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Association of Community Led Total Sanitation to Reduced Household Morbidity in Nyando District

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Abstract

Around 1.1 billion people worldwide practice open defecation, posing hazards to health and personal security. It is estimated that 30% of Kenya's disease burden is sanitation-related. Improved hygiene practices by communities, including the use of sanitary toilets, can effectively break this cycle of disease transmission and reduce the disease burden by as much as 50 percent. Open-field defecation and the failure to confine excreta safely are primary factors that contribute to the spread of disease through the fecal-oral transmission of pathogens.

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The purpose of the study was to investigate the association of CLTS to the reduced household morbidity in Nyando District. Descriptive statistics was used to assess the diarrhea prevalence, knowledge, uptake and practices on CLTS;Chi-square test was used to compare proportions between control and intervention sites. Association between CLTS and diarrhea occurrence was done using binary logistic regression where diarrhea occurrence was the outcome and CLTS or non CLTS sites were the independent variables. Odds ratio with 95% confidence intervals was used to measure the risk of diarrhea morbidity, P value < 0.05 denoted significant results. Statistical analysis was done using SPSS version 16. The study adopted a comparative cross sectional study design comparing the disease prevalence of households within intervention sub location of Kochogo Central where CLTS was implemented and the disease prevalence of households within non intervention sub location of Wang'ang'a where CLTS has not been implemented. A total of 305 household heads or proxies (102 interventions and 203 non interventions) were interviewed and data on number of cases of diarrhea, cholera and bilharzia that any member of the household had experienced in the prior 6 months before the survey was collected.

A total of 224 household heads (90 interventions and 134 non interventions) were interviewed with a total population of 1367 persons (563 in the intervention and 804 in the control site) and data on number of cases of diarrhea cases that members of the household had experienced in the prior 14 days before the survey was collected. Overall 47.3%of household members still defecated in the open the previous day (6.7% in intervention site compared to 74.6% in the control site, p<0.0001. Although all households in the intervention sites were aware of CLTS program, only 20.9% were aware of CLTS in the control sites. Overall two-week prevalence of diarrhea was 17.4% with 11.1% in the intervention site compared to 21.6% in control site.

The risk of diarrhea, cholera or bilharzia was significantly lower in CLTS households compared to control households. Similarly, the mean number diarrhea episodes was lower in CLTS households compared to control households in the prior six months to the survey.

As part of Policy, CLTS be rolled out in all the rural and urban areas in Kenya since it has shown to be significantly associated with reduction in diarrheal morbidity so that Kenya can be an ODF zone by 2030. CLTS maximizes the community members` inherent potential through small doable actions that helps them realize utmost health benefits through their own initiatives.

Keywords: Diarrhea; CLTS, Self-Analysis; Communal Action; Local Solutions; Local resources; shame; disgust; fear.

1. Introduction

As sanitation remains one of the biggest development challenge in developing countries, it is estimated the around 6,000 people, mainly children under five, die every day due to poor sanitation, hygiene and water. Sanitation-related diseases such as diarrhea and cholera continue to seriously undermine human health and well-being. Hence improving sanitation is key to achieving the health-related Millennium Development Goals (MDGs) of reducing child mortality and combating disease [2].

Decades of large-scale programs from outside imposed on the local context have failed to change poor sanitation practices. The concept of CLTS emerged from Bangladesh by Dr kamal Kar in early 2000s [3]. This has been found to be an innovative way of achieving open defeacation free communities. It is meant to change people's behavior by shifting mindsets to focus on their desire for, and triggering them to build a sanitation system themselves. It is a participatory approach to traditionally subsidized sanitation programs that have not succeeded in getting people to want, build, pay for, and use latrines [4]. The approach promotes 100% open defecation free communities to minimize the risk of contamination for all, breaking the cycle of fecal-oral contamination. Contrary to most conventional sanitation approaches which aim simply at only providing toilets [5; 6], CLTS aims to promote collective behavior change as the key to sustainable, improved sanitation [7].

In Kenya, it was introduced in May 2007, following two training workshops in Tanzania and Ethiopia which three of Plan Kenya WATSAN staff attended and has now been rolled out in all 8 Development Areas (comprising 14 districts) where Plan operates [8]. The first Open Defecation Free (ODF) village was Jaribuni in Kilifi District in November 2007 while others include Homa Bay (Manera village), Nyando (Kochogo village). In Nyando the concept was introduced in September, 2008 but it had a slow start due to lack of funds for training the master trainers who could trigger the community into implementing CLTS. That notwithstanding Kalwande village of Kochogo Location went ahead to attain ODF status and celebrated on 19th April 2010. However, no study has been done to show the association between Community Led Total Sanitation (CLTS) and the Reduced Household Morbidity in the whole of Nyando District. Hence this study only looked at open defeacation as a behavior with shame and disgust as an intervention, it was only limited to the rural population. This is why this study was conceived.

It is estimated that 30% of Kenya's disease burden is sanitation-related. Improved hygiene practices by communities, including the use of sanitary toilets, can effectively break this cycle of disease transmission and reduce the disease burden by as much as 50 percent [1].

2. Methods & Materials

Nyando district is one of the districts in Nyanza province curved from Kisumu district. Geographically, Nandi lies in North, while Kericho lies east. To the south lies Nyakach, Kisumu in west and Lake Victoria to the south west. The district has one division in an area of approximately 1168.4 square kilometers, and a population of 84,849 projected from Figureures of 1999 census.

This study adopted comparative cross sectional study design [9,10] where data from intervention areas was compared to those from a control area.

The interventions were households within a sub location where CLTS was implemented as a sanitation approach while households from a sub location where the CLTS was not implemented regardless of whether they suffered diarrhea or not acted as controls. CLTS as an intervention targeted all household living within a particular sub location and all households were considered to be exposed to the intervention while all households in sub-location where intervention was never implemented were considered as not exposed. Kochogo Central was an

intervention village while Wang'anga acted as control. In this study exposure histories of cases and controls helped to learn about exposure-disease relationship. The occurrence of disease episodes was investigated retrospectively for the prior 6 months before the survey.

Comparative cross-sectional study was carried out on 199 households in the control site and 101 households in the intervention site.

The total sample size of 300 households was divided using a population proportionate to size (PPS) using the ratio of number of households in each site. There were about 888 households in total, the number of households in the control was 591 and the intervention was 297.

The distribution of sample size is described in table 3.1 below. In the end 190 households in the control site and 101 in the intervention site were included in the study.

A list of all households in the study area was obtained from community health workers. A simple random sampling technique was used to select the required sample size from each of the two areas. The community health workers helped the research team to identify the selected households for interviews.

3. Data Management and Analysis

Data was checked for completeness, errors and inconsistencies. The data was in the custody of the researcher to ensure safety and confidentiality of the information. Entry was done in Statistical Package for Social Sciences (SPSS) version16.

Prevalence of disease was determined using descriptive statistics.

To determine the association between CLTS and household morbidity, a binary logistic regression model was used whereby the dependent variable was binary (whether a household has experienced disease in the prior six months or not). Odds ratio with 95% confidence level was used to measure association.

Further analysis was done to compare the mean number of disease cases between the intervention and control households using an independent sample t test assuming normal distribution of the number of disease cases. A p value < 0.05 was considered statistically significant result.

4. Results

4.1 Characteristics of the study population

4.1.1 Socio demographic profile of study population

Table 1 below is a summary of socio demographic characteristic of the study population. A total of 291 households participated in the study out of which 101 (34.7%) were enrolled from Kochogo Central which was an intervention sub location and 199 (65.3%) were from Wanganga a control sub location. Of the household

heads interviewed, 47.1% were males while the rest were females.

All (100%) households in the intervention community owned a toilet while only about 37.9% (77/203) households in the control sub location owned toilets. The latrine ownership and use stood at 60.3% (135/224) overall coverage in both the intervention and the control sub locations.

Table 1: Socio demographic profile of Study population

N=291	**Overall**	**CLTS Community**	**Non CLTS Community**
	% (N)	**101(34.7)**	**199 (65.3)**
Gender of head of HH			
Male	137(47.1)	48(47.5)	89(46.8)
Female	154(52.9)	53(52.5)	101(53.2)
Education level			
None	49(16.8)	13(12.9)	36(18.9)
Primary	167(57.4)	61(60.4)	106(55.8)
Secondary	61(21.0)	21(20.8)	40(21.1)
Tertiary	14(4.8)	6(5.9)	8(4.2)
Occupation			
Farmer	68.0 (157)	89(88.1)	68(35.8)
Fishmonger	9.09 (21)	0(0)	21(11.1)
Shop keeper	6.49 (15)	3(3.0)	12(6.3)
Salaried	6.49 (15)	5(5.0)	10(5.3)
Not employed	10.0 (23)	2(2.0)	21(11.1)
Toilet Ownership			
Yes	178(61.2)	101(100.0)	77(40.5)
No	113(38.8)	0(0)	113(59.5)

Table 2: Latrine Ownership

N=224	Overall n (%)	CLTS House holds n (%)	Non CLTS House holds n (%)	P value
Latrine Ownership				
Yes	135(60.3)	90(100.0)	45(33.6)	<0.0001
No	89(39.7)	0(0.0)	89(66.4)	

4.1.2 Comparison of prevalence of household morbidity between CLTS and Non CTLS households

Figure 1 below shows the difference of proportions of disease occurrence between CLTS and non CLTS communities. The result indicates that there were significant disease incidence differences in households living in the CLTS and non CLTS study areas. Amongst CLTS households, 14.9% suffered diarrhea compared to 60.5% in non CLTS

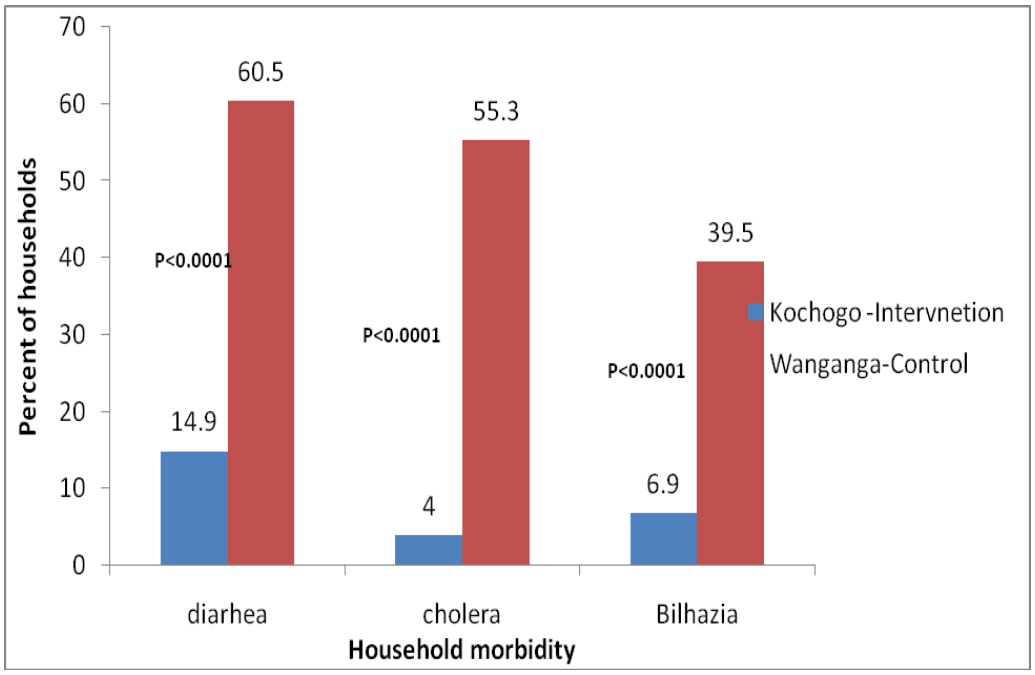

Figure 1: Comparison of prevalence of household morbidity between CLTS and Non CTLS households

4.2 Prevalence of Diarrhea in Nyando district

Table 3 below is a summary of number of diarrhea episodes and prevalence rates. During the period of the survey, 237 episodes of diarrhea cases were reported representing 17.4% 2 week prevalence amongst 1367 persons surveyed; only 63 episodes of diarrhea (11.1%) were reported amongst 563 persons in the interventions

sites, while 174 diarrhea episodes representing 21.6 % of 804 persons were reported in the control areas. The difference were statistically significant (p=0.042).

Table 3: Prevalence of Diarrhea in Nyando district

	Number of households	Number of persons	Diarrhea episodes	% prevalence	P value
Kochogo Central	90	563	63	11.1	0.042
Wanganga	134	804	174	21.6	
Total	224	1367	237	17.4	

4.3 Comparing mean number of disease cases between CLTS and Non CLTS Villages

Table 4 below shows the summary of an independent sample t -test conducted to compare the differences in mean number of disease cases experienced by households in both CLTS and non CLTS study areas. The result indeed that there were significant differences in diseases cases between CLTS and non CLTS households for diarrhea and cholera but not bilharzias. CLTS household experienced a mean of 2 diarrhea cases

Table 4: Mean number of disease cases between CLTS and non CLTS households in Nyando

	CLTS Households (Mean ± SD)	**Non CLTS households (Mean ± SD)**	**P value***
Diarrhea cases	2.0 ± 1.5	6.0 ± 3.8	<0.0001
Cholera cases	1.7 ± 1.5	4.3 ± 2.3	0.008
Bilhazia cases	1.4 ± 2.2	2.2 ±1.2	0.118

* Results from independent sample t test

4.4: Association between CLTS adoption and reduced household morbidity in Nyando district

Table above shows results from the binary logistic regression model comparing association between CLTS

adoption and non adoption and the occurrence of disease cases amongst households. Crude odds ratio indicate association before adjusting for potential confounding factors while adjusted Odds ratio indicate the ratios after.

Table 4: Association between CLTS adoption and reduced household morbidity in Nyando district

	CLTS Households (N=101)	Non CLTS Households (N=182)	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)*	P value
Diarrhea	14.9 (15/101)	63.2 (115/182)	0.1 (0.05-0.19)	0.6(0.4-0.8)	<0.0001
Cholera	4.0 (4/101)	58.7 (105/179)	0.07 (0.03-0.17)	0.7 (0.5-0.96)	<0.029
Bilhazia	6.9 (7/101)	45.2 (75/166)	0.09(0.04-0.20)	1.2 (0.9-1.6)	0.118

4.5 Knowledge of households on CLTS

The study sought to establish level of knowledge of CLTS amongst households. The households were asked if they were aware of CLTS which was meant to establish their knowledge of CLTS. The result indicated that overall, 52.2% (118/224) of the households were aware of CLTS. The level of awareness of CLTs was significantly higher in interventions site where 100% of households are aware of CLTS compared to only 20.9% of those living in the control sites ($p<0.0001$), Figure 2 below.

4.6 Discussions

When the government of Kenya initiated community led total sanitation in Nyando District in 2008, the primary goal was to minimize sanitation and hygiene related morbidity at the household level. The study established that uptake of CLTS was significantly high in the intervention sites with most households having knowledge on indicators of CLTS as compared to those living in the control sites. They also reported almost nil members of their households defecating in the open as compared to the control sites. Even though some household's members still defecated in the open as reported by household heads especially from the control sites; these findings demonstrate that overall uptake still lower than the expected. These findings confer with a comparative study in rural Cambodia on the'Characteristics of Household Sanitation Use and Demand in CLTS and non-CLTS Villages'; where it was found that 46.2% of the CLTS adopters constructed and used latrines consistently as compared to 15.3% 0f the non-adopters, in terms of ownership. The study concluded that CLTS helps to prime the community to demand for sanitation though sustainability largely depends on the type of sanitation product [11].

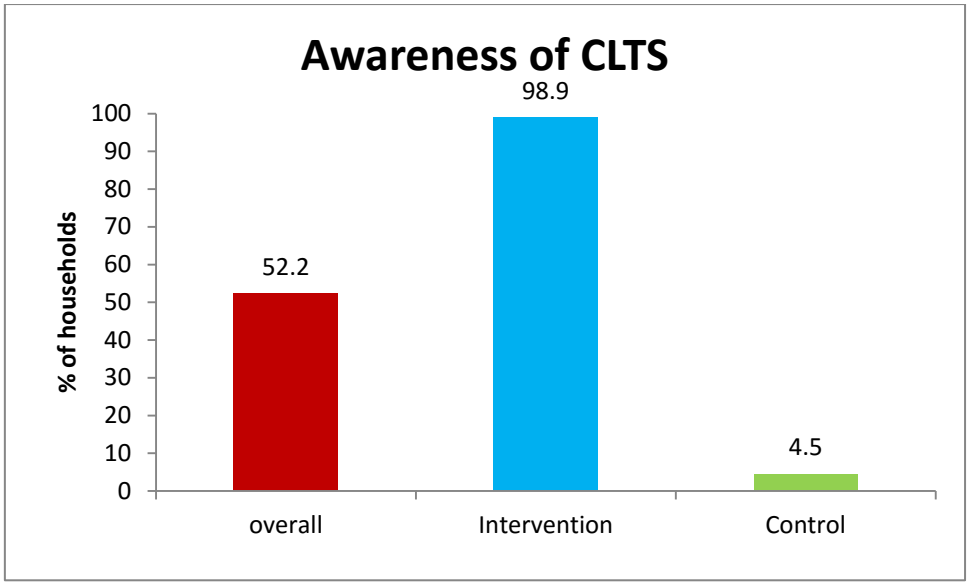

Figure 2: Awareness of households on CLTS

These findings are consistent with the findings of a study carried out in Indonesia on Improving CLTS from a Community Perspective Approach, which found that CLTS results were also primarily recognized and seen in terms of 100% toilet coverage than the end of open defecation both by the communities and implementing agencies at the district level. 100% latrine coverage and end of open defecation are almost universally assumed to be directly linked to recognizing ODF communities and recommending them for their effort by the district administration. This study contradicts Sumedang village, where 80% toilet coverage is reported to be considered good enough for claiming open defecation free (ODF) status for the villages. While in MuaraEnim village, less than 100% toilet coverage coupled with sharing of toilets but with no open defecation is good enough to be declared ODF village, contrary to Lembata village where verification has to be 100% [12], all which is constitutethe CLTS approach and methodology.

The study established that the overall two-week prevalence of diarrhea in the study area was 17.4%. The comparison between prevalence of diarrhea between CLTS and Non CLTS indicated that households in CLTS intervention areas experienced less diarrhea compared to households in the control site. This confirms findings of a study done in Nyando in 2008, where diarrheal disease was found to be a major cause of morbidity and mortality among under-fives especially in rural and peri-urban communities in the District. It found out that diarrhea contributed to 87% and 48% of child morbidity and mortality respectively [13].

On household practice of CLTS, the study has also established that, most households in the intervention sites used local materials to construct toilets as opposed to those households in the control sites who were less likely to use local materials to solve the communal sanitation challenges. A large majority of households in the intervention areas had set up village committees to oversee and support CLTS implementation compared as compared to only a few of those in the non CLTS sites. This is an important finding given the seeking local solutions, having village committees, having mutual support are some of the key pillars of CLTS. This study compares with another study in Ghana to evaluate strategies for the scaling up of Community Led Total

Sanitation where the CLTS process focused on Open Defection Free (ODF) status in the pilot projects; 60% of the communities visited had attained ODF status. Sanitation practices mostly involved upgrading or repairing the existing communal latrines which was the first priority for most communities. Provision was made for construction of separate communal latrines for men and women [14].

The findings support the conclusion that hygiene interventions are important for preventing infections and they are impressive and important because they demonstrate that there is a continued, measurable, positive effect of personal and community hygiene. However, attributing a specific hygiene intervention to a reduction in illness is difficult since it is virtually impossible to isolate the effects of specific hygiene measures. In the study the strength of the association as measured by the relative reduction in risk of illness was appreciable and generally greater than 20% for most of the hygiene interventions.

5. Conclusion and Recommendations

From the study, uptake of community led total sanitation in the study areas at 52.2% was found to be lower than the expected 100%. Awareness was more in households living in the intervention sites where CLTS was implemented as opposed to areas where it was never implemented. In addition to this all households in the intervention had sought local solutions and had also used local materials to construct toilets compared to control sites. The study recommended that CLTS is the turning point in sanitation in reduction of diarrheal morbidities and should hence be rolled out in all the rural and urban areas. Communities should be encouraged to harness their inherent potential through small doable actions if Kenya has to achieve an ODF zone by 2030. As an area for further research, the study suggests A randomized trial to follow households and observe incidence of household morbidity.

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Conflict of interest declared

None

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