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Evaluation of Social-Economic Returns On Investment Among Households Benefiaries of Community-Led-To-Total Sanitation in Busia County, Kenya

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ABSTRACT

About 21 million Kenyans use unsanitary or shared latrines while 5.6 million have no latrine at all and defecate in the open. Busia County was among the counties with the lowest (42%) sanitation coverage compared to National level of 49%, with more than half of the population defecating in the open. Diarrheal and cholera were among the top three diseases causing morbidity and mortality in the County, with cholera outbreaks frequently being reported. In December 2012, Kenya government and UNICEF jointly implemented a pilot Community-Led-Total Sanitation Intervention (CLTSI) in Busia County to tame poor sanitation. The CLTSI was to achieve total sanitation among Busia County households through sanitation behavior change. To assure sustainability of sanitation behavior change, there was need to identify the specific attributable value of CLTSI to beneficiaries of Busia County. This study aimed at evaluating the social-economic returns on investment (SROI) among household beneficiaries of CLTSI in Busia County. Quasi Experimental Stdy design was used to collect data before(baseline) and after (Outcome) for CLTSI implementation while multi stage-random sampling was used to sample 459 houselds from villages that CLTSI had been implemented and certified to have achieved total sanitation in Busia County. SROI methodology was used to establish Social-economic value added to residents of Busia County by CLTSI. SROI value added to Busia County residents was KES 1: 10.5 meaning that every KES invested it created a Social-economic value of KEES 10.5 to Busia residents. That CLTSI should be rolled out Country wide with a view of improving level of sanitation and hygiene.

Keywords: Evaluation, Sanitation, Community Led-To Total Sanitation Intervention, Social-economic Returns on Investment.

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INTRODUCTION

Busia County was among the counties with the lowest (42%) sanitation coverage, with more than half of the population defecating in the open. Diarrhea and cholera were among the top three diseases causing morbidity and mortality in the County, with cholera outbreaks frequently being reported (MoPHS, 2012).

Ministry of Health in partnership with UNICEF designed a participatory sanitation approach tapped Community Led-To-Total Sanitation Intervention (CLTSI),a pilot intervention to tame poor sanitation in Busia County with a view of scaling-up the programme to entire Country through behavior change.

The Social-economic value created needs to be comprehended by CLTSI implementers in order to understand the whole process of creating this effect. An appropriate tool framework for evaluating would be Social Return on Investment (SROI), a framework which originated from Impact Assessment (IA) and Social Cost Benefit Analysis (CBA). Social Return on Investment is used to understand how efficiently resources are being used (SERUS, 2010) in which Social, economic and environmental values are taken into account in a SROI analysis, a triple bottom line approach is provided. This means that the results are based on wider stakeholder value perspectives. Social-economic returns on investment help interpret the intangible values to tangible and measurable values which are difficult to quantity in health related interventions.

Social-economic value is created when resources, inputs, processes or policies are combined to generate improvements in the lives of individuals or society as a whole (Emerson et al. 2001; Arli and Zappala 2009). Social Return on Investment (SROI) is a method to understand how certain activities/interventions can generate value, and a way to estimate that value in monetary terms (Zappala & Lyons 2009). Social returns on investment (SROI) is a potentially useful tool for capturing and representing the social-economic and environmental value generated through investment in health programmes carried out within them, because it allows us to capture and demonstrate the wider social economic and environmental value that is generated by these activities in monetary terms that are recognizable to public health programme and other policy-makers.

MATERIALS AND METHOD

Study site:

This study was carried out in Busia County because it was among counties with lowest sanitation coverage of 42% hence CLTSI was launched in 2012 as a pilot programme. It is one of the 47 Counties in Kenya, covering an area of 673.6 square km and lies between latitudes 0° 1’ 36’’ South and 0° 33’ North and longitudes 33° 54’ 32’’ East and 34° 25’ 24’’ East. The County is divided into five administrative Sub-Counties namely Township, Funyula, Matayos,

Nambale and Butula,Teso North, Teso south and Samia. The Sub-Counties are further sub-divided into 17 locations and 52 sub-locations. It was projected that by 2015 Busia County was to have a population of 378,649 (GoK, 2009). According to the Busia County statistics (2008), 65.99% and 61.4% of the population suffers absolute and food poverty respectively.

Research design:

Quasi experimental study design was used.

Target population:

The target population was stakeholders of CLTSI. They included; CLTSI beneficiaries (28,130 households), CLTSI implementers (30 public health officers, 15 Community Health Extension Workers, 30 Community Health Workers and UNICEF as the main sponsor.

Sampling procedure:

Multi-stage sampling design was used to sample the locations, sub-locations and villages from the four divisions of the County which had been certified by stakeholders to have attained total sanitation. Random sampling was applied to select respondents within locations, sub-locations, villages and households. The sampling frame was based on Busia County administrative boundaries. Fisher's formula (Fisher *et al.* 1998) was adopted to determine the sample size using sanitation coverage in Busia County of 42% (MoPHS, 2010) and precision set at 0.03. Using proportionate sampling, a total of 459 respondents participated in the study as shown in Table 1.

Table 1: List of stakeholders and reason for inclusion/exclusion criteria

Stakeholder	**Reason for inclusion**
Households for Busia County (Beneficiaries)	They are the primary beneficiaries of CLTSI. The programme was implemented for the aim to attain total sanitation and hygiene through Sanitation behavior change.
Public health officers	Provide time and skill necessary to make the activity under analysis possible and gain benefits from being involved. They were primary implementers i.e. directly involved in implementation of CLTSI.
Community Health workers	Provide time and skill necessary to make the activity under analysis possible and gain benefits from being involved. They were primary implementers i.e. directly involved in implementation of CLTSI.
Community Health Extension Workers	Provide time and skill necessary to make the activity under analysis possible and gain benefits from being involved. They were primary implementers i.e. directly involved in implementation of CLTSI.
Stakeholders	**Reason for Exclusion**
UNICEF (Sponsor)	They provided the finance hence they affect the activities of CLTSI
Local Administrator	Oversaw certification of CLTSI i.e. participated indirectly
Religious leaders	Oversaw Certification of CLTSI i.e. participated indirectly
Political leaders	Oversaw Certification of CLTSI i.e. participated indirectly
Research Assistants	Collected the data

Data Collection procedure: Tools that were used to collect primary data included structured questionnaires and observation checklists. Baseline data was collected before implementation

of CLTSI (October 2012) and the results compared with outcome data which was collected after implementation of NTSP (from December 2012 till March 2015). Primary data was collected again after implementation (September- December 2015). Only villages where CLTSI had been implemented and certified by the stakeholders as to have achieved total sanitation were included in the study. The outcome of CLTSI was considered 100% total sanitation behavior change if the households build and use their own latrines, observe sanitation and hygiene practices like hand washing with soap after visiting toilet, before eating, proper household hygiene, proper disposal of infant excreta and no open defecation in the triggered villages. To establish outcome of CLTSI, several parameters were measured. This included level of sanitation and hygiene practices, sustainability of sanitation behavior change, prevalence of diarrhoel diseases and sanitation options.

Data analysis:

To evaluate the social –economic value of CLTSI added to Busia County households, the study adopted SROI methodology, developed by SROI network group in 2012. The SROI methodology relies strictly on the stakeholder's information so as to construct the impact map that was used to evaluate the social economic value of the NTSP. The SROI is about the social value added rather than money though it is expressed in financial terms (New Economics Foundation, 2012; SERUS, 2010). The Social Returns on Investment methodology six stages are:

Stage 1: Establishing scope and identifying key stakeholders

Establishing scope: It is a statement about the boundary of what the working process will be carried out (New Economics Foundation, 2012; SERUS, 2010). Only villages that CLTSI had been implemented and certified to have achieved total sanitation behavior change were included in the study. *Defining the key stakeholders:* Stakeholders are people or organizations that experience change, whether positive or negative, as a result of the activity being analyzed (SERUS, 2010). Stakeholders were determined by applying stakeholder's analysis approach. The first step was to identify all of the potential stakeholder groups that were likely to have been impacted by the intervention and to decide whether to include them in the SROI assessment. In this evaluative SROI study, a list of stakeholders was drawn based on their level of participation and effect (either directly/primary or indirectly/secondary). Only primary stakeholders were included in the impact analysis.

Stage 2: Mapping outcomes

Impact Map- The impact map was build informed by our engagement with stakeholders. *Identifying inputs:* The inputs refer to what stakeholders contributed in order to make the

activities possible. The NTSP was fully funded by UNICEF, KES 5,000,000. The amount covered all the activities of the programme.

Clarifying Outputs: "The outputs of a project are the tangible (easily measurable, practical), immediate and intended results to be produced through sound management of the agreed inputs" (Browers *et. al.,* 2010). The quantities of outputs were calculated for primary stakeholders using data collected via questionnaires.

Describing Outcomes: To trace the outcomes the stakeholders experience in study, we engaged stakeholders to determine the outcome to be sure that these were outcomes experienced by stakeholders. Theory of change was used to present the story of stakeholders' perceptions and beliefs about how their lives had changed due to the CLTSI (SROI Network, 2012). Specific questions on outcome were included in the beneficiary questionnaire for them to respond.

Stage 3: Evidencing outcomes and giving them a value:

Developing outcome indicators- Indicators are ways of knowing that change has happened. In this study indicators will be applied to outcomes as these are the measures of change (New Economics Foundation, 2012; SERUS, 2010; TRSO, 2011). Sanitation and hygiene indicators as designed by WHO were adopted to measure outcome in this study. *Collecting outcome data:* The techniques for collecting primary data were observation checklist and structured questionnaires. For secondary data, review of CLTSI documents was done for hospital data to determine burden of diarrhoeal in Busia County after CLTSI implementation.

Establishing how long outcome will last (duration): The effect of some outcomes will last longer than others, some depend on the activity, some on the invention or some will continue without the invention (New Economics Foundation, 2012; SERUS, 2010). To estimate the duration of the CLTSI, stakeholders were involved to determine how long the outcome was to last. Questions on the duration the outcome will last were included in the beneficiary's questionnaire. It was expected that sanitation behavior change for stakeholders could last permanently.

Putting a value on the outcome: After excluding the share of deadweight, attribution and displacement the study translated the outcome into a monetized value (New Economics Foundation, 2012; SERUS, 2010). The study used financial proxies to translate the value of the change from the outcome in to an economic unit. To measure extra financial and non-market goods/services in this evaluative study, non-market-valuation (NMV) was used (Human Dimensions, 2011), in which *revealed preference* model **(**techniques infer valuations from the prices of related market- traded goods) was used.

Stage 4: Establishing impact:

Establishing impact was necessary as it reduced the risk of over claiming and double counting (SERUS, 2010). Establishing impact involved: *Determining the outcomes*-Deadweight, attribution and displacement was subtracted from the impact (New Economics, 2011; SERUS, 2010. *Deadweight:* Deadweight is a measure of outcome that would have happened even if the activity had not taken place (SROI network, 2012). In this study a baseline survey was conducted before NTSP was implemented on October 2012. The survey results indicated what had happened before CLTSI implementation. Hence in the study, baseline survey data were used as deadweight. *Displacement:* In the SROI framework, displacement means that the problem targeted by the action might have been moved to another area as a result of the invention (New Economics Foundation, 2012; SERUS, 2010). The study assessed how much of the outcome displaced other outcomes. *Attribution:* The study established whether any other stakeholder outside the scope had contributed to the change being made from the targeted input (New Economics Foundation, 2012; SERUS, 2010). Facilitators and beneficiaries were to identify organization that were operating within the county and contributing towards component of the programme. It was calculated as a percentage (i.e. proportion of the outcome that is attributable to CLTSI). *Drop-off:* There was a consideration of how long the CLTSI outcomes had lasted (New Economics Foundation, 2012; SERUS, 2010). Since CLTSI targets to achieve total sanitation (sanitation behavior change) it was expected that the outcome was to last for a lifetime. *Calculating CLTSI impact:* All of the CLTSI impact was expressed as percentages. The impact was calculated for each outcome as follows: Financial proxy multiplied by the quantity of the outcome which will give a total value. From this total, deduct any percentages for deadweight or attribution; this was repeated for each outcome (to arrive at the impact for each); the total was added, to arrive at the overall impact (New Economics Foundation, 2012; SERUS, 2010).

Stage 5: Calculating SROI ratio

To calculate SROI, the following steps were involved: Projecting into the future: The study estimated how long the outcomes could last and engage them in the analysis (New Economics Foundation, 2012; SERUS, 2010). *Calculating the net present value:* The costs and benefits paid or received were added up. Moreover, costs and benefits were compared and discounting used (New Economics Foundation, 2012; SERUS, 2010). The value was calculated to a net present value to mirror a fair value. *Calculating the SROI ratio:* After the net present value was calculated, then divided with total input, that being the monetary input from investors, being the 100 percent subsidization from the organizational level (New Economics Foundation, 2012; SERUS, 2010). For every one Kenyan shilling of input, the beneficiary had social-economic return in Kenyan shilling in the amount of year's prognoses. *Sensitivity analysis:* In

this phase were to know how much of the impact is represented by what outcome (New Economics Foundation, 2012; SERUS, 2010).

To document the lessons learnt after implementation of CLTSI in Busia County, study focused on the implementation process of the CLTSI to draw experiences by including questions in the data collection tools that were specifically tailored to capture information facilitators (Implementers) of CLTSI in Busia County. Documenting lessons learnt helped in understanding and improving implementation of CLTSI, accounting for success (or failure) and enhancing best practice of CLTSI management before countrywide rollout. Data presentation was done using tables.

Ethical consideration:

Authority to carry out the research was obtained from Maseno University ethics and research committee (MSU/DRP/MUERC/00240/15).

RESULTS AND DISCUSSION

Determination of Social-economic value of CLTSI

To determine Social-economic value of NTSP the SROI methodology was adopted. There are six stages in the SROI analysis and they involve: (1) Establishing the scope and Identifying key stakeholders, (2) Mapping outcomes, (3) Evidencing outcomes and giving them value, (4) Establish impact, (5) Calculating the SROI and (6) Reporting (SERUS, 2011).

Stage 1: Determination of stakeholders and scope of the study:

To determine stakeholders, a list for potential stakeholder was drawn and reason for inclusion or exclusion was given as shown below in Table 1.

Only those stakeholders who were affected directly (experienced material change) were included in the programme. Local administrators, religious leaders, political leaders and research assistants were excluded from the analysis as these stakeholders did not experience material changes as a result of the CLTSI. For UNICEF (Sponsor) though they contributed funding for CLTSI, they were not affected directly with the outcome of the programme. The scope of the study was only villages that CLTSI had been implemented and certified to have attained total sanitation by the time of outcome evaluation in Busia County.

The CLTSI input

The inputs to the program were valued for each of the main stakeholder groups as follows. *Sponsor/Funder (UNICEF).* The total funding for CLTSI in Busia County by UNICEF was estimated at Ksh.5, 000,000. This funding included funding for the entire piloting of CLTSI in Busia County.

Public health officers, Community health Workers and Community Health Extension Workers. They invested time and skills i.e. knowledge and experiences in CLTSI. The time and skills

invested was not given a value because it was included in the total funding by UNICEF. They were paid on a daily basis at market rates. The main reason for not valuing the input was to avoid double counting ((Browers *et. al*., 2010, Nicolls *et. al.,* 2012). This amount included all the logistics, salaries of the facilitators and any other miscellaneous expenses for the implementation of CLTSI.

Though the beneficiaries (Households) spend time on the programme during implementation of which it accounted for input, it was not valued. The SROI current convention stipulates that time spent as input by the beneficiaries (in this case Households/beneficiaries of NTSP) an intervention is not given a financial value ((Browers *et. al*., 2010).

Stage 2: The CLTSI output

The outputs of a project are the tangible (easily measurable, practical), immediate and intended results to be produced through sound management of the agreed inputs (Browers *et. al*., 2010). The outputs of NTSP were identified as:

28,130 households (Beneficiaries) of Busia County participated in CLTSI

30 public health officers trained and facilitated implementation of CLTSI

15 Community Health Extension Workers (CHEW's) trained and facilitated implementation of CLTSI

30 Community Health Workers trained and facilitated implementation of CLTSI

The quantities of outputs were calculated for beneficiaries/households using data collected via questionnaires.

The CLTSI outcomes

"Outcomes are the likely or achieved short-term effects of CLTSI total set of outputs. Outcomes can be seen as the actual use of the outputs" (Browers *et., al.* 2010). The outcomes that emerged from the qualitative analysis are listed and grouped per output as shown in

Table 2: Outcomes grouped per output and stakeholder

Stakeholders	Output	Outcome
Beneficiaries (Households)	**28,130 households participated in CLTSI**	1.1 Increased latrine coverage 1.2 Reduced latrine sharing with neighbours 1.3 Improved children latrine usage 1.4 Reduced open defecation 1.5 Increased latrine usage 1.6 Improved latrine hygiene 1.7 Hand washing with soap after latrine use 1.8 Improved hand washing with soap after handling children feaces 1.9 Improved hand washing before and after handling food

		1.10 Improved drinking water storage in hygienically clean containers 1.11 Improved drinking water source 1.12 Improved hygienically Clean and treated drinking water 1.13 Improved solid waste disposal 1.14 Reduced diarrhea burden 1.15 Increased scaling up the ladder 1.16 constructing new/ emptying filled up latrine
Public health workers(PHO's)	30 public health workers trained and participated in implementation of CLTSI	2.1 Increased Financial gain 2.2 Improved sanitation skills 2.3 Increased work strain
Community Health Extension Workers (CHEW's)	15 Community Health extension Workers trained and participated in implementation of CLTSI	3.1 Increased financial gain 3.2 Improved sanitation skills 3.3 Increased work strain
Community Health Workers	30 Community Health Workers trained and participated in implementation of CLTSI	4.1 Increased Financial gain 4.2 Improved sanitation skills 4.3 Increased work strain

2 below. The CLTSI outcomes were as indicated by CLTSI objectives and confirmed by beneficiaries as to have been experienced.

The chain of events describes different stages of one change (SROI Network 2012). The theory of change was used to present the story of stakeholders' perceptions and beliefs about how their lives had changed due to the CLTSI intervention. A few outcomes for each stakeholder are presented below.

1.1 Increased latrine coverage, 1.2, 1.3 Improved children latrine usage, 1.4 Reduced open defecation, 1.5 Increased latrine usage: When latrines are used by entire village, there will be reduced environmental contamination of food, water and soil. Latrine cuts contact between humans and excreta. Latrine coverage and use will cut routes of transmission by flies and fluid. Moreover, latrine usage coupled by sanitation behavior change reduces open defecation hence cutting-off transmission pathway by flies and drinking water. Children feaces is considered more infectious because children's digestive system especially the under 5 years is considered not well developed. Disposal of children feaces in latrine and training of children to use the latrine reduces children from getting in contact with feaces and some even end up eating it. This reduces diarrhoeal morbidity all other factors constant. Latrine usage reduces bad odour that emanates from open defecation that also attracts flies.

"Before this programme, as a family we did not have a latrine, therefore we were going for long call in the bush we adults. My young ones have been excreting in the compound. You could see flies all over, and we did not know where they were coming from. But now we

discovered it was from our long call. Since we went of education on sanitation that day by public health officers, I build a good latrine and placed hand washing tap full of water. My family including young ones use latrine always. It's good because there are no more flies (Questionnaire, Household head in Budalang'i sub-county)"

"I didn't know that children feaces are dangerous. I used to throw them in the compound anyhow. Now days I don't because they told us about it during the day public health officers were teaching us on latrine usage and cleanliness (Questionnaire, Household head in Samia Sub-County)"

"In this village people used to excreta everywhere including road. It used to look bad. You could see feaces all over the place. But since the programme was introduced, these bad manners of defeacating all everywhere is over. All of us in this village are having latrines and using them. Those who have bad ones we force them to construct new ones. Because it keeps our village clean from bad smell and flies (Questionnaire, Household head in Matayos sub-county)"

1.6 Improved latrine hygiene, 1.7 Hand washing with soap after latrine use, 1.8 Improved hand washing with soap after handling children feaces, 1.9 Improved hand washing before and after handling food: Hygiene practices have been found to reduce poor sanitation and hygiene related diseases. Hand washing cuts transmission pathways like fingers, flies, food and water from contact by washing away germs. To be effective, households must thoroughly wash hands always in critical times like after visiting latrine, before and after handling food, washing utensils etc. Hand washing has been found to reduce poor sanitation related diseases like diarrhoeal, cholera among others.

"Before sanitation programme, I always thought washing hands will consume a lot of water and soap yet am poor and can't afford buying it weekly. I now know that washing hands with soap saves my family and I from diseases like diarhoeal and typhoid. The programme taught me to put hand washing water and soap at the toilet and to wash hands always (Questionnaire, head of household, Funyula Sub-County)."

"Sometimes we just ate food after working in the shamba. Little did I know that we were eating dirt. We used to have frequent stomach problems and used stomach medicine to stop diarrhoeal and pain. Since I was educated on hand washing, all my family members wash hands and ensure everything is very clean. We don't use those stomach medicine any more (Questionnaire, household head, Butula)"

1.10 Improved drinking water storage in hygienically clean containers, 1.11 Improved drinking water source, 1.12 Improved hygienically Clean and treated drinking water:

Drinking water can be contaminated in various ways: at the source if it's not protected, during distribution if the containers used to carry water is not clean and during storage, when the storage containers are not clean and not covered. To protect the water from disease causing germs, it needs to be treated with appropriate method like chlorination and boiling. Hence if the storage containers are treated, water sources are protected and storage containers are clean then water borne diseases will be eliminated.

"The only source of drinking water was this river. All of us in this villages use this river for washing and even animals drink from this river. The water was never clean, and we just used it for drinking. But now days we have done boreholes and those who don't have they boil the water and add chlorine than before. This programme helped us a lot (Questionnaire, head of household, Matayos Sub-County)"

I thought ones you draw water from the borehole in the jerricane it was clean hence you just drink it. The public health officers taught us a lot on how and why we should treat water. Nowadays I treat water always and store it in clean containers and cover it (Questionnaire, head of household Samia, sub-county)"

"Our water sources used to be open and animals used to drink inside. Sometimes you could find people also washing themselves in the river and spring but since the public officers came to teach us, we fenced the all of them and everybody treats water before drinking. People in this village don't complain of stomach problems anymore because we know what to do with our water and cleanliness(Questionnaire, head of household Samia Sub-County)"

1.13 Improved solid waste disposal: Proper waste disposal helps in keeping the compound clean and it also eradicates breeding grounds for insects, flies, rodents and vermin. Also it includes compound clearing. Each household must have a composite pit for refuse disposal and keep the compound clean.

"After the programme nowadays I have a composite pit that a throw my refuse and burn it to avoid it spilling near the house. Previously I used to throw refuse all over the compound. It looked dirty and also children defecated all over. My compound is clean with no refuse you see (Questionnaire, Head of household Funyula Sub-County)."

1.15 Increased scaling up the ladder, 1.16 constructing new/ emptying filled up latrine: Households who did not have latrines were expected to construct new ones. While those ones whose latrines were filled up were expected to empty them or construct new and better ones than the previous (Scaling up the ladder). This is a good indicator of sanitation behavior change.

"I had constructed a pit latrine that had no roof, no door just open. During the day we couldn't use it because they could see us hence we were using the neighbours but sometimes he chased my children away. The only option was bush and road side. Nowadays I am happy, thanks to

the public health officers programme last year (2013). I was able to construct a permanent brick iron sheet and cemented latrine and birth room. This is nice because no flies, bad smell and we can use it anytime (Questionnaire, head of household Nambale Sub-County)"

"I didn't have a latrine before. We have been surviving from the bush and special place in the compound. Bad smell and flies was the order of the day. This programme was special to me because it educated me on why I should have a latrine, clean and use it. I have constructed a ventilated pit latrine. My people don't suffer any more (Questionnaire, head of household Butula Sub-County)"

2.2 Improved sanitation skills-Facilitators were trained on community triggering process. They gained skills in sanitation and hygiene practices.

Stage 3

The CLTSI Outcome Indicators

"Indicators are ways of knowing that change has happened. To measures the CLTSI change, in the study, the indicators applied to outcomes and their sources of for each outcome is shown in the table 3 below. These indicators were designed by UNICEF, the main sponsor of CLTSI.

Table 3: The CLTSI Indicators

Stakeholder	Outcome	Indicator	Source
Beneficiaries (Households)	1.1 Increased latrine coverage	% of households access to improved sanitary facility	UNICEF, 2015
	1.2 Reduced latrine sharing with neighbours	-% of households owning latrine and in use -% of households confirming sharing latrine with neighbours	-UNICEF,2015
	1.3 Improved children latrine usage	-% of children using latrine	UNICEF,2015
	1.4 Reduced open defecation	- % of open defecation free homesteads	UNICEF,2015
	1.5 Increased latrine usage	-% of households confirming use of available sanitary facility -% of households owning an improved sanitary facility-latrine	UNICEF,2015
	1.6 Improved latrine hygiene	-% of households with hygienically clean latrine	UNICEF,2015
	1.7 Hand washing with soap after latrine use	-% of households washing hands with soap in critical moments -% of households with handwashing facility/leaky taps within 3 metres radius from latrine -% of households with hand washing facility/leaky taps filled with water and soap within 3 metres radius from latrine	UNICEF,2015
	1.8 Improved hand washing with soap after handling children feaces	-% of households washing hands with soap in critical moments-after handling children feaces	UNICEF,2015
	1.9 Improved hand washing before and after handling food	-% of households washing hands with soap in critical moments-before and after handling food	UNICEF,2015
	1.10 Improved drinking water storage in hygienically clean containers	-% of households storing water in hygienically clean containers	UNICEF,2015
	1.11 Improved drinking water source	-% of households accessing improved water source	UNICEF,2015
	1.12 Improved hygienically Clean and treated drinking water	-% of households access to improved drinking water sources -% of households treating, drinking water with recommended treatment methods	UNICEF,2015
	1.13 Improved solid waste disposal	-% of household practicing safe and improved solid waste disposal -% of households with clean compound free of solid waste	UNICEF,2015
	1.14 Reduced diarrhea burden	-% of households reporting diarrhea bouts	UNICEF,2015
	1.15 Increased scaling up the ladder	-% of households adopting new sanitation technologies/options	UNICEF,2015
	1.16 constructing new/ emptying filled up latrine	-% of households emptying/constructing new latrines	UNICEF,2015

The CLTSI Quantity

The outcome evaluation results after the CLTSI implementation were used to establish CLTSI quantity. The questionnaire responses from each of the main stakeholder groups (Households/beneficiaries, and facilitators) were analyzed and the frequency calculated for each outcome reported. In order to estimate the quantity per stakeholder, the frequency was multiplied by the total number of stakeholders (See table 4). Quantity was calculated based on the sampled population who responded to the particular question.

Table 4: Quantity per stakeholder based on frequency

Stakeholder	Outcome	Quantity	Stake holder(n)	Frequency (%)	Source
Beneficiary (Household)	1.1 Increased latrine coverage	**351**	**406**	**86.5**	Outcome of CLTSI
	1.2 Reduced latrine sharing with neighbours	**161**	**406**	**39.7**	Outcome of CLTSI
	1.3 Improved children latrine usage	**318**	**406**	**78.3**	Outcome of CLTSI
	1.4 Reduced open defecation	**140**	**406**	**34.5**	Outcome of CLTSI
	1.5 Increased latrine usage	**352**	**390**	**90.3**	Outcome of CLTSI
	1.6 Improved latrine hygiene	**303**	**377**	**80.4**	Outcome of CLTSI
	1.7 Hand washing with soap after latrine use	**329**	**406**	**81**	Outcome of CLTSI
	1.8 Improved hand washing with soap after handling children feaces	**365**	**403**	**90.6**	Outcome of CLTSI
	1.9 Improved hand washing before and after handling food	**370**	**406**	**91.1**	Outcome of CLTSI
	1.10 Improved drinking water storage in hygienically clean containers	**338**	**390**	**86.7**	Outcome of CLTSI
	1.11 Improved drinking water source	**313**	**395**	**79.2**	Outcome of CLTSI
	1.12 Improved hygienically Clean and treated drinking water	**296**	**406**	**72.9**	Outcome of CLTSI
	1.13 Improved solid waste disposal	**377**	**404**	**93.3**	Outcome of CLTSI
	1.14 Reduced diarrhoea burden	**43**	**406**	**10.6**	Outcome of CLTSI
	1.15 Increased scaling up of the ladder	253	394	64.3	Outcome of CLTSI
	1.16 constructing new/ emptying filled up latrine	174	389	44.7	Outcome of CLTSI
PHO's Community Health	2.1 Increased Financial gain	35	35	100	Outcome of CLTSI
	2.2 Improved sanitation skills	24	35	68.6	Outcome of CLTSI

CHW's, CHEW'S	2.3 Increased work strain	24	35	68.6	Outcome of CLTSI

The CLTSI Outcome Duration

To determine the duration the behavior change (outcome) lasted, beneficiaries (household) and facilitators were asked in the questionnaire how long the outcome was to last (See table 5). The study assumed a maximum duration of five years, although some of the outcomes could have a lifelong impact. As there is no evidence to value the future impact of such outcomes, the study limited the duration to five years. The main stakeholder's responses were analyzed in order to determine the duration each outcome will last.

Table 5: The CLTSI outcome duration

Stakeholder	Outcome	Duration	Assumption
Beneficiary (Household)	1.1 Increased latrine coverage	**5**	Beneficiaries/households indicated it would last for 5 years.
	1.2 Reduced latrine sharing with neighbours	**5**	This was suggested by beneficiaries/households that it was to last for 5 years
	1.3 Improved children latrine usage	**5**	Majority of beneficiaries suggested that it was to last for 5 years.
	1.4 Reduced open defecation	**5**	It was suggested by beneficiaries that this behavior change was lifelong. However we opted for 5 years to avoid over claiming
	1.5 Increased latrine usage	**5**	This change in behavior was likely to last for 5 years as per the beneficiaries.
	1.6 Improved latrine hygiene	**5**	Majority of beneficiaries reported a duration of 5 years regarding the behavior change
	1.7 Hand washing with soap after latrine use	**5**	Majority of beneficiaries reported a duration of 5 years regarding behavior change
	1.8 Improved hand washing with soap after handling children feaces	**5**	Majority of beneficiaries reported a duration of 5 years regarding behavior change
	1.9 Improved hand washing before and after handling food	**5**	Majority of beneficiaries reported a duration of 5 years regarding behavior change

	1.10 Improved drinking water storage in hygienically clean containers	**5**	Majority of beneficiaries felt that the behavior was to last for 5 years
	1.11 Improved drinking water source	**5**	Majority of beneficiaries felt that the outcome was to last for 5 years
	1.12 Improved hygienically Clean and treated drinking water	**5**	Majority of beneficiaries felt that the outcome was to last for 5 years
	1.13 Improved solid waste disposal	**5**	Majority of beneficiaries suggested the outcome was to last for 5 years
	1.14 Reduced diarrhoea burden	**5**	Beneficiaries indicated it was to last for 5 years
	1.15 Increased scaling up of the ladder	**5**	Beneficiaries indicated it was to last beyond the intervention-5 years
	1.16 constructing new/ emptying filled up latrine	**5**	Beneficiaries indicated it will last beyond the intervention-5 years
PHO's	**2.1 Increased Financial gain**	**1**	Facilitators indicated 1 year since they will earn ones during intervention period
CHW's)	**2.2 Improved sanitation skills**	**5**	Facilitators indicated that the skill gained was to last beyond the intervention period. But 5 years was chosen to avoid over claiming
CHEW'S	**2.3 Increased work strain**	**1**	This was to last for a year during intervention period according to the facilitators

The CLTSI Financial proxies

The financial proxies for each outcome were generated as shown in table 6 below. Determination of financial proxies involved the process of assign a monetary value to things that do not have a market price" (SROI network 2012). The revealed *preference* model **(**techniques infer valuations from the prices of related market- traded goods) was used to assign monetary values to non-traded market goods as shown below for each outcome.

Table 6: Stakeholder's outcome financial proxy values

Stakeholder	Outcome	Value KES	Source
	1.1 Increased latrine coverage	7000	Facilitators questionnaire

	1.2 Reduced latrine sharing with neighbours	**-7300**	Beneficiaries Questionnaires
	1.3 Improved children latrine usage	**600**	KEMSA
	1.4 Reduced open defecation	**1200**	Beneficiaries Questionnaire
	1.5 Increased latrine usage	**1200**	Beneficiaries questionnaire
	1.6 Improved latrine hygiene	**1200**	Beneficiaries Questionnaire
	1.7 Hand washing with soap after latrine use	**23725**	Facilitators and beneficiaries questionnaire
	1.8 Improved hand washing with soap after handling children feaces	**23725**	Beneficiaries questionnaire
Beneficiary (Household)	1.9 Improved hand washing before and after handling food	**23725**	Beneficiaries questionnaire
	1.10 Improved drinking water storage in hygienically clean containers	**2025**	Facilitators questionnaire
	1.11 Improved drinking water source	**1200**	Facilitators Questionnaire
	1.12 Improved hygienically Clean and treated drinking water	**3650**	Beneficiaries Questionnaire
	1.13 Improved solid waste disposal	**360**	Beneficiaries questionnaire
	1.14 Reduced diarrhoea burden	**500**	Beneficiaries questionnaire
	1.15 Increased scaling up of the ladder	500	Facilitators questionnaire
	1.16 constructing new/ emptying filled up latrine	500	
PHO'S CHEW''S CHW's)	2.1 Increased Financial gain	180,000	Facilitators Questionnaire
	2.2 Improved sanitation skills	1000	Facilitators Questionnaire
	2.3 Increased work strain	0	None

Determination of financial proxies

Beneficiaries Outcome

1.1 Increased latrine coverage- This was equated to the cost of constructing a latrine using locally available material. Cost for ordinary pit-latrine was KES. 2500, VIP KES 8000 and pour and flush KES, 15000 and open latrine KES 1000. We took the average cost {(3500+8000+15000+1500)÷4

1.2 Reduced latrine sharing with neighbours- Value of an average working hour in an average lost time per day-(160 per day-working for 8 hrs per day 160/8= KES20 for 365 days (KES 20x365)

1.3 Improved children latrine usage- Cost saved buying of an under 5 year dose of treating diarrhea (ORS and Zinc tablets) KES 50 for 1 year. Assumption- at least a child gets one bout in a month (50x12) =KES 600

1.4 Reduced open defecation- Cost saved from paying doctors consultation in a public county/sub-county referral hospital l(Registration and doctors consultation 100 at-least ones per month-(100x12)=KES 1200

1.5 Increased latrine usage- Cost saved from paying doctors consultation in a public county/sub-county referral hospital (Registration and doctors consultation 100 atleast ones in a month (100x12)=KES 1200

1.6 Improved latrine hygiene- Cost saved from paying doctors consultation in a public county/sub-county referral hospital (Registration and doctors consultation 100 atleast ones per month-for 12 months (100x12)=KES 1200

1.7 Hand washing with soap after latrine use- Cost of Bar soap (KES 10), 5 litre jerricane (KES 50) and water (KES 5)-:[65x365]=KES 23725

1.8 Improved hand washing with soap after handling children feaces- Cost of Bar soap(KES 10), 5 litre jerricane (KES 50) and water (KES 5)-: 65x365)=KES 23725

1.9 Improved hand washing before and after handling food- Cost of Bar soap(KES 10), 5 litre jerricane (KES 50) and water (KES 5)-: [65x365]=KES23725

1.10 Improved drinking water storage in hygienically clean containers- Average cost of treating water; Chlorine tablet (KES5) storage container Jerricane (KES 200). Household will incur cost of jerricane as a one-off cost. Chlorine chemical is mostly used to treat domestic water and Jerricane is the most used method of storing water (5x365+200)= KES 2025

1.11 Improved drinking water source- Cost saved from paying doctors consultation fee in county referral/sub-county referral hospital at least ones per month for 12 months KES (100x12) = KES 1200

1.12 Improved hygienically Clean and treated drinking water- Cost of treating water – Chlorine (KES 10)--:[10x365]= KES 3650

1.13 Improved solid waste disposal- Cost of collecting refuse by local authority (KES 30x12) = KES 360

1.14 Reduced diarrhoea burden- Saved medicine cost for diarrheal diseases in the family, total cost for diarrheal diseases (In public health facility), transport cost (transport KES 200, treatment inclusive of lab test KES 100, consultation KES 50 and drugs KES 150)= KES 500

1.15 Increased scaling up of the ladder- Saved medicine cost for diarrheal diseases in the family, total cost for diarrheal diseases (In public health facility), transport cost (transport KES 200, treatment inclusive of lab test KES 100, consultation KES 50 and drugs KES 150)=KES 500

1.16 constructing new/ emptying filled up latrine- Saved medicine cost for diarrheal diseases in the family, total cost for diarrheal diseases (In public health facility), transport cost (transport KES 200, treatment inclusive of lab test 100, consultation KES 50 and drugs KES 150)= KES 500

Facilitators (Public Health officer's, Community Health Workers, and Community Health Extension Worker's) Outcome

2.1 Increased Financial gain- Income earned during facilitation times number of days- {PHO'S-(1500 per day X60days)=KES 90,000); CHEW's-(1000 per day x60 days)= KES60,000; CHW'S-(500 per day X60 days)=KES 30,000}= KES180, 000

2.2 Improved sanitation skills- Standard amount earned when attending a health care training/seminar- ksh 1000 per day

2.3 Increased work strain-No financial proxy= KES 0

Stage 4: The CLTSI Impact

To establish impact, deadweight, displacement, attribution and drop-off were determined as below:

The CLTSI Deadweight

The baseline survey results indicated what had happened before CLTSI implementation. The results were taken as deadweight (See table 7).

Table 7: Deadweight of the outcomes identified

Stakeholder	Outcome	Deadweight (%)	Rationale
Beneficiary (Household)	1.1 Increased latrine coverage	42.8	Baseline survey
	1.2 Reduced latrine sharing with neighbours	77.2	Baseline survey
	1.3 Improved children latrine usage	46.1	Baseline survey
	1.4 Reduced open defecation	82.4)	Baseline survey

	1.5 Increased latrine usage	42.8	Baseline survey
	1.6 Improved latrine hygiene	27.9	Baseline survey
	1.7 Hand washing with soap after latrine use	45.6	Baseline survey
	1.8 Improved hand washing with soap after handling children feaces	42.9	Baseline survey
	1.9 Improved hand washing before and after handling food	53.3	Baseline survey
	1.10 Improved drinking water storage in hygienically clean containers	39.2	Baseline survey
	1.11 Improved drinking water source	35.5	Baseline survey
	1.12 Improved hygienically Clean and treated drinking water	35.5	Baseline survey
	1.13 Improved solid waste disposal	47.1	Baseline survey
	1.14 Reduced diarrhoea burden	48.3	Baseline survey
	1.15 Increased scaling up of the ladder	10.9	Baseline survey
	1.16 constructing new/ emptying filled up latrine	44.7	Baseline survey
PHO's CHEW's	2.1 Increased Financial gain	5	There was no evidence of deadweight for this outcome but we used 5% to guard against the possibly of over claiming.
CHW's	2.2 Improved sanitation skills	5	There was no evidence of deadweight for this outcome but we used 5% to guard against the possibly of over claiming.
	2.3 Increased work strain	5	There was no evidence of deadweight for this outcome but we used 5% to guard against the possibly of over claiming.

The CLTSI Displacement

Displacement was assessed by exploring to what extent the outcomes from CLTSI had displaced other outcomes that were likely to happen. There was no evidence that this might have been the case.

The CLTSI Attribution

Attribution was used to recognize that some of the changes seen were not only due to the intervention. These changes may have occurred due to other organizations or persons working together. Facilitators and beneficiaries identified organization that were operating within the county and contributing towards component of the programme. Among the organizations listed included Red Cross, world vision, Amref, Concern Worldwide, Ministry of agriculture and

community based organizations (CBO's). From the analysis of the questionnaire, their activities contributed to 10% of the change. The attribution rate in the impact map was deducted from the total impact. However, negative outcomes were not assigned attribution value.

The CLTSI Drop-off: The decline in outcomes over time

The effect of outcomes was to decrease over time, and also outcomes were likely to be influenced by other factors. There was no evidence to allow for the estimate of drop-off per outcome or specific to a stakeholder group. A drop-off rate of 20% for this SROI analysis was used, which was based on the assumption that the effect of the intervention was to be zero after five years.

Discount

In the study a discount rate of 6.5 percent per annum, which was Kenya's average inflation rate in 2015, was used. Discounting was applied to values having duration of more than one year.

The CLTSI Calculation of the Impact

To calculate impact, Quantity of each outcome was multiplied by financial proxy then deadweight and attribution was subtracted i.e.

Impact= {[Quantity of outcome (Qo)] X Financial proxy (Fp)-[Deadweight (D)-Attribution (A)]}.

To determine the total impact for the programme, impact for each outcome is added. See table 8 below.

Table 8: Calculation of Impact

Beneficiary (Household)	1.1 Increased latrine coverage	351(86.5%)	7000	42.8	10	1,264,863.6
	1.2 Reduced latrine sharing with neighbours	161(39.7%)	7300	22.8	10	816,598.4
	1.3 Improved children latrine usage	318(78.3%)	600	46.1	10	92,557.1
	1.4 Reduced open defecation	[140(34.5%)]	1200	17.6	10	124,588.8
	1.5 Increased latrine	352(90.3%)	1200	42.8	10	217,451.5
	1.6 Improved latrine hygiene	303(80.4%)	1200	27.9	10	235,940.1
	1.7 Hand washing with soap after latrine use	329(81.0%)	23725	45.9	10	3,800,510.1
	1.8 Improved hand washing with soap after handling children feaces	365(90.6%)	23725	42.9	10	4,450,181.3
	1.9 Improved hand washing before and after handling food	370(91.1)	23725	53.3	10	3,689,498.5
	1.10 Improved drinking water storage in hygienically clean containers	338(86.7%)	2025	39.2	10	375,147.0

	1.11 Improved drinking water source	313(79.2%)	1200	35.5	10	218,035.8
	1.12 Improved hygienically Clean and treated drinking water	296(72.9%)	3650	35.5	10	627,172.2
	1.13 Improved solid waste disposal	377(93.3%)	360	47.1	10	64,616.3
	1.14 Reduced diarrhoea burden	43(10.6%)	500	48.3	10	10,197.5
	1.15 Increased scaling up of the ladder	253(64.3%)	500	10.9	10	101,440.4
	1.16 constructing new/ emptying filled up latrine	174(44.7%)	500	44.7	10	43,299.9
-Public health workers(PHO's)	2.1 Increased Financial gain	35(100%)	180,000	5	0	5,985,000
-Community Health Extension Workers (CHEW's)	2.2 Improved sanitation skills	24 (68.6%)	1000	5	0	22800
-Community Health Workers (CHW's)	2.3 Increased work strain	24(68.6%)	3000	5	0	68,400
Total Impact						**22,413,498.5**

Stage 5 : Calculation of SROI Ratio for CLTSI

Calculating SROI ratio involved: projecting into the future –Calculating present value, Net present value, and SROI calculation.

The CLTSI Total Impact

Total impact was calculated as shown in table 9 below.

Table 9: Calculation of Total Impact

Stakeholder	Outcome	Impact (KES)	Less drop-off 20%(Impact less Drop-off)				
			Year 1	Year 2	Year 3	Year 4	Year 5
Beneficiary (Household)	1.1 Increased latrine coverage	1,264,863.6	1,264,863.6	1,011.890.9	809512.7	647,610.2	518,088.1
	1.2 Reduced latrine sharing with neighbours	816,598.4	816,598.4	653,278.5	522622.8	418,098.2	344,478.7
	1.3 Improved children latrine usage	92,557.1	92,557.1	74,045.7	59,236.5	47,389.2	37,911.4
	1.4 Reduced open defecation	124,588.8	124,588.8	99,671.0	79736.8	63,789.5	51,031.6
	1.5 Increased latrine usage	217,451.5	217,451.5	173,961.2	139169.0	111,335.2	89,068.1
	1.6 Improved latrine hygiene	235,940.1	235,940.1	188,752.1	151001.7	120,801.3	96,641.1
	1.7 Hand washing with soap after latrine use	3,800,510.1	3,800,510.1	3,040408.1	2432326.5	1945861.2	1556688.9
	1.8 Improved hand washing with soap after handling children feaces	4,450,181.3	4,450,181.3	3560145.0	2848116.0	2278492.8	1822794.3
	1.9 Improved hand washing before and after handling food	3,689,498.5	3,689,498.5	2951598.8	2361279.0	1889023.2	1511218.6
	1.10 Improved drinking water storage in hygienically clean containers	375,147.0	375,147.0	**300117.6**	240094.1	192075.3	153660.2
	1.11 Improved drinking water source	218,035.8	218,035.8	**174428.6**	139642.9	111634.3	89307.5
	1.12 Improved hygienically Clean and treated drinking water	627,172.2	627,172.2	**501737.8**	401390.2	321112.2	256889.7
	1.13 Improved solid waste disposal	64,616.3	64,616.3	**51693.0**	41354.4	33083.5	26466.8
	1.14 Reduced diarrhoea burden	10,197.5	10,197.5	**8,158**	6526.4	5221.1	4176.9
	1.15 Increased scaling up of the ladder	101,440.4	101,440.4	81152.3	64921.9	51937.5	41550.0
	1.16 constructing new/emptying filled up latrine	43,299.9	43,299.9	34639.9	27711.9	22169.5	17735.6
-Public health workers(PHO's)	2.1 Increased Financial gain	5,985,000	5,985,000	00	00	00	00
	2.2 Improved sanitation skills	228,00	22,800	18240	14592	11673.6	9338.9

-Community Health Extension Workers (CHEW's) -Community Health Workers (CHW's)	2.3 Increased work strain	68,400	68,400	00	00	00	00
Total Impact for each year		**22,413,498.5**	**22,413,498.5**	**12923918.5**	**10339234.8**	**8271307.8**	**6627046.4**

Calculation of present value, Net Present values and SROI ratio

The SROI ratio was calculated by comparing the investments (inputs) and the financial, social and environmental returns (outcomes and impact of an intervention) as follows: SROI ratio = Total (adjusted) value of results / Total value of inputs OR SROI ratio = Total results x deadweight x attribution x inflation adjustment / Total value of inputs.

The net present value was calculated using the discounting rate of 6.5% being the average inflation rate of 2015. The duration of the impact was presumed to be five years. The SROI ratio was calculated by comparing the investments (inputs) and the financial, social and environmental returns (outcomes and impact of an intervention). See table 10. The SROI ratio was 1: 10.5 KES. It means that for every KES 1 of investment in CLTSI, KES 10.5 of social value was created.

Table 10: Calculation of Present value, Net present value and SROI ratio

Year	Total impact (KES) (See table xx above	Total impact of year (1+r) [a] [Where r =6.5% which was average rate of inflation in 2015]	Total Value (KES)
Year 1	22,413,498.5	22413498.5 / (1+0.065)	21045538.5
Year 2	12923918.5	12923918.5 / (1+0.065)2	11394492.7
Year 3	10339234.8	10339234.8 / (1+0.065)3	8559326.1
Year 4	8271307.8	8271307.8 / (1+0.065)4	6429478.5
Year 5	6627046.4	6627046.4 / (1+0.065)5	4836954.2
Total present value(PV)			52,265,790
Net present value (NPV)=(Present value-Investment) =KES (5,2265,790- 5,000,000)			47,265,790
SROI Ratio (Present Value÷ Total investment(52265790÷5,000,000)			1: 10.5
Net SROI (Net present value÷ Total investment(47265790÷ 5,000,000)			1: 9.5

DISCUSSION

Overall, the CLTSI demonstrated an important positive impact, with the households of Busia County benefiting the most. A comparison of the CLTSI SROI ratios against other SROI studies showed that the ratio CLTSI obtained was the lowest. This is possibly because this was a preventive intervention, in which a sensitive issue of human excreta was being handled. There has been no SROI evaluation done on sanitation and hygiene preventive interventions. The CLTSI resulted in improved sanitation and hygiene level after the CLTSI implementation. The impact was less felt by the CLTSI facilitators. The study is consistent with other studies that have been carried out in Kenya; APHRC, 2016 nutrition study of which SROI ratio was 1: 17 USD, Jonsonn, 2011 on solvetten AB equipment for purifying water, SROI ratio was 1:26 . The SROI analysis has found a high social return on this project -the fact that these evaluation

was done some time after the project had finished, demonstrates that there is also a sustained effect.

CONCLUSION

The study has determined the social-economic value added (SROI= KES 1: 10.5) that for every 1 KES 1invested, a social-economic value of KES 10.5 was added to residents of Busia County. This is a clear indication that CLTSI added social-economic value to the residents. The CLTSI is non-subsidies to sustainable sanitation behavioral changes. It has significant potential to empower many communities to improve the national coverage for sanitation and hygiene practices.

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