



# Understanding the Effects of Poor Sanitation on Public Health, the Environment and Well-being Kericho County - Report of research findings

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# Executive Summary

Poor sanitation is linked to diarrhoeal diseases, which are among the leading causes of morbidity and mortality in children under five. It is also associated with a number of infectious and nutritional outcomes which have great bearing on the health and well-being of the child. This study was conducted to gain more insights into the effects of poor sanitation on public health, the environment and well-being in Kericho County.

The majority of respondents in the household survey were females, who comprised 88.8% of the sample, compared 11.2% of males. Most were aged 20-39 and married. At least a third of the respondents had attained secondary school education in both group (36.8% in the control group and 30.4% in the case category). Most respondents were either farmers (30.1% in control and 31.9% in case group) or self-employed (21.7% in control group and 12.6% in case group) and about the same proportion in both groups were housewives (14%). Overall, the households in the control group appeared to be moderately wealthier than those in the case group: 30% of the control group were classified poor, compared to 36% of the cases, and another 30% of the control households were in the wealthy quintile, compared to 27.8% of the cases.

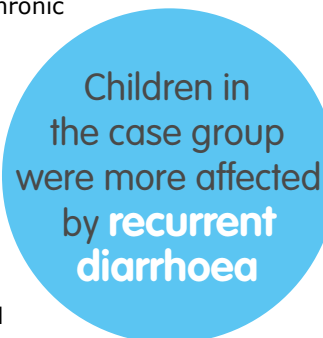
The findings show that typhoid and amoebiasis are the most common ailments in the community and that more case families were affected than controls, suggesting greater exposure to unclean water. In both groups, few household members were living with chronic illnesses in the sampled households, with the most common chronic condition being asthma and chronic respiratory disease. Although both groups used public health facilities to a large extent, more households in the control group (25.3%) sought care in private facilities than case households (15.2%). In about half of all households in both groups, the ill family member paid for healthcare services.

The results show that while the most common ailment afflicting children in the two groups was upper respiratory tract infections (URTI), there was a considerable amount of diarrhoea reported, which would be related to poor sanitation. Recurrent diarrhoea appears to be common among the children in the case group: about half had suffered diarrhoea in the previous two weeks, compared to only 13.3% of those in the control category. The results also show a likelihood that feeding practices contribute to a child having diarrhoea as although mixed feeding was common in both groups, more mothers in the cases group (73%) practised it than did those in the control group.

Both groups appear to have received messages regarding sanitation in the past year with over half of those in the cases group (53.9%) and 64.5% of those in the control group having heard messages regarding sanitation and hygiene in the past year, with the most commonly heard messages being about washing hands with soap. However, fewer respondents in the case group had heard key sanitation messages than in the control group.

In terms of water sources, the findings show that most households were using water from improved sources, but more case households reported using water sources that may be exposed to contamination, which may explain the incidence of diarrhoea. For instance, 12% of the case households used water from a public tap compared to only 4% of the control households. Over half of the households in both categories said they do nothing to the water to ensure its safety before drinking (54.8% control, 53.9% case). Tests conducted on the household water collected during this study showed that most of the water was contaminated.

Hand washing habits after toilet use were found to be equally poor. Only about a third in both groups said they wash hands after taking a child to the toilet (34.3% control and 34.6% among the case households) and even fewer used soap. The lower incidence of using soap



Children in the case group were more affected by recurrent diarrhoea



with water by the case group might be linked with diarrhoea in the child. Some families also practice open defecation, adding to the contamination of the environment and, potentially, of water sources. In 5 of the 357 homesteads surveyed, the respondent said the family uses the bush or field for defecation. Focus group discussion (FGD) participants also reported that open defecation was a common practice in their community and was associated with a lack of toilets in work areas such as tea plantations. Disposal of children's stool was also poor in some households: 5.2% of the respondents in the case households 2.4% of the control group said that the stool was rinsed off into a ditch or drain.

11%  
caregivers  
did not  
wash hands  
after using  
the toilet

The findings also show that social exclusion regarding toilet use may contribute to poor sanitation. Although it was reported that there are no cultural issues in Kericho communities associated with family members sharing latrines, young children, the elderly and those living with disabilities may be excluded because of a lack of appropriate latrine models. Only 57.8% of the respondents in the control households and 62% in the case families reported that the elderly used the household toilet. Participants in the FGDs explained that people living with disabilities may not be able to use the conventional pit latrine because it was not modified to suit their needs.

Test results on the public water points used in the study areas showed high levels of contamination with *Escherichia coli* (*E. coli*), suggesting presence of faecal matter. Analysis of the county sanitation status using GIS mapping also found a clear relationship between the proximity of households to the water sources, open defecation sites and the diarrhoeal cases.

Kericho County government and partners can use these findings to improve the coverage of appropriate sanitation services to reduce the incidence of diarrhoea in children. The county can also conduct public education campaigns on better sanitation and hygiene practices and improve drinking water through appropriate treatment.



Triggering session

# Table of Contents

<b>Executive Summary</b> .....	<b>1</b>
<b>Table of Contents</b> .....	<b>3</b>
<b>List of Tables and Figures</b> .....	<b>3</b>
<b>List of Abbreviations</b> .....	<b>5</b>
<b>Chapter 1: Introduction</b> .....	<b>7</b>
<b>Chapter 2: Study Design and Justification</b> .....	<b>8</b>
2.1 Methodology overview .....	9
2.2 Sampling .....	10
2.3 Data collection techniques.....	11
<b>Chapter 3: Key Findings</b> .....	<b>14</b>
3.1 Socio-economic status of selected families and household characteristics.....	15
3.2 Effects of poor sanitation on public health, the environment and well-being for different groups in the county population.....	16
3.3 Social effects of poor sanitation on different groups (age, gender, ability) in the county population.....	28
3.4 Political role and economic cost of poor sanitation in the selected counties.....	29
3.5 Effects of poor sanitation on the environment .....	30
3.6 Implementation of sanitation activities by Kericho County.....	33
<b>Chapter 4: Conclusions and Recommendations</b> .....	<b>38</b>
<b>Annex: Water testing protocol used in this study</b> .....	<b>42</b>

## List of Tables and Figures

Table 1: Study sample, by type of facility.....	9
Table 2: Summary of data collection methods used in the study.....	12
Table 3: Proportion of children who had diarrhoea two weeks earlier and treatment.....	18
Table 4: Treatment of drinking water at household level.....	23
Table 5: Water sampling results.....	24
Table 6: Household responses on who uses the toilet.....	28
Table 7: Results of tests on public water sources.....	31
Table 8: Household Water Sampling Results .....	32
Table 9: CLTS Summary for Kericho County.....	35
Figure 1: Illness for which household members sought treatment past six months .....	16
Figure 2: Proportion of children in study sample by type of facility .....	17
Figure 3: Infant feeding practices (<6months old) .....	19
Figure 4: Leading causes of under-5 morbidity .....	19
Figure 5: Household reports on food eaten in the last 7 days.....	20
Figure 6: Sources of sanitation messages heard by respondents .....	22
Figure 7: Main source of drinking water for households in the study sample .....	23
Figure 8: Type of toilet facility used by household .....	25
Figure 9: Money spent on diarrhoeal care .....	32
Figure 10: Household <i>E. coli</i> test results .....	32
Figure 11: WASH allocation in Kericho .....	33
Figure 12a: ODF status at February 2017.....	35
Figure 12b: ODF status at May 2018 .....	36

## List of Abbreviations

CIDP	County Integrated Development Plan
CLTS	Community Led Total Sanitation
E. coli	Escherichia coli
FGD	focus group discussion
GIS	geographic information system
KSh	Kenyan shilling
MoH	Ministry of Health
ORS	oral rehydration solution
SSH4A	Sustainable Sanitation for All
SNV	Netherlands Development Organisation
URTI	upper respiratory tract infections
VC4P	Voice for Change Partnership
WASH	water, sanitation and hygiene
WHO	World Health Organisation
WSP	Water and Sanitation Program

# Chapter 1: Introduction



Globally, more than 700 million people live without an improved water source and eight out of ten of these people live in rural areas. An estimated 2.5 billion people – over one third of the world population- lack access to improved sanitation facilities, and a billion of these practice open defecation (WHO/UNICEF 2014), most of them in sub-Saharan Africa and Southern and Eastern Asia.

Millions of people suffer worldwide from diseases related to water, sanitation and hygiene (WASH) such as diarrhoea, skin diseases and trachoma. Unsafe water, inadequate sanitation and poor hygiene are linked to 88% of diarrhoea cases worldwide and result in more than **1.5 million child deaths each year**, mostly among children under the age of five (WHO/UNICEF 2015).

In Kenya, diarrhoeal diseases are among the leading causes of morbidity and mortality in children under five, attributed to inadequate safe water, sanitation and hygiene. Poor sanitation may be associated with a number of infectious and nutritional outcomes, and these outcomes also cause a heavy burden of disease. **Poor sanitation can adversely impact nutritional status in young children, not only through the impaired absorption of nutrients associated but through sub-clinical infections with faecal pathogens.** Repeated and persistent infection may lead to environmental enteric dysfunction, a subclinical condition that can lead to growth faltering.

To gain more insights into the effects of poor sanitation on public health, the environment and well-being, **SNV Netherlands Development Organisation (SNV) commissioned this study in three counties in Kenya (Homa Bay, Kericho and Elgeyo Marakwet)** through its Voice for Change Partnership (V4CP) programme. This programme, implemented in collaboration with the Institute of Economic Affairs (IEA), complements SNV's Sustainable Sanitation & Hygiene for All (SSH4A) project which supports four counties in Kenya to improve access to new and improved sanitation and hygiene facilities: Homa Bay, Kericho, Elgeyo Marakwet and Kilifi. The research was conducted by the Centre for Population Health Research & Management (CPHRM).

This study was conducted to contribute to the existing body of knowledge and generate information for the county to use, as well as to obtain data and information on the social, health, nutritional, economic, political and environmental effects of poor sanitation on different groups in the county. The research studied the following aspects:

- The effects of poor sanitation on public health, the environment and well-being
- The social effects of poor sanitation on different groups (by age, gender, and ability)
- The political role and economic cost of poor sanitation in the selected counties
- The effects of poor sanitation on the environment, such as on the quality of underground and surface water. The study obtained data on excreta management in the rural and urban areas of the county.

# Chapter 2: Study Design and Justification

## 2.1 Methodology overview

The research study used a mixed methods design that comprised a case-control quantitative study, qualitative interviews in the community (key informant interviews and focus group discussions), observation, review of health facility data on under-five morbidity and mortality and water sampling and testing.

Cases and controls were recruited at health facilities selected in order to achieve the required rate of recruitment and representation. Table 1 summarises the types of facilities and the number of participants from each type.

**Table 1: Study sample, by type of facility**

	Total		Controls		Cases	
	n	%	n	%	n	%
<b>Hospital</b>	79	22.1	41	24.7	38	19.9
<b>Health Centre</b>	207	58.0	90	54.2	117	61.3
<b>Dispensary</b>	71	19.9	35	21.1	36	18.9
<b>FBOS</b>	0	0.0	0	0.0	0	0.0
<b>Other (Specify)</b>	0	0.0	0	0.0	0	0.0

### What is a case-control design?

A case-control study is an investigation that compares a group of people with a disease (such as diarrhoea) to a group of people without the disease. It is used by epidemiologists to identify and assess factors that are associated with diseases or health conditions, with the ultimate goal of preventing such diseases.

A case-control study begins with a group of cases of a specific disease or condition. A group of people without that disease or condition is selected as control, or comparison, subjects. The investigator then seeks to compare cases and controls with respect to previous exposures to factors of interest. Information about prior exposure may be obtained by a variety of methods, including self-administered questionnaires, interviews and medical examinations.

In case-control studies, information about exposure is generally collected after the disease has already occurred. It looks back (retrospectively) to see if an exposure to something in particular (e.g. in the environment) was more likely in the group with the condition than in the group without. Researchers trace backwards to identify possible exposures or factors that may have contributed to the condition.

This study design helps determine if a previous exposure i.e. sanitation status, environment) is linked to a current condition, such as having a disease (diarrhoea).

Recruitment took place from Monday to Saturday. All children brought to the health facilities on these days and who were eligible for inclusion were recruited into the study.

Cases were children under five years of age who presented to the participating health facilities with diarrhoea (as defined by the health worker, with a minimum requirement of three or more loose or watery stools in the previous 24 hours). Controls were children in the same age range who reported with any other infection or trauma but without diarrhoea.

After the child had been examined by a health worker, the parent or guardian was interviewed at the clinic using a structured questionnaire. Information on the child, the episode of illness, the family's access to water supply and sanitation facilities, household hygiene practices and a wide variety of socio economic variables was collected. In addition, all the cases and controls were visited at their homes and the parent or guardian who had been interviewed at the clinic was re-interviewed. The water and sanitation facilities available to the family and the general household conditions were also observed.

## 2.2 Sampling

The study used convenience sampling to select all children under five attending the selected health facilities from February 1-10, 2018.

### Selection of cases

All diarrhoeal patients under five years of age admitted to the selected health facilities from February 1-10, 2018 were recruited into the study after their parents consented to participate. If the parent did not consent to the study, the child was not recruited. The consent form was read out to the parent or caregiver to confirm their understanding and willingness to participate in the study.

To ensure that cases selected for the study represented a homogeneous entity, a strict definition of diarrhoea was established. A case was defined as a child under five years of age having three or more episode of loose, liquid or watery stools or at least one bloody loose stool within 24 hours. In addition, the age of a child was verified by cross-examining the information provided in their health and vaccination cards.

### Selection of controls

In this study, non-diarrhoeal patients under five years of age admitted to the selected health facilities from February 1-10, 2018 were selected into the study. The recruitment of controls was carried out after their parents consented to participate. The selection of controls who were attending the health facilities had some important practical and scientific advantages because they were easy to identify and readily available in sufficient numbers.

### Inclusion and exclusion criteria

*Inclusion criteria:* All the children less than five years of age attending the selected health facilities were eligible for the study. With respect to the parents of children recruited into the study, the mothers were the most suitable respondents to provide adequate information about the children and other variables surrounding the children's environment because the mothers spent more time with their children than did the fathers.

*Exclusion criteria:* Children with the following conditions were rejected for the study: those who were selected controls but had suffered from diarrhoea within the previous two weeks; those who were cases but were diagnosed with intestinal diseases, irritable bowel syndrome, food intolerance and reactions to medication; and those (both cases and controls) who were not resident in the county.

## 2.3 Data collection techniques

To obtain this information, the researchers used the following methods to collect information in Kericho County:

- *Household surveys* (with informed consent) were held with the parents or guardians of the 357 children selected for follow-up, to establish the knowledge, attitudes and practices of the communities in relation to sanitation and hygiene. The researchers inquired about the number of children under the age of five who had ever died from water and sanitation-related diseases in the family; the cost of water and sanitation-related diseases in the family; how the family manages faecal matter; and about cultural norms surrounding sanitation that the family observed, among other issues. The interviews were conducted using a questionnaire.
- *Review of health facility data on children under the age of five:* The researchers also reviewed data from selected healthcare facilities in the county to identify the number of children under five seeking treatment for any illnesses; those treated for water and sanitation-related diseases; the number that had died; and specifically, those that had died from water and sanitation related diseases.
- *Field interviews with selected informants:* The researchers held key informant interviews with local and national government officials and heads of water and sewerage companies to engage them in the research process and to understand the WASH situation in each county from their perspective. The researchers also held FGDs with groups of residents in the research communities to gather more information on sanitation in the community and the management of human waste, among other issues. FGDs were also held with individuals who empty toilets (pit emptiers) in the communities, to explore management of waste and their perceptions about risk of water contamination.
- *Water sample testing:* The researchers also collected water samples from all the sources that the households in the study were using, including water taps, water vendors, wells, boreholes, springs and tanks for collecting rainwater. The team used high quality testing kits to detect whether the water is contaminated by faecal matter, which poses a risk to human health.
- *Review of sub county weekly epidemic monitoring data.* The researchers also conducted a review of health facility records and community health extension workers' weekly summary tool to identify areas prone to outbreaks of sanitation-related illnesses.



Focus Group Participants



The study methods are summarised in the following table by study objective:

**Table 2: Summary of data collection methods used in the study**

Study Objective	Focus & Scope	Data collection approach
To examine the effects of poor sanitation on public health and nutrition	Analysis of all causes and water related causes of mortality in each county over the last six months	Review of health facility records in sampled facilities - review of under-five all-cause mortality data in the sampled health facility and compared all-cause mortality to child mortality due to water and sanitation-related diseases
	Analysis of risk factors for diarrhoea for cases and controls	<p>A health facility interview and data review of caregivers of under five children who are attended at the health facility (using a health facility screening tool)</p> <p>Anthropometric measures</p> <p>Household survey</p> <p>Focus group discussion on sanitation experience and emptying service within communities (focused on men and women – the elderly, young to middle-aged and opinion leaders)</p> <p>Key informant interview guide for local and national government ministries and departments</p> <p>Water quality assessment tool</p>
To examine the social effects of poor sanitation on different groups	Analysis of social effect of poor sanitation on the following groups:	Household survey
	Children	Focus group discussion on sanitation experience and emptying service within communities (focused on men and women – the elderly, young to middle-aged and opinion leaders)
	Women	Focus group discussion on sanitation experience and emptying service within communities (focused on men and women – the elderly, young to middle-aged and opinion leaders)
	Persons with disability	Key informant interview guide for local and national government ministries and departments
	Analysis of epidemic data three months prior to the study	Sub-county level review of weekly data related to (i) sanitation related epidemic monitoring data collected weekly in the county through the sub counties and (ii) a review of community health extension workers' weekly summary tool
	Water testing for main sources of water in the epidemic zones	Water testing and analysis for main sources of water in the epidemic zones

Study Objective	Focus & Scope	Data collection approach
To examine the political role and economic cost of poor sanitation	Analysis of the political and economic cost of poor sanitation	<p>Household survey</p> <p>Focus group discussion on sanitation experience and emptying service within communities (focused on men and women – the elderly, young to middle-aged and opinion leaders)</p> <p>Key informant interview guide for local and national government ministries and departments</p>
To examine the effects of poor sanitation on the environment (e.g. quality of underground water and surface water) and obtain data on excreta management in the rural and urban areas of the county	<p>Water analysis of underground and surface water</p> <p>Analysis of the excreta management in urban and rural areas of the county</p>	<p>Household chlorine and pH test, presence and absence of coliform (using a water sampling and analysis monitoring form)</p> <p>Faecal sludge management situational assessment tools</p> <p>Key informant interview guide for the heads of water and sewerage companies; instructions to the participants</p> <p>Key informant interview guide for local and national government ministries and departments</p>
To establish trends during the devolution years and compare pre-devolution data with data obtained for the years since devolution	<p>Qualitative analysis of the trends of sanitation related epidemics pre-and during devolution</p> <p>Qualitative analysis of the trends of sanitation surveillance and epidemic reporting pre- and during devolution</p>	<p>Key informant interview guide for local and national government ministries and departments</p> <p>Desk review of documents</p>
To evaluate the extent to which the sanitation activities as planned in the County Integrated Development Plan (CIDP) have materialised in the county	A policy analysis of the planning, funding and sanitation-related activities in the county	Key informant interview guide for local and national government ministries and departments

# Chapter 3: Key Findings

### 3.1 Socio-economic status of selected families and household characteristics

The majority of respondents in the household survey were females, comprising 88.8% of the sample, compared 11.2% of males. This was more or less evenly distributed between the control and cases: 86.8% of the respondents in the control group and 90.6% in the case group were female. Most were aged 20-39. Three of the household respondents in the control group and nine in the case group were aged under 19 years, while two and three in the control and case group respectively were aged over 50.

At least a third of the respondents had attained secondary school education in both group (36.8% in the control group and 30.4% in the case category). While only two respondents in the entire sample had no formal education, it appears that the respondents in the control group had received more formal education than those in the case group. For instance, there were more respondents (11.5%) in the case group with incomplete primary school education than in the control group (6.6%) and slightly more respondents in the control group had college-level education and higher (9.5% compared to 8.9% in the case group).

Over 70% of the respondents were married (77.7% in the control group and 75.9% in the case group) and about 20% in both groups were single. In terms of occupation, the majority were either farmers (30.1% of controls and 31.9% in the case group) or self-employed (21.7% in the control group and 12.6% in the case group) and about the same proportion in both groups were housewives (14%). Fourteen respondents (3.9% of the entire sample) reported they were either too young to work or were students (five in control group and nine in case group). Only three respondents in the entire sample were reported as living with a disability. Most of the respondents had lived in the study locality for more than five years.

In terms of wealth status, the households in the control group appear to be moderately wealthier than those in the case group. Thirty percent of the control group were classified poor, compared to 36% of the cases, and another 30% of the control households were in the wealthy quintile, compared to 27.8% of the cases. An analysis of the reported income in the 12 months before the survey confirms that the control households were wealthier than the case group. At KSh 40,000/-, the median income for the control group had been higher than for the case families (KSh 30,000/-) in the previous 12 months. However, over 70% of the total sample of respondents in both categories lived in their own homes, with at least two bedrooms. About 70% of the households in both categories owned livestock and 83.2% families in the case group 77% in control owned agricultural land.

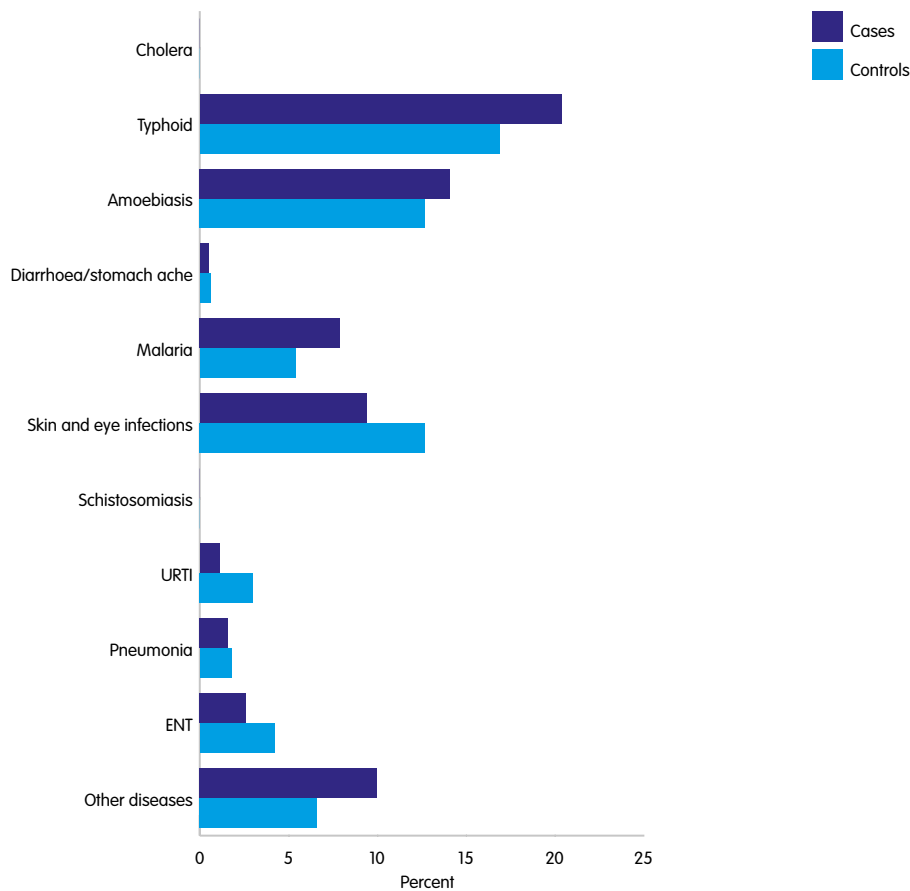


Households in the control were moderately wealthier

#### Household disease burden and healthcare seeking behaviour

The study also sought to establish the household's disease burden and care-seeking behaviour in the six months before the survey. The findings show that typhoid and amoebiasis were the most common ailments in the community and affected more case families than control, suggesting that case families were more exposed to unclean water. In the previous six months, a family member had sought treatment for typhoid in 16.9% of the control households and in 20.4% of those in the control group. In the same period, in 12.7% of households in the control group and 14% in the case group, a family member had sought treatment for amoebiasis. Other illnesses mentioned include malaria and skin and eye infections, as illustrated in Figure 1.

**Figure 1: Illness for which household members sought treatment past six months**



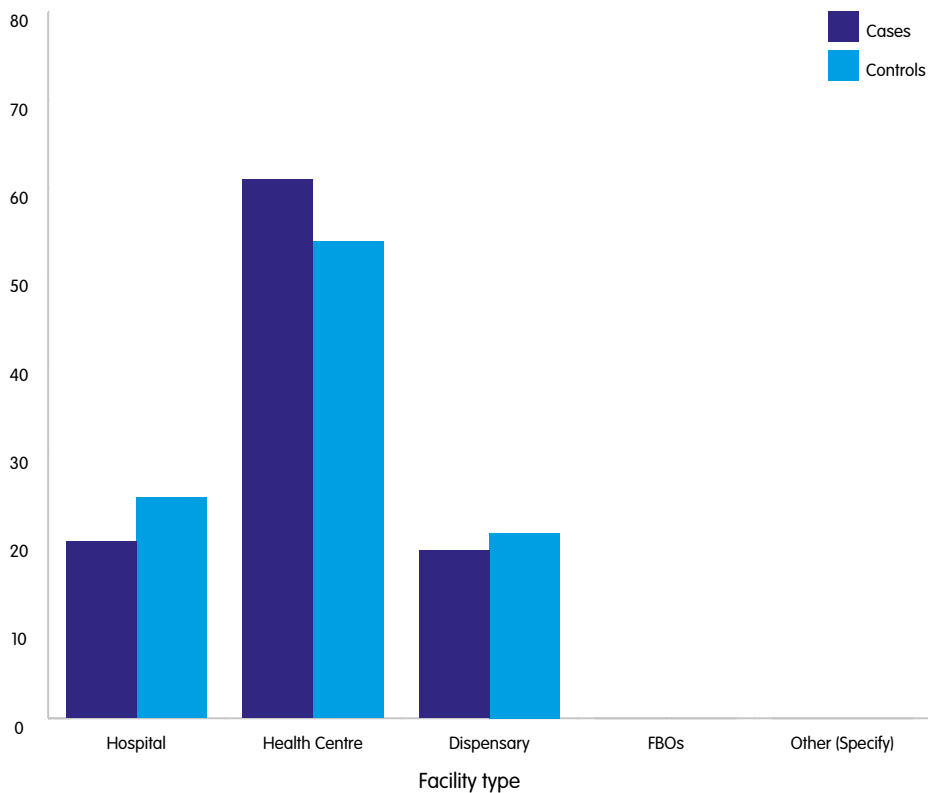
Overall, few household members were living with chronic illnesses in the sampled households. The most common chronic condition was asthma and chronic respiratory disease, reported in 3.6% of the control households and 4.7% of those in the case group. Household members living with hypertension and related conditions were reported in 2.4% of the control households and 2.6% of the case households. In case of illness, over 60% of the households in both groups sought care from a public facility. More households in the control group (25.3%) sought care in private facilities than case households (15.2%). Some households also sought care from pharmacies (21.7% controls and 17.8% cases) and shops or kiosks (11.5% controls and 3.7% cases), indicating that they may have been self-prescribing and treating. In about half of all households in both groups, the ill family member paid for healthcare services (50% of controls and 59% in case households).

### 3.2 Effects of poor sanitation on public health, the environment and well-being for different groups in the county population

Most of the children in the study sample (both control and cases) were drawn from public health centres, as illustrated in the Figure 2, suggesting that most families in Kericho County seek healthcare assistance for their children mainly from these facilities. The proportion of children identified at health centres was more than double the proportion selected from hospitals and dispensaries.



**Figure 2: Proportion of children in study sample by type of facility**



### a) Effects on poor sanitation on child morbidity and mortality

The study recruited 357 children in Kericho County, of whom 177 were boys and 180 were girls. The sample was evenly distributed between controls and cases: of the 166 controls, 84 were boys and 82 were girls and among the cases, 93 were boys and 98 were girls. In terms of age, 84 of the children in the total sample were aged under one year and 273 were aged 1- 4 years.

Over 80% of children in the total sample were sick on the day of recruitment. About half of the children in the case category (51.3%) had suffered diarrhoea in the past two weeks, compared to only 13.3% of those in the control category, suggesting that the children in the case category were at risk of recurrent infection. Of those that had suffered from diarrhoea in the two weeks before the study, the majority had received oral rehydration solution (ORS) (86.4% in the control group and 92.8% in the case group) and about 86% in both groups had received Zinc supplements.

**51% of children in the case group had suffered diarrhoea in the past 2 weeks**

**Table 3: Proportion of children who had diarrhoea two weeks earlier and treatment**

	Total		Controls		Cases		p-value
	n	%	n	%	n	%	
<b>Diarrhoea in past 2 weeks</b>							
<b>Yes</b>	120	33.6	22	13.3	98	51.31	<0.001
<b>No</b>	236	66.1	144	86.8	92	48.17	
<b>Don't Know</b>	1	0.3	0	0.0	1	0.52	
<b>Child got ORS supplements</b>							
<b>Yes</b>	110	91.7	19	86.4	91	92.86	0.319
<b>No</b>	10	8.3	3	13.6	7	7.14	
<b>Child got Zinc supplements</b>							
<b>Yes</b>	103	85.8	19	86.4	84	85.71	0.937
<b>No</b>	17	14.2	3	13.6	14	14.29	

The household survey also questioned respondents on feeding practices for all children who were aged below six months in both control and case households. The results show that there is a likelihood that feeding practices contribute to a child having diarrhoea. Although mixed feeding was common in both groups, more mothers in the case group (73%) practised it than did those in the control group (66%). In addition, fewer mothers in the case group (22%) were exclusively breastfeeding, compared to those in the control group (33%).

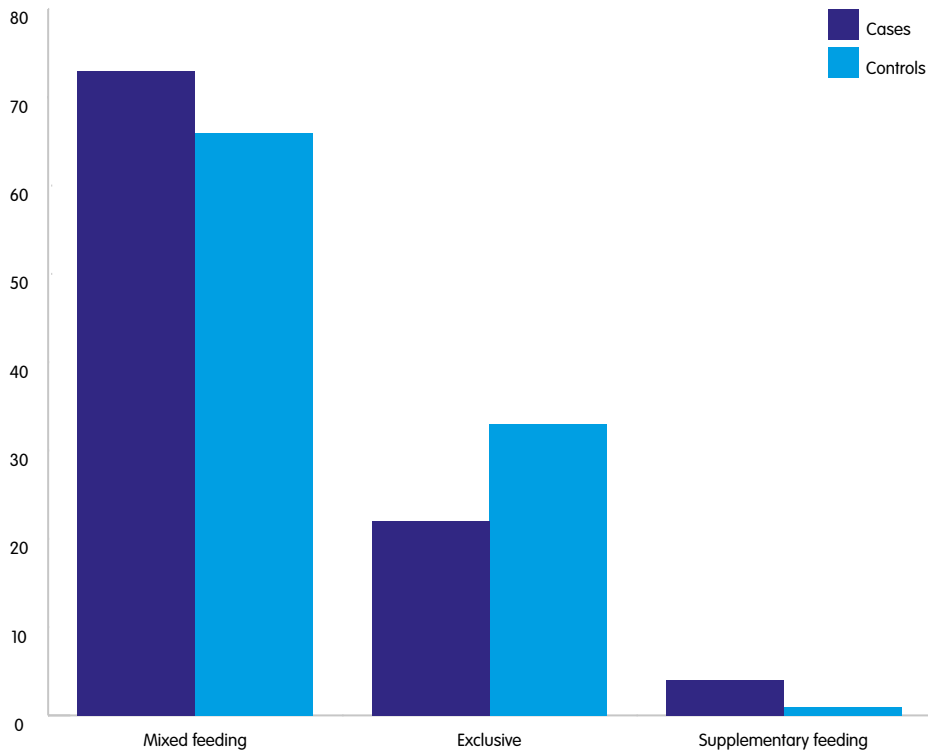
The study team collected data on weight, height and upper-arm circumference of the children recruited into the sample, to analyse their health and nutritional status. The findings show that the children in the case category were less healthy than those in the control group. The median weight for the children in the control group was 13 kg, while those in the case group had a median weight of 11 kg; significantly lower than that of the control group. The median height was 71 cm in the controls and 67 cm in the cases. The measurement of upper-arm circumference showed that the children in both groups were at risk of acute malnutrition: those in the control group had a median upper arm circumference of 110 mm while those in the case group had a median of 120 mm.

Data drawn for this study from the Ministry of Health (MoH) DHIS database for 2017 show that while the most common ailment afflicting children in the two groups was URTI, a considerable amount of diarrhoea was reported, which is related to poor sanitation, as illustrated in Figure 4.

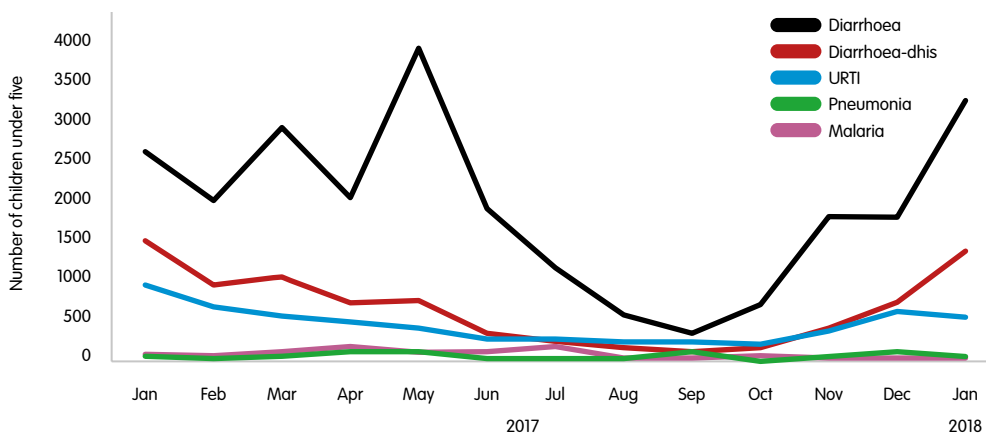
In the FGDs with community members in the research areas, participants were asked about health issues common in their community that they could link to poor sanitation (toilet leakages, flying toilets and dumping of faecal waste). They mentioned diarrhoea, stomach problems and cholera.

*"Yes, we are aware of disease like diarrhoea, typhoid and stomach aches that people acquire when they are exposed to human waste, especially with the food we grow in the farms like maize and potatoes and water because in the rivers we see human waste and when it rains the waste goes into the water and people use the same water."*

**Figure 3: Infant feeding practices (<6months old)**



**Figure 4: Leading causes of under-5 morbidity**



They also mentioned diarrhoea with recurrent infections as affecting children most, especially under-fives.

*"Yes, we have children who have suffered from diarrhoea. These days, diseases have increased. In the past centuries, there was low level of health sickness like diarrhoea and cholera diseases"*

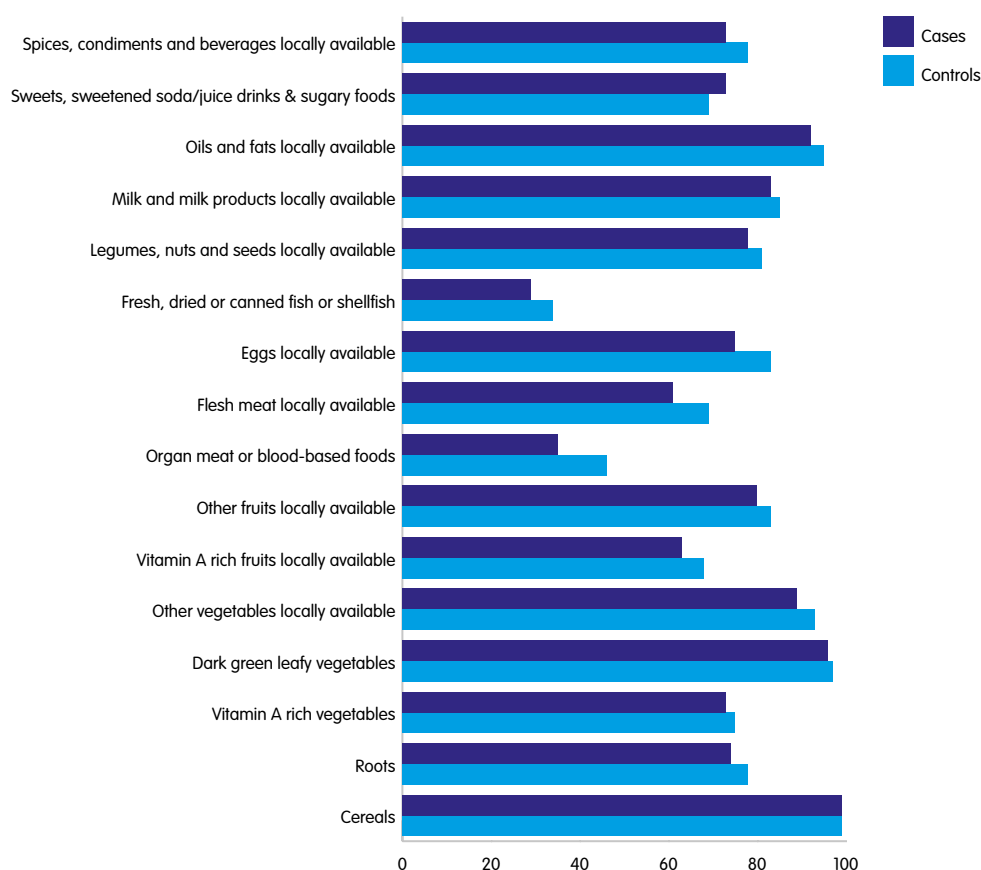
Besides illness and (sometimes) death, other problems associated with poor sanitation in the FGDs include loss of income for caregivers of the sick child or family member and disrupted school attendance for sick children.

## b) Risk factors associated with diarrhoea among the study population

### Household nutrition

Over 60% of the households in both groups produced their own food, and there was no marked difference between the groups in this finding. About the same proportion in both groups (33%) said they purchase food. Over 80% of the households (both groups) ate at least three meals a day. Slightly more households in the control group (56.3%) had a family member that had eaten elsewhere the day before the survey (not in the home) than in the case group (50%). The most commonly eaten foods in nearly all the households in the two groups (over 90%) were cereals, dark green leafy vegetables and oils and fats available locally. There were notable differences between the control and case groups in the consumption of some proteins: slightly more families in the control group ate more protein foods than those in the case group. For instance, 34% and 83% of control households had eaten fish and eggs respectively in the previous seven days, compared to 29% and 75% in the case group.

Figure 5: Household reports on food eaten in the last 7 days



Further examination of the households' nutrition patterns found that 70% of the control and 76% of the case families had, in the past month, reduced the amount of food eaten in the household and that there had been instances where consumption by adults was restricted to allow children to have enough food (88.5% of control households and 91% of case families). Nearly all households in both groups (92% controls and 95% cases) had, in the previous month, sent a family member to eat elsewhere, while 44.5% control and 51% case households had bought food on credit.

Household respondents were also asked questions to gauge their exposure to common sanitation and hygiene messages. The responses indicate that over half of those in the case group (53.9%) and 64.5% of those in the control group had heard messages regarding sanitation and hygiene in the past year, with the majority reporting having heard such a message over one month ago.

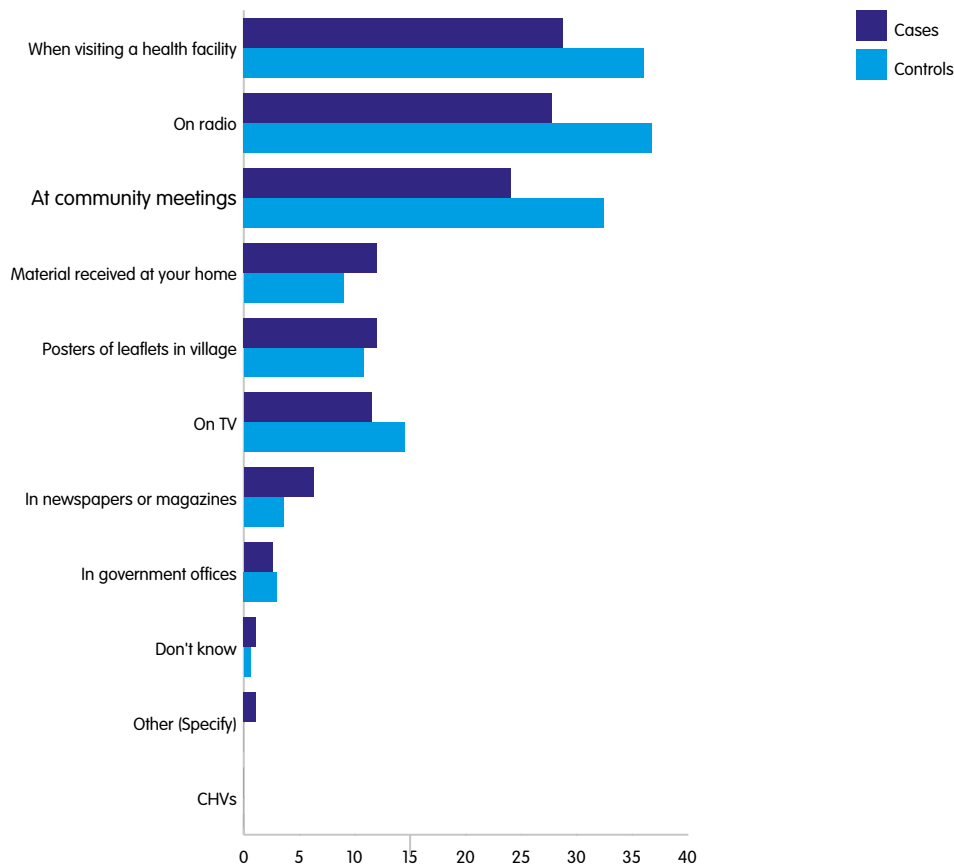
The most commonly heard messages were about washing hands with soap (heard by 50% of the respondents in the control group and 42.4% of the case group), safe disposal of a child's stool (33% controls and 28.3% cases) and a latrine use (stop open defecation), which had been heard by 34.3% and 25.7% of the respondents in the control and case groups respectively. Overall, fewer respondents in the case group had heard key sanitation messages than in the control group, suggesting that they may be less aware of these messages. Figure 6 shows the sources of the sanitation messages cited by the respondents.



Health Director and CPHO visit Sosit Belgut



**Figure 6: Sources of sanitation messages heard by respondents**



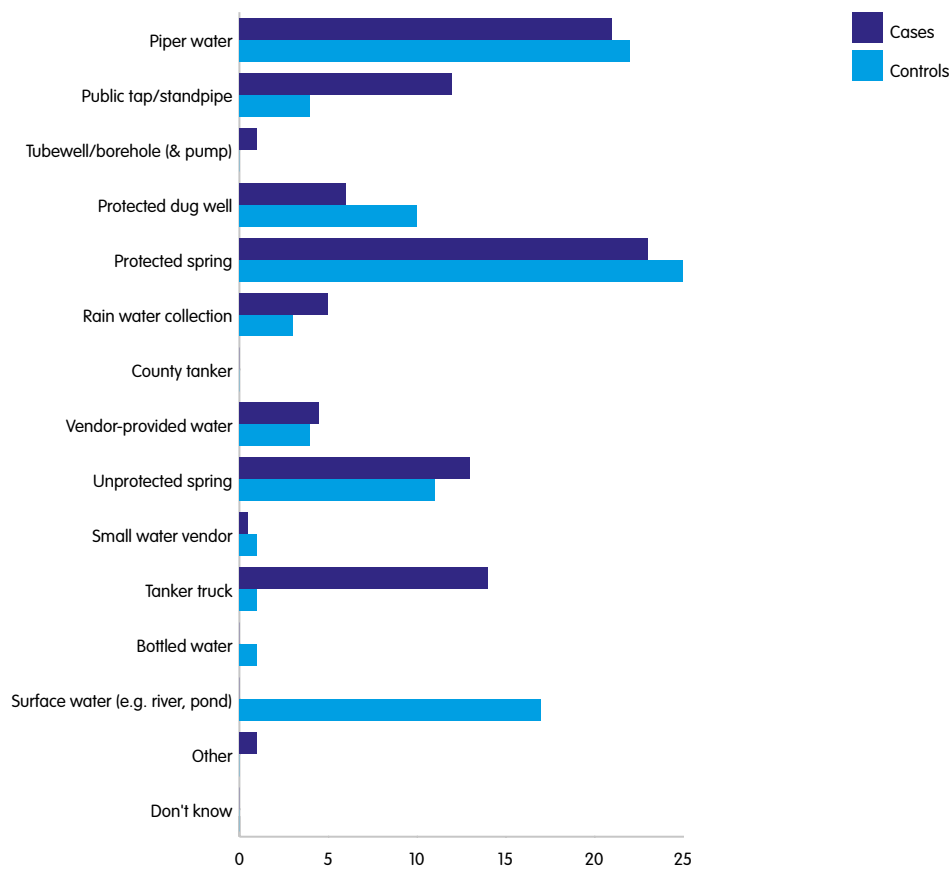
### Quality of household water

*Household water sources:* The study classified common water sources into improved and unimproved. Under improved sources are piped water, public tap, tube well, borehole with pump, protected wells and springs. Among unimproved water sources are unprotected wells and springs, water provided by small vendors and all surface water (rivers and ponds). The findings show that most households used water from improved sources. Twenty-two percent of the households in the control group and 21% of those in the case group used piped water, while 25% and 23% from control and case families respectively used water from protected springs.

More case households reported using water sources that may be exposed to contamination, which may explain the incidence of diarrhoea. For instance, 12% of the case households used water from a public tap compared to only 4% of the control households. Further, 14% of the case families used water from trucks or tankers, which none of the control families reported using, and slightly more case families used unprotected springs (13%) compared to control households (11%).

Treatment of the water at home before drinking is equally as important as the source in preventing water-borne diseases. The respondents were asked what their families did with the water before drinking. Over half of the households in both categories said they do nothing to the water (54.8% controls, 53.9% cases). About 16% in both groups said they use chlorine to treat the water and 16.9% in the control group and 21.5% in the case group said they boil the water. Slightly more households in the case group (5.8%) used pot filtering than in the control group (3%). Over 70% of the households in both groups stored the water in a closed jerry can (78% in the control and 77.5% in the case group). (Table 4)

**Figure 7: Main source of drinking water for households in the study**



**Table 4: Treatment of drinking water at household level**

Do you do anything to your water before drinking?	Totals		Controls		Cases	
	n	%	n	%	n	%
Chlorination	59	16.5	27	16.3	32	16.8
Boiling	69	19.3	28	16.9	41	21.5
Pot filter	16	4.5	5	3.0	11	5.8
Strain through a cloth	3	0.8	2	1.2	1	0.5
Solar disinfection	0	0.0	0	0.0	0	0.0
Traditional herb	0	0.0	0	0.0	0	0.0
Let it stand and settle	47	13.2	21	12.7	26	13.6
Nothing	194	54.3	91	54.8	103	53.9
Other	0	0.0	0	0.0	0	0.0
Don't know	0	0.0	0	0.0	0	0.0

For most of the households in the survey, the main water source was located close to home, less than one hour away, with 63% reporting that it was less than 15 minutes away and 32.5% reporting that it was 15 minutes to one hour away. More households in the case group were closer to their main water source than those in the control group.

Tests conducted on the household water<sup>1</sup> collected during the study showed that the water was contaminated, as illustrated in Table 5.

**Table 5: Water sampling results**

Type of sanitation facility	Total		Controls		Cases	
	n	%	n	%	n	%
<b>Ideal values [0.6-1.5 Cl; 7.4-7.6pH]</b>	126	35.29	50	30.12	76	39.79
<b>Low values [Colilert test done]</b>	74	20.73	36	21.69	38	19.9
<b>Unclassified water</b>	157	43.98	80	48.19	77	40.31

Chi Square p-value=0.154

### Caregivers’ hygiene habits: hand washing and toilet use

The study considered household respondent’s hand-washing habits, because unwashed hands after toilets use contribute significantly to faecal contamination of food and water.

Respondents were asked about instances in the previous 24 hours when they had washed hands and what they washed their hands with. About 89% of the respondents in the control homes and 85.3% in the case group said they washed hands after using the toilet, and 89.8% and 86.4% in control and case homes respectively said they washed hands before eating. Only about a third in both groups said they washed hands after taking a child to the toilet (34.3% controls and 34.6% among the case households). Over 70% in both groups said they washed hands before cooking.

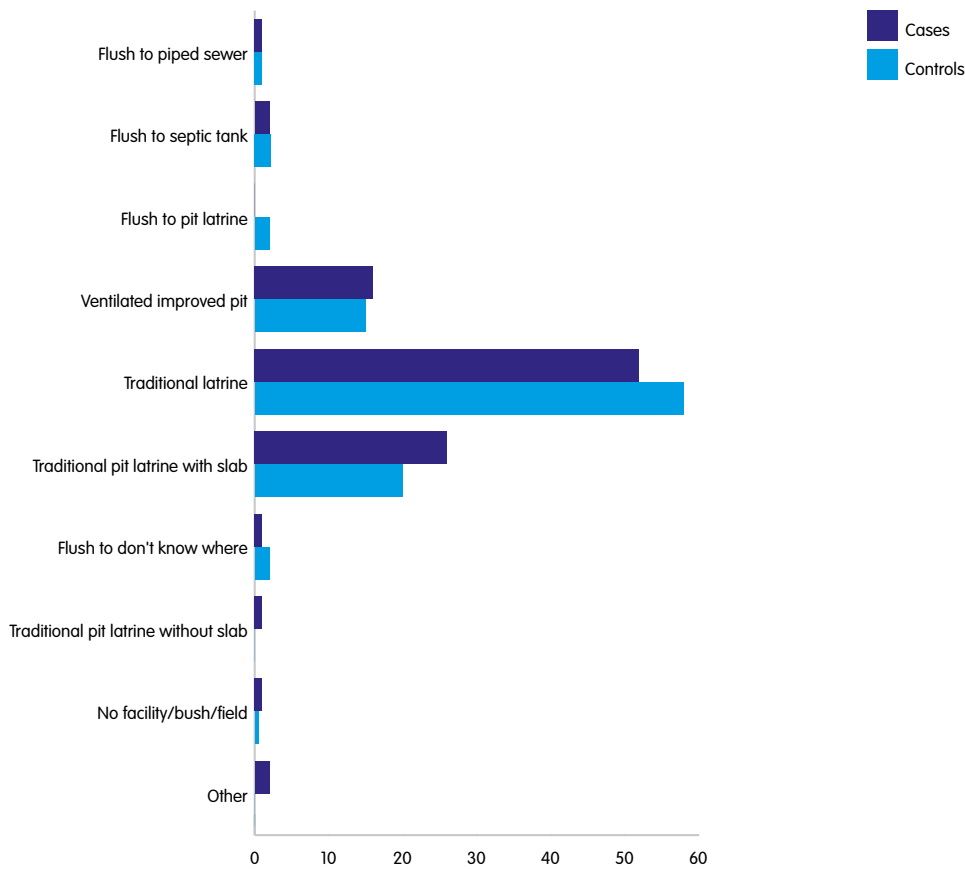
However, critical differences were observed in the reported use of soap, which suggests that the lower incidences of using soap with water by the case group might be linked with diarrhoea in the child. While 60% of respondents from the control homes reported using water and soap when washing hands, only 50% of those in the case group reported doing so. More respondents in the case group (43%) used water only than those in the control group (35%). The study team made observations around the home and enquired about hand-washing facilities. In 42.2% of the control households and 51.3% of the case homes, the team observed a mobile provision for handwashing (bucket, jug, leaky tin, tippy tap). Only in 6.6% of the control homes and 5.8% of the case homes did the team observe a fixed tap and sink. Only about a third of the homes had soap or other detergent at the hand-washing facility (28.3% control and 30.4% cases).

### Type of sanitation facilities used by the households

The data shows that the use of flush toilets, either connected to sewer or septic pits, is very low in the community under study: only 6% of the control households and 3% of those in the case category had a flush toilet, as reported by the respondents. The majority (over 50%) used pit latrines: 52% of the controls and 55% of the cases reported using a traditional pit latrine and 20% and 26% in the control and case groups respectively used a traditional pit latrine with a slab. Use of a ventilated improved pit was only reported in 15% control and 16% case households.

<sup>1</sup> All tests conducted on water in this study followed set protocols and standard procedures. See Annex for procedure applied

**Figure 8: Type of toilet facility used by household**



Only in five of the 357 homesteads surveyed did the respondent say the family used the bush or field for defecation (three in controls and two in the case group). In another three households in the control group, the respondent said they used a water body for defecation. None of the households in the cases category said they used a water body. The majority of the households in both groups did not report sharing a toilet with any other homestead (66% in both groups). Slightly more households in the case group (20%) reported using a communal toilet (three or more homesteads) than in the control group (16%).

Interviews with community members in FGDs confirmed that most of the communities used unimproved toilets, where they dig a pit and put up a superstructure using polythene bags, sacks and even live fences. Availability and affordability of materials dictates what is used to construct the toilet and may be the reason the community widely uses unimproved pit latrines. It was reported that timber cast-offs (off-cuts) are most commonly used because they are cheap and easily available and can be used for the superstructure and to cover the floor (act as slab). Improved latrines with cemented slabs were associated with rich families and seen as the preserve of the rich in the community.

*"[we use] semi-permanent latrines and not a temporary one. What I mean about not a temporary one is that the pit latrine is made of timber offcuts around the pits but is a pit latrine."*

*"... We first do the pit digging inside deeper like 5 feet. We use timber to cover the surroundings. Use of offcuts to construct the latrines and some use cement if one can afford it."*


Although the household survey showed that some families shared toilets, some of the participants in the FGDs said that the community did not allow sharing of toilets between households, unless they were related. They reported that there are even community initiatives to ensure that every home builds its own latrine so as not to share between families.

*"Nearly every family has a pit latrine. We don't allow sharing of the pit latrine with other families. Some families (extended family) do share. Some families who don't have one use the bush."*

Only a very small proportion of the respondents (two households in the total sample) reported being connected to the formal sewerage system. The community members interviewed in the FGDs said that sewer connections were expensive and only families living near towns had them, and that there was no infrastructure in the rural areas.

*"We haven't even heard of its existence. The sewer system is good instead of the usage of pit latrines and carefully dumped stools."*

*"Some people living near the rivers and stream connect the latrines to drain there [in the water]. This is a common practice especially for those people in urban and peri-urban [who] are not willing to be connected to the sewer line."*



Only a few are connected to the sewerage system

## Disposal of faecal waste

The survey findings show that over 80% of the respondents in both groups believe that children's excreta is harmful (82% of respondents in the control households and 81% in case households). Asked how the household manages children's excreta, 80% of those in the control households and 82.7% in case households said that it was disposed of in the toilet or latrine. More respondents in the control group (13.3%) than the case group (4.2%) said the child used the toilet or latrine. Slightly more respondents in the case households (5.2%) said that the stool was rinsed into a ditch or drain, compared to 2.4% in the control group. Only five respondents in the total sample said the excreta was left out in the open, while 12 (3 in the control and 9 in the case group) said that it was thrown into the garbage.

*"Some people living near the rivers and stream connect the latrines to drain [into the water]."*

The household respondents were also asked how they managed filled up toilets. In communities where filled-up toilets are not safely sealed, the waste matter can leak and pose a hazard as well as contaminate water sources. In the majority of homes in both groups, the respondents reported that the

toilets had never filled up (77.7% control and 72% case households) and of those whose toilet had ever filled up, the majority responded that it had never over-flowed (89% controls and 95% cases). For those that had ever filled up, the majority closed/sealed the pit (61% controls and 91% cases). Only in six households in the control group and one home in the case group did the respondent say that the filled up toilet was managed by treating the sludge.

Similarly, in the large majority of the households (84% in the control group and 83% in the case group), the respondents reported that the toilet had not been emptied in the past one to two years. Only one household reported that the filled-up toilet had been emptied in the last one to two years. Asked about who did the emptying, the respondent reported that it was emptied by a paid formal utility provider using buckets.

In the FGDs, participants thought that toilets in their community filled up every 3-5 years. When they did fill up, the participants reported that the common practice was to seal it and build another one or leave it to subside then reuse.

*"We just close or cover it with soil then construct another pit latrine. We don't remove or emptied the pit latrine when it's full."*

Participants felt that Kericho communities have enough land to construct new latrines when the old ones fill up.

*"We ensure that when the pit latrine is full we construct the others very fast."*

The participants also said that sometimes the filled-up toilets are emptied using the services of manual pit emptiers, who use a bucket and rods to empty the pit at night.

*"There is a group of manual pit emptiers who help to empty the pit latrines and it's good to involve them. The county government only visits institutions to empty the pit latrines but neglect the community."*

FGD participants felt that many families in the community could not afford to contract a formal exhauster service to empty a pit latrine because it was considered expensive. It was reported that even some institutions such as schools used manual pit emptiers when their facilities filled-up because they charged less, around KSh 8000/=.

"Yes. They are there but mostly work for institutions such as schools only. They are well paid based on calculation of pit latrines empties. The pit emptiers help the schools as most of them may not afford the exhausters coming to remove the waste frequently."

Asked how the removed sludge was disposed of, participants in the FGDs said the formal exhauster services used by institutions took the waste away to a treatment plant, although mention was made of unscrupulous transporter who dumped the sludge in the forest. Pit emptiers were also reported to dump waste carelessly in empty lots or the forest.

*"Sometimes people empty their sewer in the forests."*

An analysis of faecal sludge management in the county conducted in this study shows that 71% of the county's faecal sludge is safely managed but 29% is not. Only 25% of the county's faecal sludge is contained off-site through the sewer system, and 23% makes it to the treatment plant. Over half (52%) of the sludge is contained in onsite facilities (pit latrines, septic tanks and soak pits) and only a very small proportion (1%) of this ends up in a treatment plant, with the rest remaining on-site. Seven percent of the faecal waste in the county ends up in the environment through open defecation (Note. Validation of county faecal sludge management is ongoing and will be detailed and published as a Shit Flow Diagram Report).

*"We have big lands we can let the children use the land outside and the soil covers."*

The FGD participants argued that open defecation was a common practice in their community and was associated with a lack of toilets in work areas such as tea plantations. On tea plantations, the participants said that workers used the bushes because of the scarcity of toilets and those available being far away. Most of the tea employees are women and they defecate at the location of their daily activities. The participants also said that passengers on long distance travel through the county contributed to the menace due to lack of toilets along the highways. Kericho is on the highway to Kisumu, Nyamira and Kisii and is a major transit road for passenger buses. Children are also sometimes allowed to use the bushes.

The FGD participants also felt that people living with disabilities contributed to open defecation in households that had not built user-friendly toilets or modified latrines to suit their needs.

*"Sometimes they don't enter the latrine inside but help themselves near the toilet structure."*

*"Yes, we have people with disabilities here but in most households they use the same latrines as we do. We shall try and modify the latrine for them because most of them always request for help to sit and help themselves."*

There were also perceptions expressed that some families chose not to construct toilets, or neglected their maintenance and used the bushes instead.

*"Other people do not construct latrines but instead uses the environment and nothing is done to them and their children too. Some people have toilets but neglect maintaining the latrines as they say it's a toilet."*

### 3.3 Social effects of poor sanitation on different groups (age, gender, ability) in the county population

The research study sought to establish if there were any factors that contributed to poor sanitation among some groups and the effects of such discrimination or exclusion.

Respondents in the household survey were asked who uses the household toilet, to try and establish if any groups were excluded. The results show that children, men and women equally could all use the household toilet. However, the findings show that there may be some exclusion of the elderly and those living with disabilities from using the toilet as only 57.8% of the respondents in the control households and 62% in the case families reported that the elderly used the toilet. A smaller proportion (7.2% in the control group and 14% in the case group) reported the disabled as using the toilet (Table 6).

*"There are no issues in sharing the latrines. We use the facility as a family. Even the children use the latrines our culture has no problem."*

**Table 6: Household responses on who uses the toilet**

	Total		Controls		Cases	
	n	%	n	%	n	%
<b>Children</b>	336	94.1	157	94.6	179	93.7
<b>Elderly</b>	214	59.9	96	57.8	118	61.8
<b>Disabled</b>	39	10.9	12	7.2	27	14.1
<b>Women</b>	339	95.0	156	94.0	183	95.8
<b>Men</b>	331	92.7	155	93.4	176	92.2

Participants in the FGDs explained that people living with disabilities may not be able to use the conventional pit latrine because it was not modified to suit their needs.

*"Yes, we have people with disabilities, the blind, deaf and people who are unable to walk. But the latrines we have are not well built well for them. They should be provided with improvised machines in order to help themselves better without dirtying the place. Some we advise them to use buckets then dispose the stool later."*

*"... We have tried to modify the pit latrines for them. If one is using a wheel chair, we avoid constructing a higher pit slab. We include something like a rope so they can support themselves. Some we have seen have a stool-like seat."*

The participants also reported that members of the same household used the same toilet regardless of the age or gender, and that there were no cultural issues associated with family members sharing latrines in their community.

*"...The latrines in the households are used by each family member. We do not have issues in the use of the latrines."*

Household respondents were also asked questions to gauge whether there were any security-related issues or other considerations that may affect some household members' ability to use the toilet thus contributing to poor sanitation. The results show that in both control and

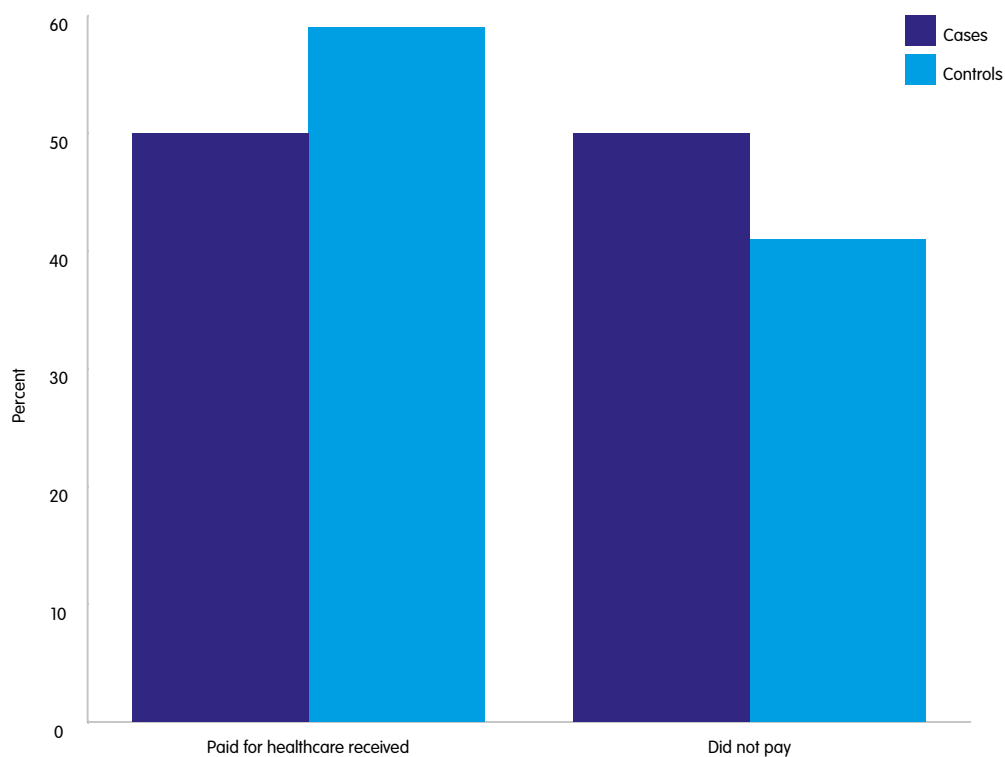


case households, there were no occasions when a member was not allowed to use the household toilet. The only reason given as why some members may not use the family toilet was having young children share toilets with adults, cited by 3% and 3.7% of the respondents in the control and case groups respectively. Distance to the toilet was not an issue in either group, with the majority saying the toilet was located either in its own dwelling or within the yard or plot. While both groups reported that the best time to use the toilet for family members was morning (39.8% controls and 30.9% cases), a larger proportion of the case respondents (45.6%) said that the best time was "anytime", compared to 37.4% of the control group.

### 3.4 Political role and economic cost of poor sanitation in the selected counties

In Kericho County, most of the households visited paid money for treatment. Those with a child suffering from diarrhoea paid more (59%) than the controls (50%).

Figure 9: Money spent on diarrhoeal care



The data shows that on average, the households in the sample had spent KSh 575/- on treatment of diarrhoeal disease in the previous six months, with the families of the children in the case category spending slightly more at KSh 650/-.

Since health facilities were usually far from the homes, taking a sick child required effort and time. It also disrupted the roles in the household: when a child is suffering from sanitation-related diseases such as diarrhoea, the mother has to go with the child to seek care, leaving the husband to take care of the household and the other children.

In instances when the child was admitted to hospital, their immediate neighbours tended to offer a helping hand and take care of the remaining children in the household.

*"My neighbours must chip in in case we are admitted because their father cannot take of the remaining children and the other household chores alone. He needs assistance."* FGD, Sigowet-Soin Women

One of the most striking features about the economic cost of poor sanitation in Kericho County is inequity. Access to improved sanitation facilities is for the rich while those having unimproved facilities and practising open defecation are the poor, especially community members living in the rural areas.

*"We only construct latrines using shrubs and polyethene. We cannot afford to construct a slab as it is for the rich in the community."* FGD, Kapsuser Men

## Political Role in Sanitation

It is evident from the study that there is lack of political will to address poor sanitation in the county. Most of the sanitation activities such as the building of latrines, behaviour change communication and sanitation marketing are addressed by the partners. For instance, most of the work of building latrines in Kericho County is being done by SNV and Bill and Melinda Gates through the Water Service Trust Fund, as well as civil society organisations (CSOs) such as Caritas.

*"The services are supported by Melinda and Gates through the water service trust fund to build toilets. The standard for building the toilets is KS 20,000".* Key Informant Interview (KII), KEWASCO Director

*"The Water Trust Fund is also assisting in building toilets. The first phase consisted of about 200 and the 2nd phase will do about 300. This is done through UBSP - Upscaling Basic Sanitation for the Urban Poor."* KII, KEWASCO Director

There has been no significant rise in the villages triggered, verified and declared open defecation free (ODF), which is mainly attributed to low or lack of funding. The latrine coverage is poor in open areas and the market, thus increasing open defecation. The county has not been able to legalize manual pit emptiers to make the practice healthy and to meet the standards of emptying in the sewer.

*"If we are registered and legalized, we can be doing our activities and taking the waste to them for treatment. We do it at night because it is illegal."* FGD, Sigowet-Soin Manual Pit Emptiers

## 3.5 Effects of poor sanitation on the environment

Poor disposal of human waste or excreta can contaminate the environment, contributing to poor health outcomes observed in the community. The researchers also analysed the effects of poor sanitation on the environment, to establish if poor faecal matter management had affected the quality of the water. Samples were collected of the water in some of the rivers and other water bodies traversing Kericho County. The results revealed that the public water points tested were contaminated with a high presence of *E. coli*, as shown in Table 7.

Analysis of the county sanitation status using geographic information system (GIS) mapping shows a clear relationship between proximity of households to the water sources, open defecation sites and the diarrhoea cases. Cases were denser along the water sources (rivers and lake beaches). It means that open defecation had contaminated water sources which in turn triggered the diarrhoea in the children under five.

**Table 7: Results of tests on public water sources**

Site sample taken	# Escherichia coli (#Coliforms) in 100 ml of untreated water	Comments
Kipkelion West Mjini Village	25 (>1800)	Unsatisfactory for Human Consumption
Kipkelion East Huruma Village	14 (>180)	Class IV-Unsatisfactory for Human Consumption
Sigowet Community Water Tank	12 (>1800)	Unsatisfactory for Human Consumption
Animal Pond River Source–Kapsurer Rd	0 (>1800)	Unsatisfactory for Human Consumption
BelgutSusumuet – Spring	5 (>180)	Class IV-Unsatisfactory Unless Further Treated

There are different ways of emptying faecal matter in Kericho County. A small portion of the population living in urban and peri-urban areas who are served by the sewer use it. However, others contract exhausters for the services at a cost ranging from KSh 5,000-8,000. Most of the institutions such as schools, hospitals and other social amenities are served by the exhausters, popularly known as the honey suckers. Some of the exhausters are owned by private entities thus not effectively monitored by the county government.

They sometimes empty the waste unsafely into the forests and rivers further endangering the lives of the dwellers.

*"You see we can only effectively monitor what we provide. Sometimes the private exhausters do not get to the treatment plant. They empty in the rivers and forests."*

KII, KEWASCO Director

The services of manual pit emptiers are employed mainly in the villages. This is an act that is illegal in the county therefore they do it mostly at night to avoid confrontation with the law enforcement officers. The emptied faecal matter is deposited in a nearby dug hole since they cannot access the county sewers for safe disposal.

*"We dig a hole next to the pit that has filled where we empty the waste and close"*

FGD, Sigowet-Soin Manual Pit Emptiers

The pits where they deposit the faecal matter are not lined therefore risk leaking contaminated water into the underground water sources. The result is contamination of ground water sources with faecal matter as indicated in Table 8. Most of the households fetched their domestic water from unprotected springs and wells that were prone to contamination with *E. coli* and coliforms.

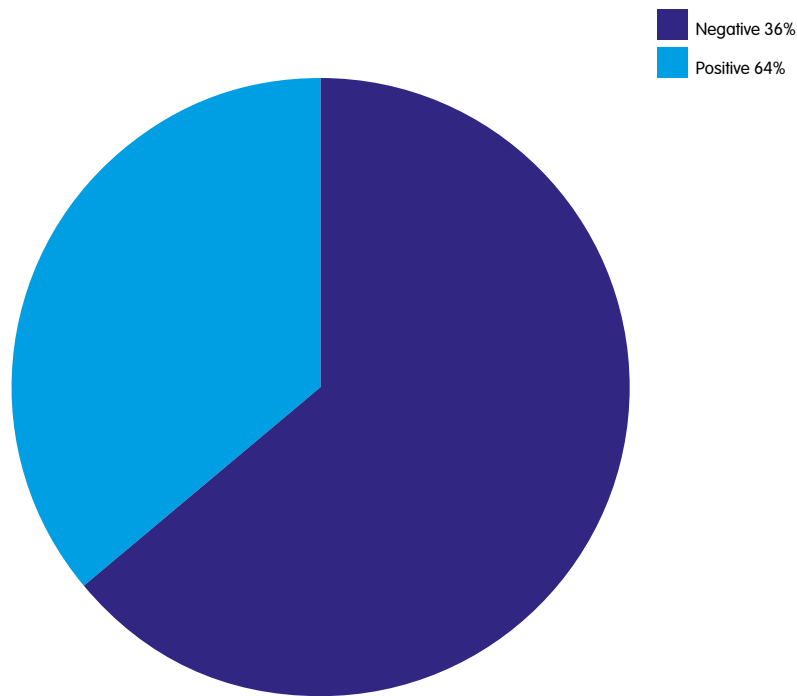
**Table 8: Household Water Sampling Results**

	Total		Controls		Cases	
	n	%	n	%	n	%
<b>Ideal values [0.6-1.5 Cl; 7.4-7.6pH]</b>	126	35.29	50	30.12	76	39.79
<b>Low values [Colilert test done]</b>	74	20.73	36	21.69	38	19.9
<b>Unclassified water</b>	157	43.98	80	48.19	77	40.31

Chi Square  
p-value=0.154

The quality of water was tested in 50 households in the county. Over half of the household used water that was positive for *E. coli*.

**Figure 10: Household E.coli test results**



The low latrine coverage, especially in the rural areas, has contributed to the environmental degradation due to open defecation.

### 3.6 Implementation of sanitation activities by Kericho County

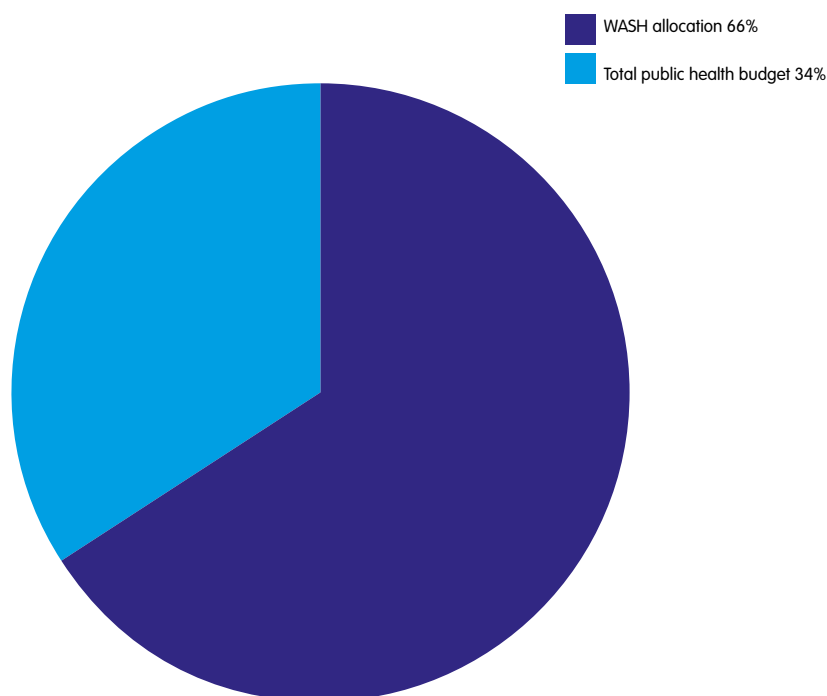
The CIDP reflects the strategic mid-term priorities of the county governments. The CIDP contains specific goals and objectives, a costed implementation plan, provisions for monitoring and evaluation and clear reporting mechanisms.

In Kericho County, most of the sanitation-related priorities are in the water and sanitation sector which include the following key programmes:

- Create awareness of the need to manage solid waste from domestic and industrial areas targeting light industries, homes, hotels and shops. This includes fencing off dumping sites, creating suitable dumping sites and recycling solid waste.
- Connect sewer lines to main trunk sewer lines, Ketepa estate and the surrounding area; connect Motobo and the adjacent areas; procure and lay 225mm waste pipe with the aim to increase coverage by 7 km.
- Construct sewerage treatment works and network systems at Sondu town to provide safe waste disposal mechanism to cater for 1,000 households.
- Construct Kipchebor sewer line to eliminate water contamination downstream which will cater for 50 households.
- Acquire a waste disposal site and construct a sewerage system for the Roret disposal and sewerage system, solid and liquid waste management, disposal site and functioning sewerage system.
- Construct two ablution blocks in every sub-county in urban centres to ensure that citizens have access to sanitary facilities.

Although the CIDP prioritises investment in the budgets, the county has allocated only 34% of the total public health budget to WASH activities.

Figure 11: WASH allocation in Kericho



The funds allocated to public health in the CIDP 2018-2022 is 168,325,677. Only 88,414,313 is allocated to WASH.<sup>2</sup>

The Sanitation Bill has not been passed by the county assembly thus derailing the funding and sanitation activities as it is the framework for the operations.

Other challenges in the county reported include; lack of sufficient sanitary facilities in the tea estates, open areas and the markets and high poverty levels that reduces access to improved sanitation facilities.

*"Most people cannot afford to build improved latrines with the slabs. That is a reserve for the rich in the society. We use timber and other materials that we can afford."* FGD, Brighter Communities-Londiani

*"The cost of emptying a toilet using our exhauster is approximately KSh 5000 within town and then we charge per kilometre for the ones away from the radius that we cover in town. Very few people can afford it."* KII, KEWASCO Director

Kericho County purchased Eco loo toilets at a cost of 10.7 million in 2014-15 as part of the efforts to improve sanitation with the assistance of its partners. Community Led Total Sanitation (CLTS) training and triggering was done at a cost of 269, 220 in 2015-2016 in Bureti sub-county. The partner's contribution in 2014-2015 stood at 18,325,000. The county has trained CLTS implementers.

### Policies and Guidelines available

1. Natural Resources Policy
2. Waste Water Treatment and Disposal Policy
3. County Water and Sewerage Services Policy
4. County Water Services Management Policy

Since devolution, the county has developed policies to provide an enabling environment. This has included adopting the ODF roadmap, sanitation action plan and targets. The county is in the process of domesticating the prototype sanitation bill in readiness for improving sanitation and implementing CLTS. The leaders and assembly have shown commitment to pass the bill.

The gaps reported in the current county policies include a need to define the roles in the different departments dealing with the issues of water and sanitation. These include water, the environment and public health. There is a need to work as a team to address water and sanitation issues yet there have not been partner mapping and exchange forums in the county to identify who does what and where duplication of activities may occur. Other gaps include open defecation, mainly resources mobilisation structure and developing technical guidelines and protocols for implementing WASH activities.

The water sources in Kericho County include roof catchment in rainy seasons, shallow wells, streams and springs. Most of the springs are protected. There is also gravity piped water. KEWASCO provides treated water to mostly urban and peri-urban residents. Other sources of water include boreholes, such as Chepsion borehole, and raw water. Kipkelon West and East is also supplied by gravity water from the forest. Kipkelon East has very many boreholes. Bureti and Litein have treated water from water works in Bomet. This was already in Bomet before devolution and they get water from there. There is a challenge of small schemes pumping raw water, apart from the one in Kipkelion and Londiani.

2 Kericho County CIDP Report: 2018-2022

There is 25% sewer connectivity in Kericho. Water coverage is about 71% in the KEWASCO area, which equates to approximately 140 square metres. The sewer network covers a small area within Kericho town and a few residential estates.

The study sought to examine the trends of CLTS implementation. Based on data from the real-time monitoring system of the CLTS, only 115 villages have been triggered, 20 claimed, 6 verified and 0 certified.

**Table 9: CLTS Summary for Kericho County**

Indicator	KERICHO EAST			KERICHO WEST		KIPKELION EAST			KIPKELION WEST		SIGOWET		SUBCOUNTY UNASSIGNED
	2016	2017	2018	2016	2017	2016	2017	2018	2016	2017	2016	2017	2016
Triggered	8	22	2	14	8	6	10	3	16	1	20	4	1
Claimed	1	5	1	1	4	1	-	-	3	-	3	1	-
Verified	1	-	-	1	-	1	-	-	1	-	2	-	-
Certified	-	-	-	-	-	-	0	-	0	0	0	0	-
Updated	-	-	-	-	-	-	-	-	-	-	-	-	1

The results show a poor performance of the CLTS implementation and lack of a standard training and operating procedure for the data entry. The data was further compared to results presented in the Second Sanitation Conference in 2017. In 2017, the number of triggered and claimed villages was higher than 2018. This could imply incomplete data entry into the CLTS system.

**Figure 12a: ODF status at February 2017**

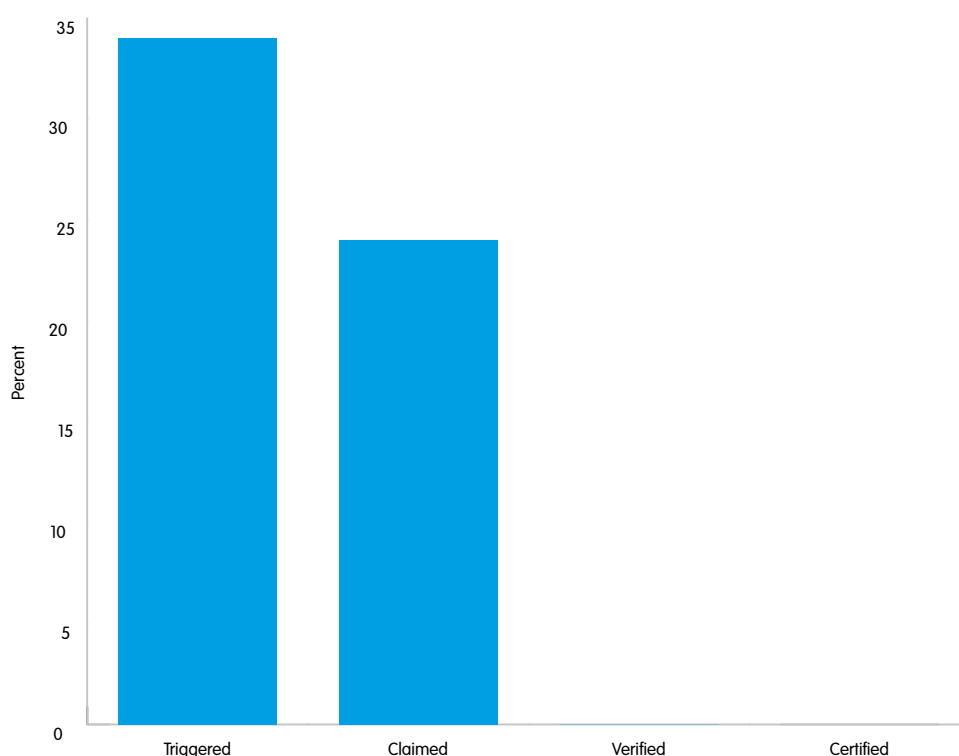
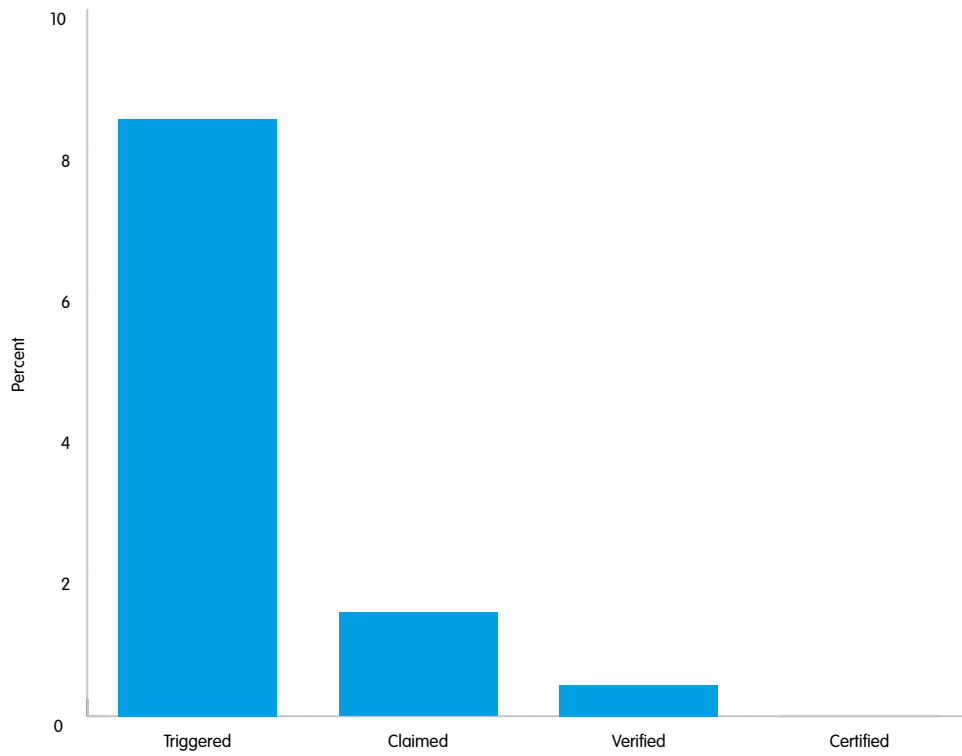




Figure 12b: ODF status at May 2018





SAFI latrine installation

# Chapter 4: Conclusions and Recommendations

This study was conducted to gain more insights into the effects of poor sanitation on public health, the environment and well-being in Kericho County. Poor sanitation is linked to diarrhoeal diseases, which are among the leading causes of morbidity and mortality in children under five. Poor sanitation is also associated with a number of infectious and nutritional outcomes which have great bearing on the health and well-being of the child. With this study, SNV, through the SSH4A project, aims to support Kericho County to learn from the findings and take steps to improve its sanitation and hygiene activities.

The findings show that typhoid and amoebiasis are the most common ailments in the community and that more case families were affected than control, suggesting more exposure to unclean water. The results also show that while the most common ailment afflicting children in the two groups was URTI, there was a considerable amount of diarrhoea reported, which would be related to poor sanitation. Recurrent diarrhoea appears to be common among the children in the case group. It is also likely that infant feeding practices in the community contribute to a child having diarrhoea as mixed feeding is common in both groups, with more mothers in the case group (73%) reporting it than did those in the control group. Exposure to sanitation messages is also critical: although both groups appear to have received messages regarding sanitation in the past year, more of those in the control group had heard such messages than in the case group.

In terms of water sources, the findings show that most households used water from improved sources, but more case households reported using water sources that could have been exposed to contamination, which may explain the incidence of diarrhoea. Over half of the households in both group also said they do nothing to the water to ensure its safety before drinking (54.8% controls, 53.9% cases). Tests conducted on the household water collected during this study showed that most of the water was contaminated. Test results on the public water points used in the study areas also showed high levels of contamination with *E. coli*, suggesting presence of faecal matter. Analysis of the county sanitation status using GIS mapping also found a clear relationship between proximity of households to the water sources and open defecation sites and the diarrhoea cases.

Hand washing habits after toilet use were found to be equally poor, with a lower incidence of using soap with water reported by the case group, which might be linked with diarrhoea in the child. Some families also practice open defecation, adding to the contamination of the environment and potentially, of water sources. In 5 of the 357 homesteads surveyed, the respondent said that the family used the bush or field for defecation. Disposal of children's stool was also poor in some households: 5.2% of the respondents in the case households 2.4% of the control group said that the stool was rinsed off into a ditch or drain.



**Kericho County government and partners can use these findings to improve the coverage of appropriate sanitation services to reduce the incidence of diarrhoea in children. The following recommendations can be drawn from these findings:**

- **Address the high level of contamination and improve access to safe water in the county:** The county should improve access to piped water, and protection of springs, to reduce dependence on other unsafe water i.e. surface and water delivered by vendors. The chief public health officer (PHO) and public health monitoring and evaluation department must monitor the activities of the PHOs and ensure that they meet weekly targets on water sampling and testing as part of their routine sanitary inspections. The county public health department must set aside funding for water quality monitoring. Supportive legislation and policy framework for water quality monitoring should be put in place clarifying the roles of each players in the county.
- **Increase water testing and treatment in the county:** The findings show a clear association between water quality and diarrhoea in children under five. Tests conducted on the household water collected during the study indicated that water used for drinking is contaminated with faecal matter. Provision of household water treatment options and safe water storage should be made a priority by the county's public health department.
- **Address social exclusion and discrimination in sanitation:** The study results show that poor sanitation is linked to social discrimination and exclusion of some groups in Kericho. Women are not involved in construction of the toilets hence do not contribute to developing a design that is user-friendly to them and the children. Besides, it was evident that open defecation is practised by people living with disabilities in the household where they had not constructed user-friendly latrines. The county government and partners should focus on building suitable latrines for people living with disabilities.
- **Conduct public education campaigns that address sanitation and hygiene:** Exposure to sanitation messages was found to be related to the incidence of child diarrhoea, with results suggesting that more of those in the case group are less aware of these messages. Such campaigns should address the need to wash hands with soap all at critical times and the need to treat water and store it hygienically. Public education and awareness campaigns should be channelled through community health workers and volunteers to reach more people in the villages. Communities should be enlightened on the need to construct latrines, safe storage of drinking water and hand washing with soap.
- **Take action to discourage open defecation:** A fair amount of open defecation is reported, associated with a lack of toilet facilities around working areas. The county government and partners should address this and provide appropriate facilities. KEWASCO should construct sanitary facilities in the major markets and towns to improve access.
- **Strengthen monitoring of CLTS:** The current reporting is incomplete and therefore the current data cannot be used for monitoring or to improve programming. There is a need to build the county capacity to ensure completion of data entry. Besides, there is need to integrate water testing and sampling into CLTS and ensure that there is a standard operating procedure and training to reduce the gaps in data entry.
- **Strengthen the sanitation related policies and action plans:** The public health monitoring and evaluation department need to operationalize their M&E plan. The county public health department must expediate the members of county assembly (MCAs) to pass the sanitation bill and implement it fully.





Artisan training in Kericho

# Annex: Water testing protocol used in this study

## WATER ANALYSIS

The national microbiology reference laboratory (NMRL) is a public health laboratory in the division of national public health laboratory services. The laboratory's mandate is to offer reference microbiology services and oversee all quality assurance programmes for microbiology.

## SAMPLING PROCEDURES

### Microbiological samples:

Microbiological samples should be collected in sterile plastic or glass bottles which NMRL supplies. NMRL supplies 100 ml sterile glass bottles. A sample volume of 200 ml should be sufficient for Faecal coliform and *E. coli* count.

Chemical analysis:

- Keep sample bottles closed until they are to be filled.
- Collect a sample that will be representative of the water being tested.
- Remove the cap of the bottle and ensure no contamination of cap or the neck of the bottle when filling occurs.

### Potable water:

Apply the procedures as described above. Never sample leaking taps where water runs down on the outside of the tap. When collecting water from wells and boreholes, pump water for 5 minutes when a pump is fitted. When sample locations for a distribution system are identified, include dead-end sections and all the different lines in the sample programme.

### Waste and effluent water:

Sampling frequency may be seasonal for recreational waters, daily for water supply intakes and even hourly for waste water where the quality may vary tremendously. Hold the sample bottle near its base in one hand and plunge it mouth downward below the surface of the water. This is especially important when sampling from a dam: never sample water from the surface.

### Sample size:

Sample volume should be sufficient to carry out all tests required. A sample volume of 750 ml should be sufficient.

Sample identification:

Samples must be sufficiently identified. Important information that could be included for identification are:

- sampling date
- sampling time
- origin of sample
- type of sample.



### Sample preservation and storage:

Although recommendations vary, the time between sample collection and analysis should, in general, not exceed six hours, and 24 hours is considered the absolute maximum. It is assumed that the samples will be immediately placed in a lightproof insulated box containing melting ice-packs with water to ensure rapid cooling. Sample temperature should be kept below 10°C for a maximum transportation time of six hours. If ice is not available, the transportation time must not exceed two hours. It is imperative that samples are kept in the dark and that cooling is rapid.

Test	Turnaround time (days)	Charges
Water bacteriological analysis	7	2000





For more information on these findings, see:

*Understanding the Effects of Poor Sanitation on Public Health, the Environment and Well-being. Report of a study conducted in Homa Bay, Elgeyo Marakwet and Kericho counties in Kenya. 2018.*

*Distribution of Diarrhoea and Associated Factors in Kericho County - A Geospatial Analysis*

*Poor Sanitation is Key Contributor to Diarrhoea in Children in Kericho County (Poster)*

*F-Diagram - Kericho County*

*Kericho County Shit Flow Diagram Report*

## **Further information**

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