be coded to minimize chances of associating the information with particular households. However, we may be compelled to divulge some information bordering on legal and ethical obligations such as child abuse, abuse of the elderly, intent to hurt yourself/others among other legal issues.

**Costs of Study Participation**
You will not be required to pay for participation in this study.

**Compensation**
You will not be paid for participating in this study.

**Treatment and compensation for injury**
It is important that you promptly tell the researcher, Mr. Cornellius M. Muendo, if you believe that you have been injured because of taking part in this study. You can tell the researcher in person or call him using mobile number **0726 238 582**, or send an e-mail to corn.muendo@gmail.com.

**Rights**
Participation in this research is completely voluntary. You have the right to decline to participate or to withdraw at any point in this study without penalty or loss of benefits to which you are otherwise entitled.

**Questions**
If you have any questions or concerns about this study, you may contact Cornellius M. Muendo at **0726 238 582** or send an e-mail to corn.muendo@gmail.com or KUERC Chairman, Dr. Titus Kahiga, Kenyatta University.

******************************************************************************
CONSENT
You have been given a copy of this consent form to keep.

If you wish to participate in this study, please sign and date below.

Participant's Name ___________________________ Date __________

Participant's Signature/Thumb print ___________________________ Date __________

Person Obtaining Consent ___________________________ Date __________
Appendix 5: Map of Kenya Showing the Location of Tharaka Nithi County
Appendix 6: Research Authorization by NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349, 3310571, 2219420
Fax: +254-20-318246, 318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

Ref. No. NACOSTI/P/16/51833/10197

Date: 1st August, 2016

Cornellius Musembi Muendo
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “An assessment of the effects of community health strategy on sanitation indicators in Tharaka Nithi County, Kenya.” I am pleased to inform you that you have been authorized to undertake research in Tharaka Nithi County for the period ending 30th July, 2017.

You are advised to report to the County Commissioner and the County Director of Education, Tharaka Nithi County before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

BONiface WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Tharaka Nithi County.

The County Director of Education
Tharaka Nithi County.
Appendix 7: Approval of the Research Protocol by KUERC

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Our Ref: KU/R/COMM/51/648
Date: 29th February, 2016

Cornellius Musembia Muendo
Kenyatta University,
P.O Box 43844,
Nairobi

Dear Muendo

APPLICATION NUMBER: KU/411/1380- “AN ASSESSMENT OF THE EFFECTS OF COMMUNITY HEALTH STRATEGY ON SANITATION INDICATORS IN THARAKA NITHI COUNTY, KENYA”.

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic “An assessment of the effects of community health strategy on sanitation indicators in Tharaka Nithi County, Kenya”.

2. APPLICANT
Cornellius Musembia Muendo

3. STUDY SITE
Tharaka Nithi County, Kenya.

4. DECISION
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines AND APPROVED that the research may proceed for a period of ONE year from 29th February, 2016.

5. ADVICE/CONDITIONS
i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, enclose the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

[Signature]

Dr. Titus Kahura
CHAIRMAN ETHICS REVIEW COMMITTEE

I hereby accept the advice given and will fulfill the conditions therein.

Signature

Dated this day of .......... 2016.

cc. Vice-Chancellor
DVC - Research Innovation and Outreach
Appendix 8: Research Authorization by Kenyatta University

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: Q139/CE/24346/2012
DATE: 3rd September, 2015

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MUENDO CORNELLIUS MUSEMBI—REG. NO. Q139/CE/24346/2012

I write to introduce Mr. Muendo Cornelius Musembi who is a Postgraduate Student of this University. He is registered for M.P.H degree programme in the Department of Community Health.

Mr. Musembi intends to conduct research for a M.P.H Proposal entitled, “An Assessment of the Effects of Community Health Strategy on Sanitation Indicators in Tharaka Nithi County, Kenya”.

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

11 SEP 2015

AM/rem
Appendix 9: Approval of Research Proposal by Kenyatta University

KENYATTA UNIVERSITY
GRADUATE SCHOOL

FROM: Dean, Graduate School
TO: Corneliuss Musemhi Muendo
C/o Community Health Dept.
Kenyatta University

DATE: 3rd September, 2015
REF: Q139/CE/24346/2012

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board at its meeting of 28th August, 2015 approved your Research Proposal for the M.F.H Degree. Entitled, “An Assessment of the Effects of Community Health Strategy on Sanitation Indicators in Tharaka Nithi County, Kenya”.

You may now proceed with your Data Collection, subject to clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking forms per semester. The form has been developed to replace the progress report forms. The supervision Tracking Forms are available at the University’s website under Graduate School webpage downloads.

Thank you.

ANNBELL MWANIKI
FOR: DEAN, GRADUATE SCHOOL

cc. Chairman, Community Health Department.

Supervisors:

1. Dr. Isaac Mwanza
   Department of Community Health
   Kenyatta University

2. Prof. Mohamed Karana
   Centre for Public Health Research
   Kenya Medical Research Institute- Nairobi
   C/o Department of Community Health
   Kenyatta University

AB/RW

11 SEP 2015