SNV

Understanding the Effects of Poor Sanitation on Public Health, the Environment and Well-being

Homa Bay County - Report of research findings

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Kenya Country Office
Ngong Lane, off Ngong Road
P.O. Box 30776, 00100
Nairobi, Kenya

Tel.: +254 724 463355

Email: kenya@snv.org

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 Homa Bay County.

The results of this case-control study show that the majority of adult respondents (the child's caregiver) were females (85%), with the majority in both the case and control groups (41%) aged 30-39. A small proportion were aged under 19 (2.5% in the control group and 5.4% in the cases). A considerable proportion of respondents had basic education, with 27.5% of the control group and 31.3% of the case group having completed primary school and 18.9% and 15.8% in the control and cases categories respectively having completed secondary school.

About 70% of the respondents lived in their own homes and about a quarter were renting (29% controls and 26.7% cases), with most of the homes being either one- or two-bedroomed. The results suggest a potential link between household poverty and the incidence of child diarrhoea: the control group households had higher annual incomes than those in the case group and more control families were in the middle wealth quintile than case families. More households in the case group (73.8%) had borrowed money, food or other items in the past month than in the control group (69%).

More respondents in the control had **heard sanitation messages**

Most of the families (over 60%) had a family member who had ever been diagnosed with some type of chronic illness. The findings suggest that the households have good healthcare seeking behaviour: in about 90% of the households in both categories, sick family members sought treatment and in over two-thirds of the households, they sought treatment in a public health facility. Most paid money for the treatment: more case households (73%) paid for healthcare (in general) than those from the controls (62%).

The results show that besides malaria, sanitation-related illnesses are the most common reason the community seeks treatment and that case households bear a bigger burden of sanitation-related illness, compared to the control households. The findings suggest that recurrent diarrhoea in children is likely to be common among the cases: more of the children in the case category had suffered diarrhoea in the two weeks before the survey.

Overall, more respondents in the control group had heard messages related to sanitation than did those in the case group, which suggests that exposure to these messages has a link with a child having diarrhoea. The study findings also show a clear link between the household source of water and a child having diarrhoea, but no link between infant feeding practices and the child having diarrhoea. More households in the control group used protected water sources than those in the case group. However, tests on the water collected show that over half of the sampled households in Homa Bay were using water that was contaminated and unfit for human consumption: laboratory tests show that 52% of the water samples collected were contaminated with *Escherichia coli* (*E. coli*), a clear indication of contamination with faecal matter.

Hand washing was reported to be common, but a physical examination of the homestead by the study team failed to find evidence of using soap in a majority of the homes. The majority of the caregivers said they washed hands after using the toilet, with more caregivers in the control group washing hands (94.8%) than in the case group (86.6%). More caregivers in the control group also reported washing hands before cooking (66%) than in the case group (60%). But the lack of soap suggests that, despite what they reported, most households use water only to wash hands after toilet use, which is inadequate.

Most of the households in both groups use unimproved sanitation facilities (traditional pit latrine) and more case households practice open defecation (13.3%) than controls (9%), suggesting a strong link with the child having diarrhoea. Although small in proportion, slightly more households in the case group left a child's stool in the open (5.4% compared to 3% in the control group) or rinsed it off in a ditch or drain (7% compared to 3% in the control group). An analysis of faecal sludge management in the county also reveals that over half of the faecal sludge in the county (52%) is unsafely managed or disposed of, meaning that significant amounts of excreta end up in the environment, polluting water sources. Most respondents (over 60%) in both groups said they use chlorine to treat the water, but about 20% said they do nothing.

13.3% of cases **practice open defecation**

The study results show that poor sanitation is linked to social discrimination and exclusion of some groups in Homa Bay County, as a result of their inability to have or to use proper sanitation facilities. These groups include the elderly, young children and people living with disability, who may not be able to use the conventional pit latrines. Some of the findings also suggest that there may be security concerns that prevent some groups from using household toilets at night and that some cultural norms also impact on access to sanitation for some groups.

To address the challenges established through this study, it is recommended that the county government and partners take action to, among other things, improve sanitation coverage and promote public education on sanitation and hygiene. The county should put more efforts into securing the quality of drinking water by increasing improved water supply. This can be achieved by developing new water points and upgrading existing unimproved sources. Improving access to clean water supply not only increases the quantity of clean water available for household consumption but also allows households to save much time by reducing the distance between each household and the nearest water access point.

A collapsed latrine in Wang'chieng

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List of Abbreviations

CIDP	County Integrated Development Plan
CLTS	Community-Led Total Sanitation
E. coli	Escherichia coli
FGD	focus group discussion
KSh	Kenyan shilling
MoH	Ministry of Health
ORS	oral rehydration solution
PHO	public health officer
SSH4A	Sustainable Sanitation for All
SNV	SNV Netherlands Development Organisation
V4CP	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 but through sub-clinical infections with faecal pathogens**. Repeated and persistent infection may lead to environmental enteric dysfunction, a sub-clinical 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).

Study Area

Homa Bay County had an estimated population of 963,794 in 2009, projected to rise to 1,177,181 persons in 2017.[1] The county has an estimated 206,255 households and 3,036 villages. The county's main economic activities include farming, fishing, livestock rearing and trading activities. It has a booming fishing industry, which accounts for over 90 % of the total economic activities of the area. Other economic activities include lake transportation by boat, building stone and sand harvesting at Kendu Bay. The county is dissected by a number of rivers that include Awach Kibuon, Awach Tende, Maugo, Kuja, Rangwe and Riana and several seasonal rivers and streams. In 2014, 5.4% of children were underweight (weight for age) while 18.7% were stunted (MOH 2015[2]). Other data shows that the most common causes of ill health and death among children aged under five are malaria, upper respiratory tract infections and diarrhoea (Homa Bay County 2017[3]). Homa Bay has four recognised townships, each with a population of over 10,000 people.

1 All data cited in this section from Homa Bay County Integrated Development Plan 2013-2017
2 Ministry of Health. 2015. Homa Bay Health at a Glance. Factsheet
3 Homa Bay County Health Accounts report (2017), based on KNBS Statistical Abstract, 2015

County Sanitation Situation

In 2014 **only 22%** of the population had access to improved sanitation

Homa Bay has made significant progress in sanitation during the last decade, mainly because of the Community-Led Total Sanitation Approach (CLTS), a coordinated effort led by the government and supported by non-governmental organisations (NGOs) and other development partners. The county sanitation bench marking survey in 2014 (Ministry of Health 2014) found that only 22% of the population had access to improved sanitation facilities, while 20.5% were using unimproved latrines. The proportion of the population that were sharing latrines in 2014 was 18.7%. This means that about 61% of the population had access to some form of latrine, irrespective of its quality. Open defecation had declined to 38.8% in 2014 compared to 44.8% in 2012. Sewerage systems only cover 8% of the county, with the vast majority (about 92% of the county's population) served by on-site sanitation systems such as septic tanks, improved pit latrines and unimproved pit latrines.

By 2013, only 19% of the population aged 18 and under had access to safe drinking water (UNICEF 2013[4]). Other data shows that only 10% of the villages had been triggered towards open defecation free (ODF) status, while 10% had claimed ODF, 8% of the villages had been verified ODF by the department of public health and only 3% had been certified by a third party.[5]

Access to clean water and proper sanitation facilities is important in safeguarding the health of people and communities. Poor sanitation and unsafe drinking water are known to cause illness and death through diarrhoeal diseases. In Kenya, an estimated 19,500 people, including 17,100 children, die every year because of diarrhoea (WSP 2014). The impact of this inadequate sanitation on the well-being of the population in these counties and their ability to contribute to the counties' economic activities is expected to be profound and far-reaching. One study estimated that Homa Bay County loses KSh 920 million each year due to poor sanitation-related causes, including losses due to time taken to access facilities, premature death, healthcare costs and hampered productivity (WSP, 2014).

However, the real effects of poor sanitation in Homa Bay and in Kenya at large are only partially understood, and there has not been enough research to document the political, social and economic consequences associated with poor sanitation. This study was conducted to contribute to the existing body of knowledge and generate information for the county to use and 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 in the three counties:

- 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.

4 UNICEF. 2013. Homa Bay County. Kiongozi bora hujali masilahi ya watoto. Factsheet
5 2nd Kenya Sanitation and Hygiene Report

Toilet facilities in use

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.

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 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 in 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 other 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.

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, such as sanitation status or environment, is linked to a current condition, such as having a disease (diarrhoea).

2.2 Sampling

The study used convenience sampling to select all children under five years of age 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 in the study. 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, or simply by the confirmation of the mother.

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 in the study. 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 criteria

Inclusion criteria: All the children under 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 or primary caregivers were suitable respondents to provide adequate information about those children and other variables surrounding the children's environment because they spent more time with their children than others did.

Exclusion criteria: Children with the following conditions were rejected for the study: those who were selected as controls but had suffered from diarrhoea within the past two weeks: those who were cases but were diagnosed with intestinal diseases, irritable bowel syndrome, food intolerance or medication reaction; 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 Homa Bay County:

- *Household surveys* (with informed consent) were held with the parents or guardians of the 473 children selected for follow-up, to establish the knowledge, attitudes and practices of the communities in relation to sanitation and hygiene. The researchers enquired about the number of children under the age of five who have 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, 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 three counties to identify the number of children under five seeking treatment for any illnesses; those treated for water and sanitation-related diseases; the number that have died; and specifically, those that have 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 in the three counties, to engage them in the research process and to understand the WASH situation in each county from their perspective. The researchers also held focus group discussions (FGDs) with groups of residents , 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, among other issues.
- *Water sample testing:* The researchers also collected water samples from all the sources that the households in the study used, 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 was contaminated by faecal matter, which poses a risk to human health. (see Annex for the water testing protocol used in this study).
- *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.

The study methods are summarised in Table 1 by study objective.

Training of research staff

Table 1: 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 comparison of all-cause mortality to child mortality due to water and sanitation-related diseases
	Analysis of risk factors for diarrhoea for cases and controls	• A health facility interview and data review of caregivers of children under five who attended the health facility (using a health facility screening tool) • Anthropometric measures • Household survey • 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) • Key informant interview guide for local and national government ministries and departments • Water quality assessment tool
To examine the social effects of poor sanitation on different groups	Analysis of social effect of poor sanitation on the following groups: • Children • Women • Persons with disability • Elderly	• Household survey • 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) • Key informant interview guide for local and national government ministries and departments
	Analysis of epidemic data three months prior to the study Water testing for main sources of water in the epidemic zones	• Sub-county level review of weekly data related to (i) sanitation-related epidemic monitoring data collected weekly in the county through the sub-counties (ii) a review of community health extension workers' weekly summary tool • 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	• Household survey • 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) • Key informant interview guide for local and national government ministries and departments
To examine the effects of poor sanitation on the environment (e.g. quality of underground and surface water) and obtain data on excreta management in the rural and urban areas of the county	Water analysis of underground and surface water Analysis of the excreta management in urban and rural areas of the county	• Household chorine and pH test, present and absence of coliform (using a water sampling and analysis monitoring form) • Faecal sludge management situational assessment tools • Key informant interview guide for the heads of water and sewerage companies; instructions to the participants • Key informant interview guide for local and national government ministries and departments
To establish trends during the devolution years and compare pre-devolution data with data obtained for the years since devolution	Qualitative analysis of the trends of sanitation-related epidemics pre- and during devolution Qualitative analysis of the trends of sanitation surveillance and epidemic reporting pre- and during devolution	• Key informant interview guide for local and national government ministries and departments • Desk review of documents
To evaluate the extent to which the sanitation activities as planned in the 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

In the household survey, the majority of adult respondents (the child's caregiver) were female (85%), with the majority in both groups (41%) aged 30-39 years. A small proportion was aged less than 19 (2.5% in the control group and 5.4% in the cases). An equally small proportion were aged fifty and over (3.9% among controls and 3.3% among cases). The majority was married (91.4% in the control group and 88.3% in the case group), suggesting that there is no relationship between marital status and the child having diarrhoea. A small difference was noted among single parents: among the cases, 5.4% of the respondents were single compared to 2.2% in the control group.

A considerable proportion had **basic education**

There does not appear to be any clear relationship between the respondent's educational attainment and having a child with diarrhoea. A considerable proportion of respondents had basic education, with 27.5% of the control group and 31.3% of the case group having completed primary school and 18.9% and 15.8% in the control and case categories respectively having completed secondary school. More of the respondents in the control category (27.5%) had incomplete secondary school education than those in the case category (22%). While the majority of the respondents were self-employed (28.8% among the controls and 29.6% among the cases), there is no evidence to suggest a link between caregivers' occupation and the child having diarrhoea. Although the number of disabled respondents was small, ability status also does not appear to have any link with the child having diarrhoea. Over half of the respondents (54.8%) had lived in their locality for over five years.

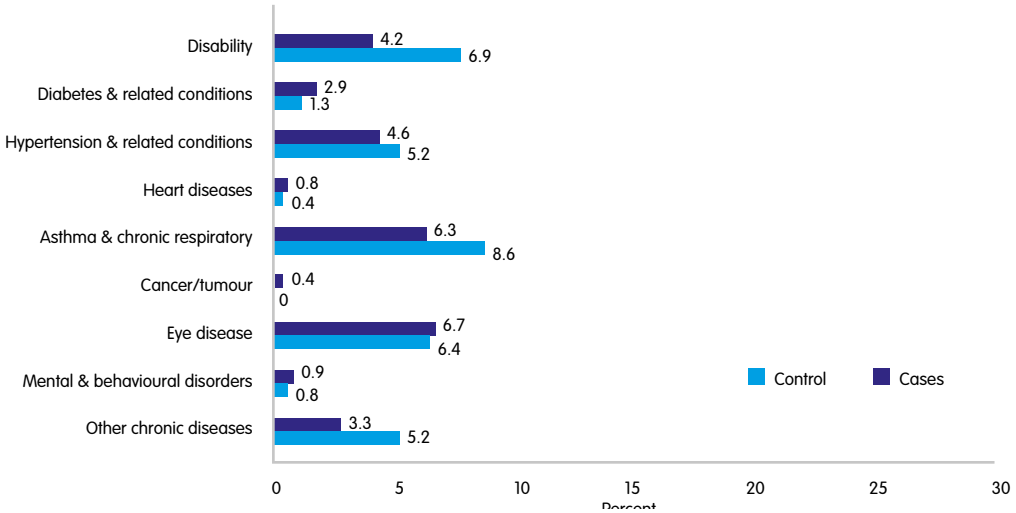
About 70% of the respondents lived in their own homes and about a quarter were renting (29% controls and 26.7% cases), with most of the homes being either one- or two-bedroomed. Most of the homes in both groups were classified temporary or semi-permanent and only about a quarter (25%) lived in permanent houses. The proportion of respondents in the control group who lived in permanent houses was slightly larger (28%) than in the case category (22%). Over 50% of households had four to five members living in the household. Slightly more households in the control group had seven or more members (21.4%) spending the night before the survey at the home. This was higher than in the cases group (18.8%), meaning they were likely to be more crowded, especially given that about 42% of the respondents in the control group lived in homes with one bedroom.

About the same proportion in the two groups (73%) owned livestock and agricultural land. There was a marginal difference between the groups in the proportion owning agricultural land: 63% control and 65.4% cases. In terms of family income, the control group appears to have more money, with a median income of KSh 48000/- in the 12 months before the survey, compared to KSh 36000/- among the case families. More households in the case group (73.8%) had borrowed money, food or other items in the previos month than in the control group (69%). However, analysis by wealth quintiles shows that at least a third of the families (35% control and 32% cases) were poor and more households in the case category (37%) could be characterised as wealthy compared to those in the control group (29%). More control households were in the medium wealth quintile (35.6%) than case households (30.8%).

Household disease burden and health-seeking behaviour

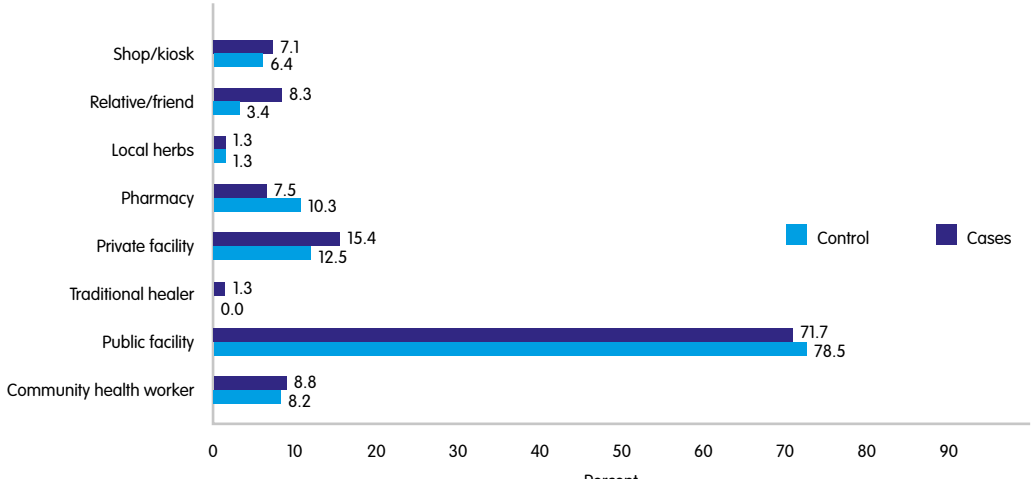
Prompt and appropriate health seeking is critical in the management of childhood illnesses. The respondents in the household survey were asked a range of questions to establish the disease burden and their healthcare seeking behaviour. Of the total households surveyed, 62% in the case families and 64% in the control families had a family member who had ever been diagnosed with some type of chronic illness, as shown in Figure 1.

Figure 1: Proportion of family members ever diagnosed with chronic illness



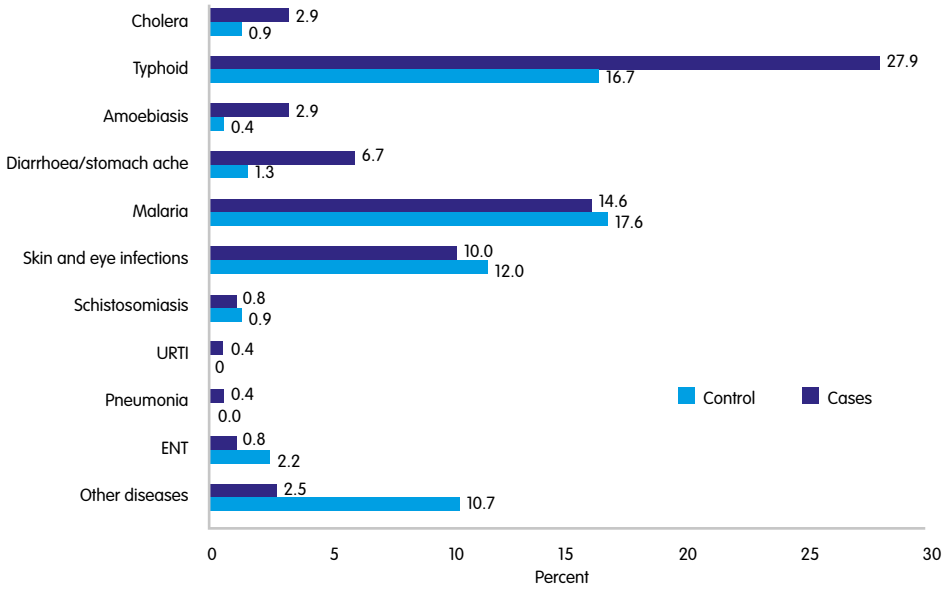
From the findings, it appears that both types of families suffer an almost similar burden of disease and there are no major differences. About a third of the control families (31.6%) and 26.8% of the case families had a household member who took medicine regularly. The findings also show (Figure 2) that in about 90% of the households in both categories, sick family members sought treatment. In over two-thirds of the households, the sick family members sought treatment in a public health facility: 71.7% from the case families and 78.5% of the controls (Figure 2). There appears to be a fair amount of self-prescription and treatment in both groups, with some households seeking treatment from the local shops, pharmacy or friends. The proportion of case households seeking treatment from friends or relatives (8.3%) was double that of control families (3.4%)

Figure 2: Where sick family member sought assistance



Respondents were also asked whether any family members had sought care in the six months prior to the study for a range of diseases that included those related to sanitation (cholera, typhoid, amoebiasis, skin and eye infections and schistosomiasis). The results show that besides malaria, sanitation-related illnesses were the most common reason the community sought treatment and that case households bear a bigger burden of sanitation-related illness compared to control households (Figure 3). More family members from households in the case category had sought treatment for typhoid (28% versus 16.7%), cholera (2.9% compared to 0.9% in the control) and amoebiasis (2.9% compared to 0.4% in the control). This suggests that children in the case households have an aggravated risk of suffering diarrhoea.

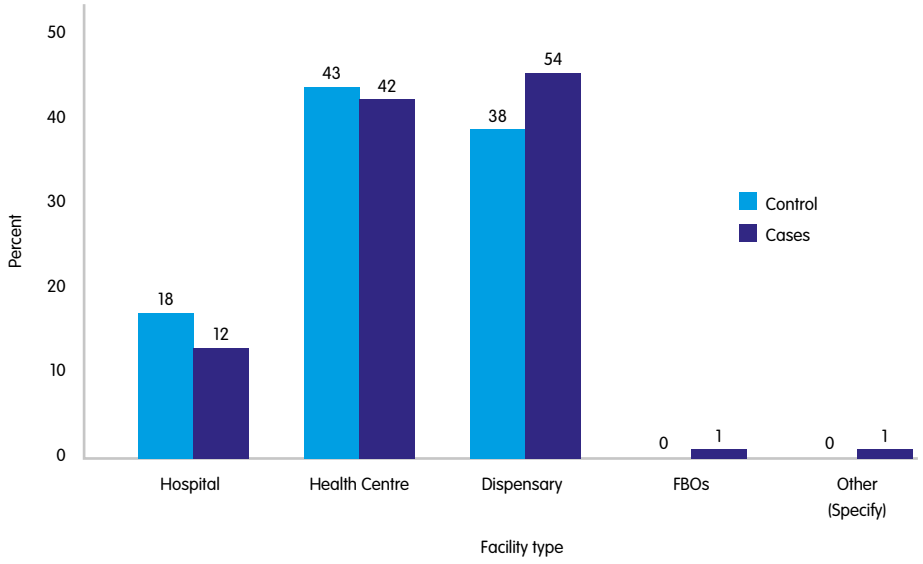
Figure 3: Proportion of children in study sample by type of facility



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

The study recruited 473 children, of which 235 were boys and 238 were girls. There were more boys in the case category (132) than in control group (103), and more girls in the control group (130) than in the case group (108). Twenty-nine percent of the children in the total sample were aged under one year (27% of controls and 31% of cases). There were no remarkable differences in weight and height, and both groups had a median weight of 11kg and a median height of 70cm. The majority were recruited from either a dispensary or health centre (Figure 4) and nearly half (47%) were sick on the day of the recruitment (50% cases and 44% controls).

Figure 4: Proportion of children in study sample by type of facility



a) Effects on poor sanitation on child morbidity and mortality

The study sought to establish a link between poor sanitation and the negative health outcomes observed in children in the study population. The nutritional outcomes included underweight, wasting and stunting, which were all measured through anthropometry (weight, age and height) and based on WHO child growth standards.

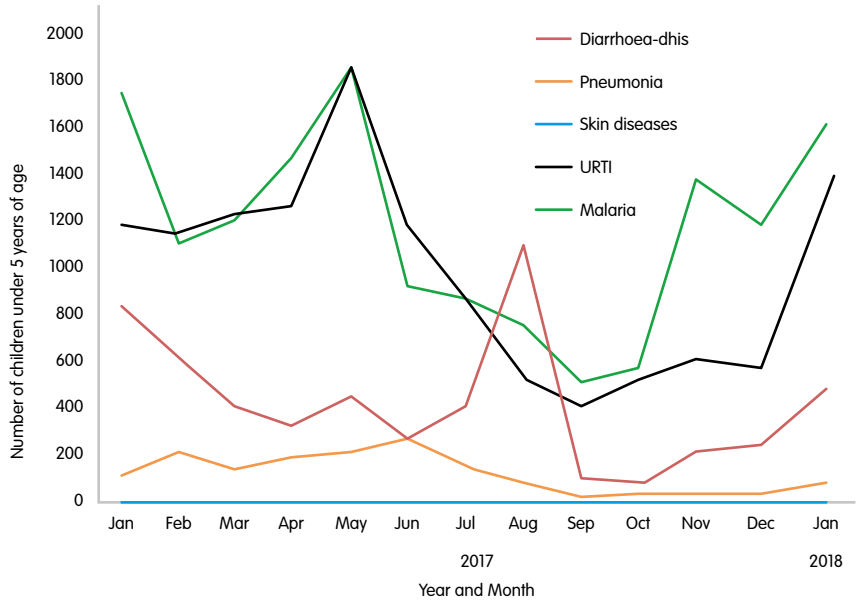
The findings suggest that recurrent diarrhoea is likely among the cases in Homa Bay: more of the children in the case category had suffered diarrhoea in the two weeks before the survey (72.5% compared to only 16% among the controls). The results also show that a small number of children with diarrhoea did not get oral rehydration solution (ORS) and Zinc supplements, which are crucial to management of diarrhoea. Table 2 illustrates these findings.

Table 2: Proportion of children who had diarrhoea in the two weeks prior to the study and the treatment received

	Total		Controls		Cases		p-value
	n	%	n	%	n	%	
Had diarrhoea in past 2 weeks							
Yes	212	44.8	38	16.3	174	72.5	<0.001
No	261	55.2	195	83.7	66	27.5	
Child received ORS supplement							
Yes	183	86.3	29	76.3	154	88.5	0.048
No	29	13.7	9	23.7	20	11.5	
Child received Zinc supplements							
Yes	183	86.3	27	71.1	156	89.7	0.003
No	29	13.7	11	29.0	18	10.3	

Figure 5 illustrates the most common causes of illness for children aged five and under, from the review of health facility records and Ministry of Health (MoH) DHIS data (Jan 2017 - Jan 2018). The results show that in Homa Bay County, malaria, upper respiratory tract infections and diarrhoea were the leading causes of illness in children. There were more diarrhoea cases in August 2017.

Figure 5: Causes and patterns of ill health in children aged five years and under



The difference in diarrhoea morbidity was insignificant between dry and rainy seasons in Homa Bay County, although a higher prevalence of diarrhoea has been observed in the rainy season (May-September).

In the focus group discussions, members of the community participating expressed concern that poor sanitation led to disease outbreaks.

"Cholera is also a problem when the environment is contaminated, and a lot of cases and mortalities are reported."

The participants in the FGDs associated the following illnesses with poor sanitation: vomiting, cholera, typhoid, intestinal worms, "malaria of the stomach" and measles. Respondents specifically identified young children and the elderly as some of those most affected by illnesses associated with poor sanitation.

"A lot of children suffer from diarrhoeal cases and some die in the process."
"The elderly also become sick and they suffer from diarrhoea a lot."

In one FGD, it was pointed out that conditions associated with poor sanitation also led to pregnancy miscarriage.

"The pregnant women at times also miscarry due to dirt. Faecal matter isn't good in the environment."

The FGD participants also recognised other negative outcomes associated with poor sanitation, which include loss of income for caregivers when they have to take care of ill family members or when they are unable to work due to illness, and disrupted school attendance for children when they fall ill. Schooling is also disrupted when schools are ordered to close due to poor sanitation facilities.

"Schools, with environmental contamination, are closed by the public health officers." (Key Informant Interview (KII), Homa Bay)

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

Infant feeding practices: Mothers of the 26 children in the sample who were aged below six months were asked questions regarding their feeding practices. Morbidity related to diarrhoea is lowest in exclusively breast-fed children, higher in partially breast-fed children and highest in fully-weaned children. The findings show that most of the mothers (60%) in both cases were exclusively breastfeeding (Table 3). Only two children were on mixed feeding and 7 on supplementary feeding. The study did not find a clear link between infant feeding practices and the child having diarrhoea, as illustrated in Table 3.

Table 3: Breastfeeding and link to diarrhoea

Breastfeeding Status	Total		Controls		Cases	
	n	%	n	%	n	%
Exclusive	17	65.4	8	61.5	9	69.2
Supplementary feeding	7	26.9	4	30.8	3	23.1
Mixed feeding	2	7.7	1	7.7	1	7.7

Household nutrition practices

About half of the households in the study sample grew their own food, while the others bought it. Among the control households, 46.5% produced their own food while 50% purchased it. Among the case households, 50.6% produced their own food and 47% purchased food. There are no clear differences in the source of family food among the two categories of households, and no clear link to having a child with diarrhoea. In nearly all the households (90% in the controls and 89% in the cases) the members took three meals a day. In both control and case households, the most commonly eaten food was cereals (99% of both types of households), dark green leafy vegetables and other locally available vegetables, without any significant differences between the groups.

About 22% of the households in the control group and 26% in the case group reported having reduced the number of meals their members ate per day. Thirteen percent of the control households and 15.7% of those in the case category reported that family members had skipped eating for an entire day. In about 15% of the control households and 18% of the case households, the respondents reported that there had been restriction of food consumption by adults to allow more food for the children. Slightly more households in the case group (11.4%) reported having sent a member of their family to eat elsewhere (due to inadequate food) in the past month, compared to 9.4% among the controls.

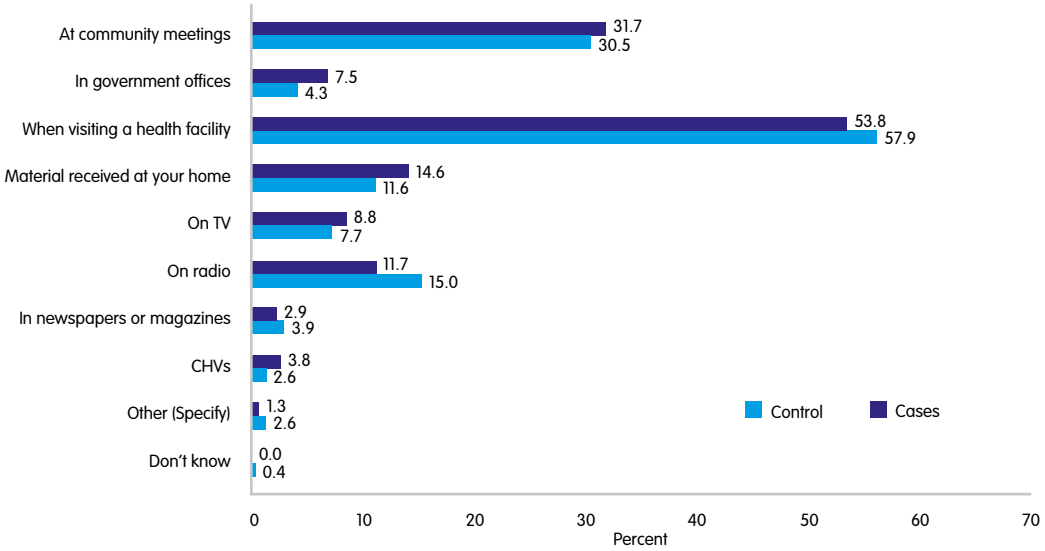
Exposure to sanitation messages and information: Household respondents were also asked questions to gauge their exposure to common sanitation and hygiene messages. About 70% of the respondents in both groups had heard messages on washing hands with soap, treating drinking water and using latrines or otherwise stopping open defecation. Overall, more respondents in the control group had heard messages related to sanitation than did those in the case group, which suggests that exposure to these messages has a link with a child having diarrhoea (Table 4).

Table 4: % of respondents that heard sanitation messages in the last year

	Total		Controls		Cases	
	n	%	n	%	n	%
Seen, heard or received messages or materials on sanitation and hygiene last year						
Yes	350	74.0	184	79.0	166	69.2
No	123	26.0	49	21.0	74	30.8
Sanitation and hygiene messages seen, heard or received						
Build a latrine	166	35.1	87	37.3	79	32.9
Latrine use / stop open defecation	223	47.2	113	48.5	110	45.8
Safe disposal of infants' faeces	143	30.2	72	30.9	71	29.6
Wash hands with soap	281	59.4	144	61.8	137	57.1
Treat drinking water	260	55.0	140	60.1	120	50.0
Wastewater management	64	13.5	37	15.9	27	11.3
Proper solid waste disposal	112	23.7	59	25.3	53	22.1
Other	17	3.6	11	4.7	6	2.5
Don't know	0	0.0	0	0.0	0	0.0

Most of those that had heard sanitation-related messages in the previous year heard them when visiting a health facility or at a community meeting (Figure 6).

Figure 6: Where respondent saw, heard, or received sanitation messages

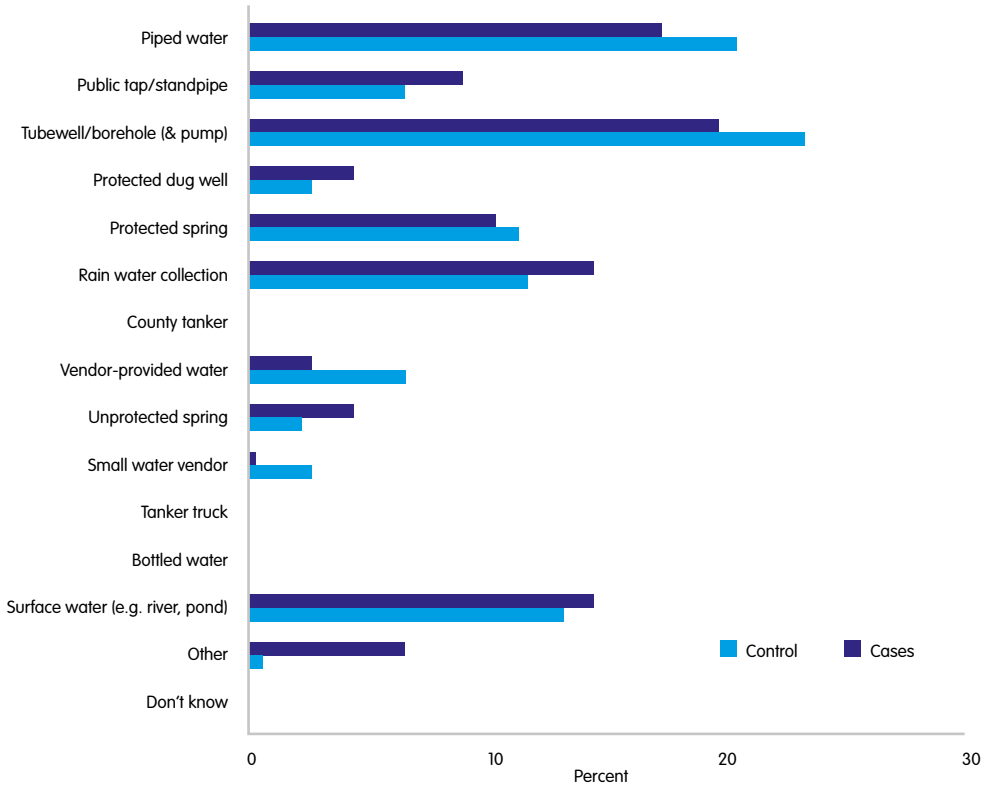


Quality of household water

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 study findings show a clear link between household source of water and a child having diarrhoea. More households in the control group used protected water sources than those in the cases group (Figure 7). For instance, while 22% of the control group households used piped water, only 16% of those with a case child did so. In addition, slightly more case households used surface water (14%) and unprotected springs (4%) than did control households (13% surface water and 2% unprotected springs). The majority of the families used the same source of water all year round (76.4% controls and 77% cases). For over half of the households in both categories, the water source was less than 500 metres (15 minutes) away from the home. Over 80% of the households in both categories stored their drinking water in a closed container or jerry can.

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



Households were also asked about treatment of water before drinking. Households that treat water are less likely to experience diarrhoea incidences. The results show that most households used chlorine to treat their drinking water, with more of the case families reporting using chlorine (67.5%) than controls (60%) (Table 5). About the same proportion of households in the two groups said they boiled their water before drinking (18.9% controls and 19.6% cases). Other methods used to a lesser extent included pot-filtering, straining through a cloth and leaving the water to stand and settle.

Table 5: Household water treatment

Do you do anything to your water before drinking?	Total		Controls		Cases	
	n	%	n	%	n	%
Chlorination	302	63.9	140	60.1	162	67.5
Boiling	91	19.2	44	18.9	47	19.6
Pot filter	49	10.4	20	8.6	29	12.1
Strain through a cloth	14	3.0	6	2.6	8	3.3
Solar disinfection	0	0.0	0	0.0	0	0.0
Traditional herb	1	0.2	0	0.0	1	0.4
Let it stand and settle	36	7.6	23	9.9	13	5.4
Nothing	94	19.9	52	22.3	42	17.5
Other?	0	0.0	0	0.0	0	0.0
Don't know	0	0.0	0	0.0	0	0.0

Tests conducted on the household water collected during the study indicated that the water used for drinking was contaminated as shown in Table 6.

Table 6: Household water sampling results

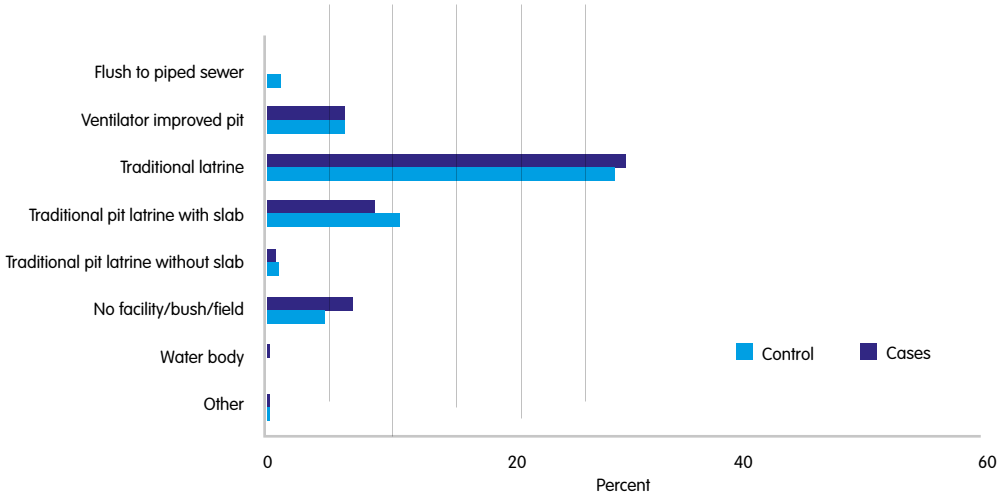
Test result for E. coli	Kericho	
	n	%
Negative	18	36
Positive	32	64

Caregivers' hygiene habits

Hand washing is a key health behaviour, crucial in attaining better health. The hygiene habits of a child's caretaker are important factors in eliminating the risk of diarrhoea. This is more so in regard to washing hands with soap after toilet use and before eating or feeding the baby, because these are the critical times when the likelihood of transmitting germs to the child is high. The results show that there may be a link between the caregivers' hand washing habits after toilet use and the child having diarrhoea, with slightly more caregivers in the control group washing hands with soap than those in the case group.

Asked about hand washing in the 24 hours before the survey interview, the majority of the caregivers said they washed hands after using the toilet, with more caregivers in the control group washing hands (94.8%) than those in the case group (86.6%). More caregivers in the control group also reported washing hands before cooking (66%) than in the case group (60%). Only 35% of the caregivers in both groups washed hands after taking a child to the toilet, suggesting that children's faeces may not be associated with a hygiene risk by this community.

Figure 7: Caregivers' hand washing habits



A physical check by the study team revealed that about half of the households reporting washing hands after using the toilet had a mobile hand washing facility (jug or kettle), but in 11.6% of those in the control group and 15% of those in the cases category, no such facility was observed. Caregivers were also asked if they used soap or other detergent in washing hands after toilet use. While the majority reported that they used soap and water, slightly more caregivers in the control group did so (73.8%) than in the case group (68.3%). Further, more caregivers in the case group reported using only water (20.8%) than in the control group (18.5%).

Table 7: Caregivers' use of detergent in hand washing after toilet use

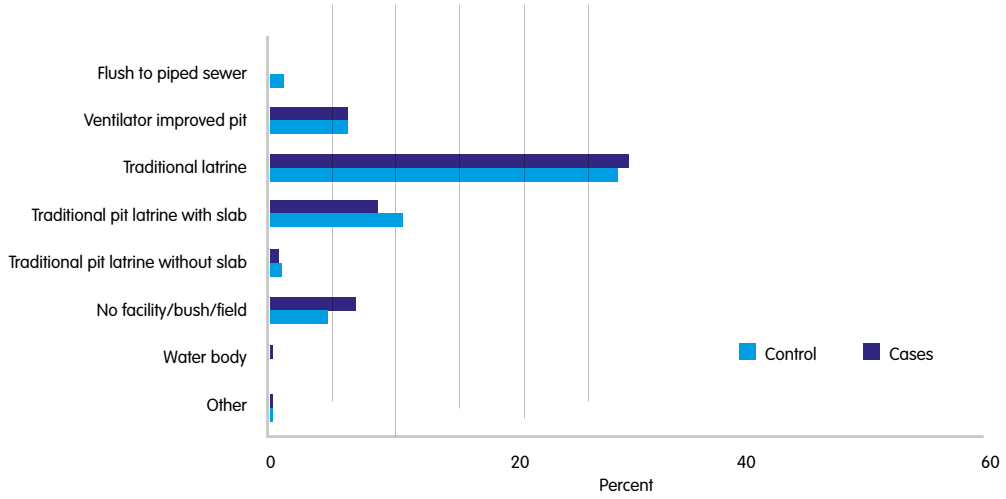
What was used to wash hands?	Total		Controls		Cases	
	n	%	n	%	n	%
Only water	93	19.7	43	18.5	50	20.8
Soap and water	336	71.0	172	73.8	164	68.3
Soap when I can afford it	41	8.7	17	7.3	24	10.0
Traditional herb	0	0.0	0	0.0	0	0.0
Other (Specify)	3	0.6	1	0.4	2	0.8

However, a physical inspection by the study team of the hand washing facilities during the visit did not find any soap or other detergent present in over 90% of all the households where the caregiver reported washing hands with soap after toilet use, suggesting that despite what they reported, most households use water only to wash hands after toilet use, which is inadequate.

Type of sanitation facilities used by the households

Respondents were also asked about the type of toilet facilities that the family used. The results show that most of the households in both groups used unimproved sanitation facilities (traditional pit latrine) and that more case households practiced open defecation (13.3%) than controls (9%), suggesting a strong link with the child having diarrhoea. Very few households reported being connected to the sewerage system and with a flush toilet, and these that did were only from the control group (2%).

Figure 8: Type of sanitation facility used by sample households



Discussions with the community members revealed that there is limited availability of connections to the sewerage system in towns, with none in the rural areas.

"No. We don't have that many people to be connected to the sewer network." (KII, Homa Bay)

Some groups reported using onsite septic tanks and soak pits.

"We have our own private sewer i.e. a septic tank and a soak pit where a pour flush type toilet is directly connected."

Some of the barriers to connection to the sewerage system identified by the community include costs associated with the connections, which were seen as expensive, and lack of water.

"We don't have water here so can't afford to have such types of toilets. They are meant for cities and the rich people, not us."

Other reasons included having the option to construct septic tanks, low demand due to low population requiring the sewer system and a perceived lack of prioritisation of sewer networks by the county government.

The result also show that a large proportion of the households used shared toilets, with only about a quarter of households having their own toilets in both groups. About 47% of the households having a toilet in the control group and 48% in the case group reported sharing a toilet between two households and about 23% in both groups were sharing a toilet with three or more households. Slightly more households in the control group (28%) had their own toilet compared to 25% in the case group.

Disposal of faecal waste

Respondents were also asked about how the household disposed of children's stools. The findings indicate that to a large extent, most families in both groups disposed of the stool in the toilet (64.4% of the controls and 61.3% of the cases). Although small in proportion, slightly more households in the case group left a child's stool in the open (5.4% compared to 3% in the control) or rinsed it off in a ditch or drain (7% compared to 3% in the control).

Table 8: Household management of children's faecal waste

	Total		Controls		Cases	
	n	%	n	%	n	%
Aware that child stool is harmful						
Yes	363	76.7	175	75.1	188	78.3
No	90	19.0	50	21.5	40	16.7
Don't know	20	4.2	8	3.4	12	5.0
What was done to dispose of the child stools						
Child used toilet or latrine	63	13.3	37	15.9	26	10.8
Put or rinsed into toilet or latrine	297	62.8	150	64.4	147	61.3
Buried	29	6.1	11	4.7	18	7.5
Thrown into garbage	32	6.8	19	8.2	13	5.4
Put or rinsed into drain or ditch	24	5.1	7	3.0	17	7.1
Left in the open	20	4.2	7	3.0	13	5.4
Other	1	0.2	0	0.0	1	0.4
Don't know	7	1.5	2	0.9	5	2.1

The household respondents were asked how they managed filled up toilets or septic tanks. The findings indicate that the community under study did not appear to have a problem of toilets filling up. In over 80% of the households, the respondents reported that the toilet had never filled up (84.6% controls and 80% cases) and never overflowed (76.5% controls and 90% of cases). Of the small proportion of households reporting that the toilet ever overflowed, most said it overflowed due to a storm or surface water. Of the 37 households that reported ever having a toilet that filled up, 64.7% in the control group and 75% in the case group had the toilet closed up, while 23.5% in the control group and 25% in the case group left the toilet to dry or subside, then resumed using it.

In the focus group discussions, participants said that the families in the community abandoned filled up toilets and built new ones or waited for them to subside then re-used them.

"In this place where we live, it is so dry, so toilets don't get filled up easily. But when they get filled up, we bury it and dig another one."

Only a total of 13 households in both groups reported ever having to empty their filled up toilets or septic tanks in the past one or two years (four in the control group and nine in the case group). Informal providers or individual pit emptiers emptied the toilets in 8.3% of the control households and 21.4% of the case households, as illustrated in Table 9. The most used method of emptying was hands, buckets or other manual means in both groups.

Table 9: Who emptied the filled up pit latrine or septic tank?

Who did the emptying?	Total		Controls		Cases	
	n	%	n	%	n	%
Member of household	5	9.6	1	4.2	4	14.3
Informal provider (individual)	8	15.4	2	8.3	6	21.4
Formal provider (company / NGO)	3	5.8	1	4.2	2	7.1
Formal provider (utility)	6	11.5	6	25.0	0	0.0
Others (specify)	30	57.7	14	58.3	16	57.1

The results show that a significant proportion of the faecal sludge from the emptied toilets and septic tanks was unsafely disposed of, and in about 42% of the cases, it was emptied directly into a water body or open field or disposed of in a pit in the compound that is left open (20.8% of the control households and 10.7% of the cases), contributing to environmental contamination. Slightly more households in the control group (37.5%) disposed of the sludge in a pit that was then covered than those in the case group (32%).

Table 10: Disposal of faecal sludge from emptied toilets

What toilet was emptied into	Total		Controls		Cases	
	n	%	n	%	n	%
Directly into drain / water body / field	22	42.3	10	41.7	12	42.9
Into a pit on the compound that then covered	18	34.6	9	37.5	9	32.1
Into a pit on the compound that is left open	8	15.4	5	20.8	3	10.7
Directly into drum or other open container	2	3.9	0	0.0	2	7.1
Directly into machine or tanker	2	3.9	0	0.0	2	7.1

"Here, issues of toilets are a big problem. Most of us use bushes, they are adequate and private."

Participants in the focus group discussions also revealed that some households do use manual emptiers when the toilets fill up.

"Some people who don't have adequate land hire manual emptiers who transfer the sludge into another pit adjacent."

There was concern expressed in the FGDs that pit emptiers and some exhauster services dispose of the faecal sludge into the environment, rather than transporting it to a treatment plant.

"First, we see them pouring the waste just next to the toilet – the black, thick liquid. Our children can drown in it."

"Such unscrupulous disposal of faecal sludge may lead to disease outbreaks in the estates, especially when it rains."

An analysis of faecal sludge management in Homa Bay County also reveals that over half of the faecal sludge in the county (52%) is unsafely managed or disposed of, resulting in significant amounts of excreta ending up in the environment, polluting water sources (Note. Validation of county faecal sludge management is ongoing and will be detailed and published as a Shit Flow Diagram Report). The analysis shows that only 8% of the waste is collected through the formal sewerage system, but due to leakages only 6% ends up in the treatment plant. An estimated 44% of the faecal waste is contained in onsite facilities (pit latrines and septic tanks) and most of it (42%) remains on site, with a small 1% emptied and transported to the treatment plant. Thirty-nine percent of the faecal waste is disposed of in the open. Only 48% of the sludge is contained safely through on- and off-site sanitation facilities.

The discussions with community members in the FGDs explored why open defecation is so common in the communities. The findings show that there are several reasons, which include lack of resources to construct appropriate toilets. The ones they have are poorly constructed, smelly and unsafe to use, so family members sometimes use open areas.

"Most of the homesteads cannot afford to construct a modern one so they just thatch the mud-walled pit latrines."

Others practice open defecation at night and when out in the fields or away from home when it is difficult to access a proper toilet.

"[Open defecation is] mostly used by poor families and also during emergencies at night."

"When you are on the farm, do you need to run home for a long call?"

There were other participants who thought that people use the open fields and bushes just because they are convenient.

"Some just use the bush directly. Especially passers-by and drunkards."

"Mostly people do it in the bush or in water. You see, the reeds along the beach is the best place, though there are a lot of snakes and at times crocodiles living there."

"The majority of us use the bush, because there are a lot of bushes here, that's why you can see we have a lot of guava trees everywhere."

It was also reported that some households gave up constructing toilets because frequent flooding of their locality laid to waste their efforts.

"I built a beautiful latrine last year, cemented it well and finished the internal and external walls with cow-dung. When it rained heavily, the floods of River Oluch swept it away. Nowadays we fear building another one."

"Here, there are usually heavy rains. The soil is black and bad. It is called clay soil. If you build a pit toilet it will fall down during the heavy rains. Some sink, others are carried away by wind. We are tired or constructing latrines and then tomorrow it is gone."

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

The study results show that poor sanitation is linked to social discrimination and exclusion of some groups in Homa Bay County, as a result of their inability to have or to use proper sanitation facilities.

"Every home should have a latrine, those without are discriminated against."

Among those who suffer social exclusion and discrimination are the poor, who may lack the means to construct toilets to an acceptable standard, or any at all. Also excluded are the elderly, who may not be able to squat to use the conventional pit latrine and small children, who cannot use the pit latrine because of great risk of falling in.

"Small children defecate in the compound even in homes with latrines since they are not trained on how to use them."

"On the issue of latrine construction, we don't have the knowledge and skills about how to construct latrines for the disabled. If we get good friends like you people, you can give us ideas or even build for us one," a FGD participant said, amid laughter and applause.

The household survey found that only about half of the households with toilets reported that people living with disabilities use them (58% among the controls and 54% among the cases). The survey also identified the following as some of the reasons and situations that may lead to discrimination and exclusion from using household toilets. As shown the in Table 11, the most common reasons for family members not using the household toilet revolve around cultural norms, accounting for around 8% in both groups.

Table 11: Reasons why some family members may not use the household toilet

	Total		Controls		Cases	
	n	%	n	%	n	%
Pregnant	6	1.27	1	0.4	5	2.1
Young children sharing with adults	3	0.63	1	0.4	2	0.8
Different gender not allowed to share	4	0.85	1	0.4	3	1.3
Insecurity or fear of violence	0	0	0	0.0	0	0.0
Long distance	1	0.21	0	0.0	1	0.4
High cost / not affordable	0	0	0	0.0	0	0.0
Cultural norms	38	8.03	18	7.7	20	8.3
Circumcised	1	0.21	0	0.0	1	0.4
Sickness	1	0.21	1	0.4	0	0.0
Menstruation	0	0	0	0.0	0	0.0
In-laws	2	0.42	0	0.0	2	0.8
Other	0	0	0	0.0	0	0.0

"We have some pit latrines but they are in very bad condition, there's no maintenance."

In the FGDs, it emerged that the social and cultural norms that contribute to social exclusion and discrimination of some groups are related to sharing of toilets. For instance, young, unmarried women cannot share latrines with fathers and old men and in-laws cannot share latrines, meaning they may not be able to use the household toilet.

"In our community, unmarried woman cannot share a latrine with her father. It is wrong."

Qualitative findings show that open defecation is still rampant in the county. This was attributed to a lack of latrines in the fields or along the roads, long distances between houses and latrines and a lack of latrines in market centres and social places such as churches.

"Here, toilets are a big problem. Most of us use bushes, they are adequate and private enough as compared to the latrines, which we don't money to construct and maintain."

The study also explored whether there are any security-related issues and fear of violence that may be linked to the use of sanitation facilities. The researchers asked if there were particular times that were most appropriate for household members to use the toilet and a little over half of all respondents in both groups reported that the toilet could be used any of the time. In some of the households (39% controls and 40.4% cases), the respondents reported that the most appropriate time was in the morning, suggesting some concern with security and convenience.

Table 12: Most appropriate time for most household members to use the toilet

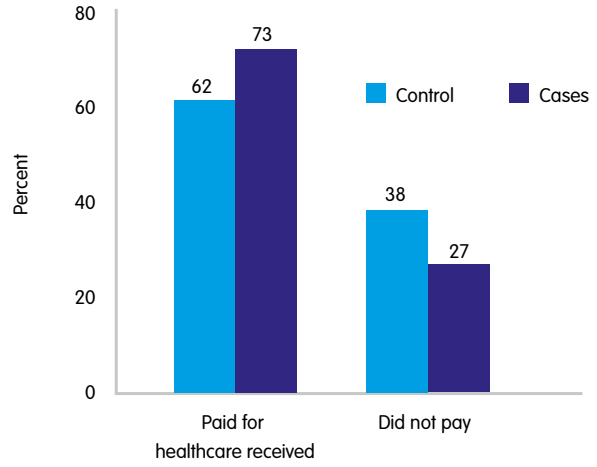
	Total		Controls		Cases	
	n	%	n	%	n	%
Morning	188	39.8	91	39.1	97	40.4
Afternoon	6	1.3	5	2.2	1	0.4
Evening	7	1.5	5	2.2	2	0.8
At night	2	0.4	1	0.4	1	0.4
All the time	270	57.1	131	56.2	139	57.9

CLTS triggering session

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

In Homa Bay County, most households paid money for healthcare treatment, although more case households (73%) paid for healthcare (in general) than those from the control group (62%).

Figure 9: Payment for healthcare



The data also shows that on average, the households in the sample had spent KSh 200/- 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 225/-.

Diarrhoea was reported, mainly by women, to bring disruption in the family. Children's care and feeding were reported to face massive disruption. During incidences when a mother has to be in and out of hospital or admitted to hospital, the responsibility for feeding the children was shifted to next of kin, including the husband or grandmothers. In addition, the education of the other children was often affected, as more time was focused on the sick child.

"When my child had diarrhoea, I was referred to the county hospital. I was admitted so left my children under the care of my mother in law." FGD women, Homa Bay

The loss of a baby after diarrhoea was described as a very devastating experience by most women. The loss of the baby was reported as not only painful but added additional costs related to the funeral.

"Some diarrhoea diseases leads to death of children. The cost of funeral is very expensive." FGD women, Homa Bay

3.5 Effects of poor sanitation on the environment

This study also examined the effects of poor sanitation on the environment, including water sources. The findings show that over half of the sampled households in Homa Bay were using water that was contaminated and unfit for human consumption. Laboratory tests show that 52% of the water samples collected from their water sources were contaminated with *E. coli*, a clear indication of contamination with faecal matter. Tests on samples of water collected from the local public sources of domestic water also show high levels of contamination by the same bacteria (*E. coli*), as shown in Table 13.

Table 13: Results of public water points test

Site sample taken	# E. coli (coliforms) in 100ml of untreated water	Comments and conclusions
Rangwe Subcounty River	6 (>1800)	Unsatisfactory for human consumption
River Kibwon Karachuonyo	6 (>1800)	Unsatisfactory for human consumption
Mbita Location Lake	4 (>1800)	Unsatisfactory for human consumption
Homa Bay Town Centre Tap	0 (>180)	Class IV- Unsatisfactory unless further treated

Participants in the FGDs identified contamination of water sources as a major problem in the county, affecting households and even businesses.

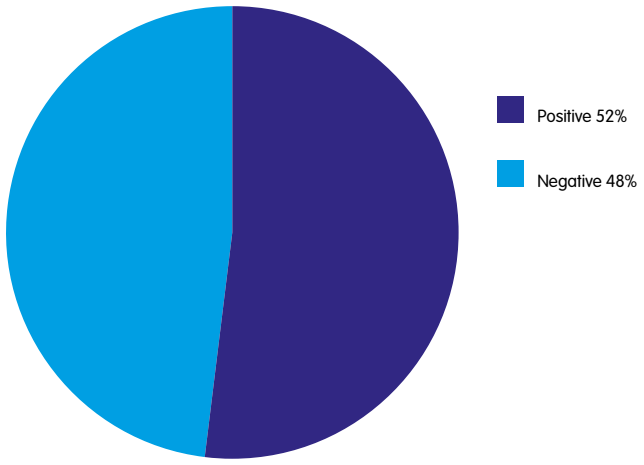
"Latrine leakages have been a big problem here. Imagine toilets leak out to the ground and when it rains it is carried away by surface run-off to the lake. Our water gets dirty and yet that's where we bathe. We drink that water you know."

"You can't even find a safe place to store and wash fish because the area especially inside the reeds are full of faecal matter."

Participants said that it is especially bad in the rainy season when rivers and ponds in the area are "always full of faecal matter and smelling bad when it rains because all … faecal matter is swept away."

The quality of water was tested in 42 households in the county. Over half of the household used water that was positive for *E. coli*.

Figure 10: Results of tests for E. coli in household water



3.6 Implementation of sanitation activities by Homa Bay County

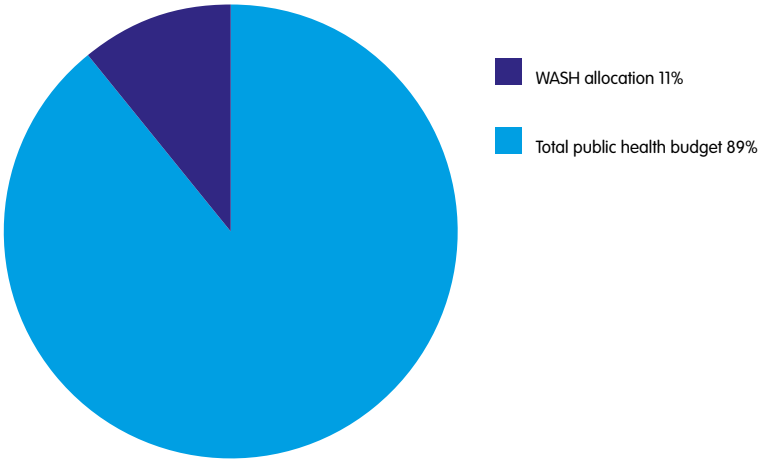
The County Integrated Development Plan (CIDP) reflects the strategic midterm priorities of the county governments. The CIDP contain specific goals and objectives, a costed implementation plan, provisions for monitoring and evaluation and clear reporting mechanisms.

In Homa Bay County, the bulk of sanitation related priorities are in the water and sanitation sector which include the following key issues:

- Design and rehabilitate the Homa Bay sewerage system and ensure all Homa Bay town residents are connected to the sewerage system by 2017 through expansion of treatment works and rehabilitation or extension of sewerage works
- Mobilise communities to set up toilet systems; enforce sanitation standard laws; implement laws to manage the environment by county government; and find effective ways to recycle waste material
- Prioritise investment in the sanitation budgets; capacity-build community members in project management for sustainability of water projects in the county; create awareness and enforce measures against water pollution through bathing, washing, effluent discharge and poor sanitary facilities at the beaches and near water sources, especially springs rivers and lake shores
- In the health sector, the sub-sector priorities, constraints and strategies mentions increasing funding for WASH activities including putting up public sanitation facilities at all strategic points.

Although the CIDP prioritises investment in the sanitation budgets, the county has allocated only 11% of the total public health budget to WASH activities.

Figure 11 : Allocation of public health budget



Other implementation challenges reported include: lack of toilets and poor hygiene in most restaurants, high poverty levels and normalisation of open defecation in Homa Bay County.

"People relieve themselves in the bush because most homes do not have toilets. When it rains, the waste is swept into River Riena which is the main river in the area."

"Most of the households can't afford a meal day, let alone own a toilet." (KII, County PHO)

"Communities living along the beaches do not own toilets, as they believe that lake is more reliable." (KII, County Health Management Team)

Since evolution, the county has developed polices to provide an enabling environment. This has included developing a sanitation action plan and targets, creating a county sanitation roadmap and programme operation structure. Additionally, the county has held a county WASH stakeholders' forum, formed sub-county and county WASH technical working groups and domesticated the prototype sanitation bill in readiness for improving sanitation and implementing CLTS.

The gaps reported in the current county policies include the need to address open defecation, mainly the resource mobilisation structure and developing technical guidelines and protocols for implementing WASH activities.

The Homa Bay sewerage system is operational but does not cover all urban areas. However, the county has been implementing best practice for WASH that includes (i) capacity building and mobilisation of communities and CLTS actors, (ii) construction on community sanitation facilities through the county's community strategy approach, and (iii) provision of water though the construction of dams and ponds.

The study sought to examine the trends of CLTS implementation. Based on data from the real-time monitoring system of the CLTS, only 481 villages have been triggered, 245 claimed, 123 verified and 60 certified.

Policies and Guidelines available

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

Table 14: CLTS summary for Homa Bay County

Indicator	Kabondo Kaspuil			Kaspul	MBITA		NDHIWA		Rachuonyo North		Suba		
	2016	2017	2018	2016	2016	2017	2016	2017	2016	2018	2016	2017	2018
Triggered	23	6	3	63	3	31	105	1	131	63	1	21	30
Claimed	16	2	3	28		-	38	1	63	63	1	-	30
Verified	15	2	-	18		-	30	1	46	10	1	-	-
Certified	8	-	-	17		-	3	-	30	2	-	-	-

The results show a poor performance of CLTS implementation. The data was further compared to results presented in the second Sanitation conference in 2017. In 2017, the number of triggered and claimed villages were higher than 2018.This could imply incomplete data entry into the CLTS system.

Figure 12a: ODF status as of February 2017

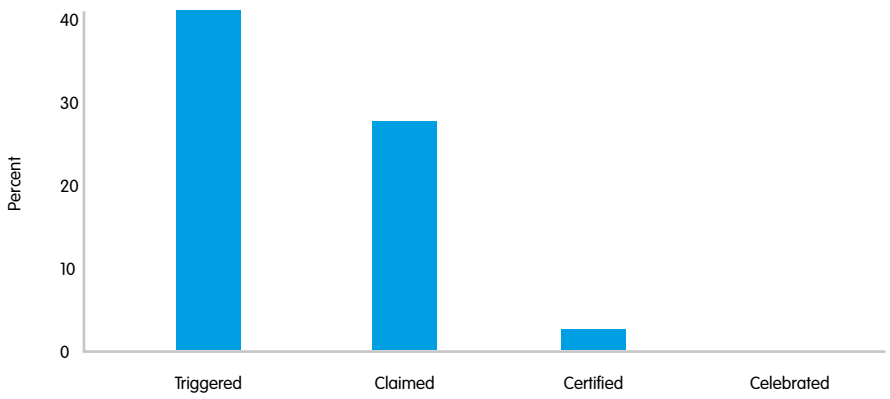
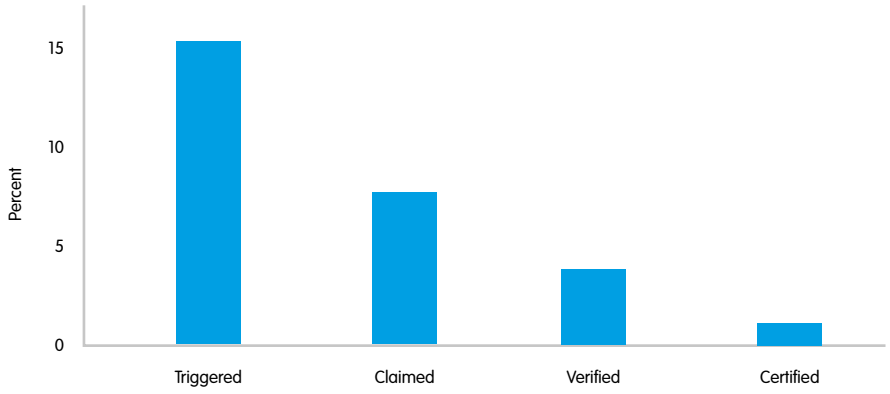


Figure 12b: Homa Bay County ODF status as of May 2018



Chapter 4: Conclusions and Recommendations

Inadequate access to improved water and sanitation facilities remains a major cause of health problems in Homa Bay, particularly in rural areas, where a lack of clean drinking water and unsafe sanitation practices are the main causes of diarrhoeal diseases among children under five. The negative health impact of contaminated water is worsening because most rural households only have access to drinking water from unprotected sources and they often consume the water without any in-house treatment.

The findings suggest that access to an improved drinking water source was low in the study areas and only 40% of the households had access to improved water sources. The household water sample test also indicated that the water used for drinking is contaminated, which is a significant problem in the county. Beside the fact that most of the improved water sources do not guarantee the water is safe for consumption, the problem of unsafe drinking water is exacerbated by contamination through unsafe water storage and handling practices.

In terms of sanitation, the study found that 87% of the households had simple pit latrines while 11% defecated in the open. Access to improved sanitation facility was virtually non-existent in the study areas. In some cases, these latrines did not have a proper structure and become dysfunctional for many reasons, including filling up, collapsing and flooding.

The study results suggest that the case households may be poorer than those in the control group. For instance, the control group makes more money per year than the case families. Also, more households in the case group (73.8%) had borrowed money, food or other items in the past month than in the control group (69%). In addition, slightly more case families made adjustments in their food to accommodate inadequate supply.

Diseases related to sanitation are common: the results show that besides malaria, sanitation-related illnesses were the most common reason the community sought treatment, and that case households bore a bigger burden of sanitation-related illness, compared to control households. In children, the results suggest that recurrent diarrhoea was common among the cases in Homa Bay. More of the children in the cases category had suffered diarrhoea two weeks before the survey (72.5% compared to only 16% among the controls).

A number of policy recommendations can be derived from the findings for implementation by the county government and partners. These can be summarised as follows:

- **Increase the coverage of improved water supply:** This can be achieved by developing new water points and upgrading existing unimproved sources. Improving access to clean water supply not only increases the quantity of clean water available for household consumption but also allows households to save a lot of time by reducing the distance between each household and the nearest water access point. The county should also adopt a water quality monitoring system which monitors a set of common water quality indicators, to ensure water supply schemes comply with quality standards.
- **Improve faecal sludge management in the county:** The results show that a significant proportion of the faecal sludge from the emptied toilets and septic tanks is unsafely disposed of, and in about 42% of the cases, it is emptied directly into a water body or open field or disposed of in a pit in the compound that is left open (20.8% of the control households and 10.7% of the cases). Slightly more households in the control group (37.5%) disposed of the sludge in a pit that was then covered than those in the cases group (32%). The county needs to address this and make provisions to support homes in safe disposal of faecal sludge.
- **Ensure children with diarrhoea receive appropriate treatment:** The results also show that a small number of children with diarrhoea did not get ORS and Zinc supplements, which are crucial to management of diarrhoea. Health facilities can improve how they monitor such children and perhaps link them with community health workers to ensure continuity of care.
- **Increase sanitation messaging/campaigns – giving comprehensive messages through a variety of appropriate channels and emphasizing on hand washing with soap:** Overall, more respondents in the control group had heard messages related to sanitation than had those in the case group, which suggests that exposure to these messages has a link with a child having diarrhoea. Most of those that had heard sanitation-related messages in the previous year heard them when visiting a health facility or at a community meeting. Translation of these messages to actual behaviour appears problematic, as many are still washing hands with water only: more caregivers in the case group reported using only water (20.8%) than those in the control group (18.5%). Therefore, public education campaigns should directly address hand washing with soap and the proper disposal of children's faeces. It should educate communities on the potential sources of water contamination, proper water treatment methods, safe disposal of faeces away from the domestic environment and good hygiene practices (such as hand washing with soap at critical times). These messages can also be integrated through the community health strategy programme.
- **Increase treatment of drinking water in the county:** The study findings show a clear link between household source of water and a child having diarrhoea. More households in the control group used protected water sources than those in the case group. Tests conducted on the household water collected during the study indicated that the water used for drinking was contaminated. Household water treatment and safe water storage should be promoted to address point of use water quality concerns. Increasing the provision of water supply alone may not be enough if households do not treat their water or practice safe water storage and handling.

- **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 Homa Bay County, as a result of their inability to have or to use proper sanitation facilities. Among those who suffer social exclusion and discrimination are the poor, who may lack the means to construct toilets to an acceptable standard, or any at all. The county government, with partners, should also address the social and cultural norms that contribute to social exclusion and discrimination of some groups, related to sharing of toilets, and security issues that limit use of the toilet to daylight hours.
- **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.

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 100C 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 Homa Bay County - A Geospatial Analysis

Poor Sanitation is Key Contributor to Diarrhoea in Children in Homa Bay County (Poster)

F-Diagram - Homa Bay County

Homa Bay County Shit Flow Diagram Report

Further information

Contact: SNV Kenya Country Office Ngong Lane, off Ngong Road Nairobi, Kenya

Tel.: +254 724 463355

Email: kenya@snv.org

SNV