STRATEGIA NETHERLANDS

CORRELATES OF SLIPPAGE BACK TO OPEN DEFECATION AMONG HOUSEHOLDS IN VILLAGES FORMERLY DECLARED ODF WITHIN RUBAYA SUB COUNTY – MBARARA DISTRICT

BY

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AN RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF POSTGRADUATE DIPLOMA IN WATER, SANITATION AND HYGIENE (WASH) TO THE STRATEGIA NETHERLANDS

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DECLARATION

I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

DEDICATION

I sincerely dedicate this research project to my entire family for their encouragement and support both financially and morally.

ACKNOWLEDGEMENT

I would like to express my very profound gratitude to my parents and to my wife for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

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LIST OF ACRONYMS

CLTS	Community Led Total Sanitation
GoU	Government of Uganda
NGOs	Non-Governmental Organizations
OD	Open Defecation
ODF	Open Defecation Free
RICE	Research Institute for Compassionate Economics
SDGs	Sustainable Development Goals
SQUAT	Survey of Sanitation Quality, Use, Access and Trends
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

ABSTRACT

Background: The elimination of open defecation is one of the most important tenets of sustainable development, it being related to more than 5 of the 17 sustainable development agenda, including the goal for health. The need to achieve that target had led to the wider coverage of CLTS programs, with much success, as more and more communities are being declared open defecation free. However, the apparent greatest obstacle to the total achievement of that target is the slippage back to open defecation among open defecation free communities, which explains the persistence of the global number of open defecation practitioners at close to 1 billion over the past 2 years, with the greatest numbers being from Africa. In Uganda, Mbarara district, whose sanitation program received national acclaim, is still battling open defecation because of slippage in previously ODF communities in sub counties like Rubaya.

Objective: The purpose of this study was to assess the correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

Method: A cross sectional survey design was used, to study household heads in villages that were previously declared ODF in Rubaya Sub County. The sub county was purposively sampled, the parishes therein stratified, and previously ODF declared villages purposively sampled from each parish. Simple random sampling was then used to sample half the number of villages. Convenience sampling was used to sample the households, and the eligible member purposively sampled. Structured interviews were the data collection method, and the data collected was collected using SPSS v 25, using descriptive and inferential statistics.

Results: It was found that 16% (25) of the households had slipped back to OD by interview time, putting slippage at 16%. The prevalence of slippage back to OD was 1.5 times more among households that had children under five years as members (aPR = 1.411 (1.011 - 4.628, p = 0.033). The prevalence of slippage back to OD was least among households whose average age among male members was less than 18 years old (aPR = 0.237 (0.118 - 0.475, p = 0.000). Slippage to OD, was least prevalent among household in which the household head or adult member witnessed the putting of some feces into a water bottle by CLTS officials following which they asked any community member whether they would drink it (aPR = 0.411 (0.178 - 0.689,P = 0.004).

Conclusion: Slippage back to open defecation among households in villages that were previously declared ODF within Rubaya sub county is prevalent then, at a level of 16%, implying that approximately 2 in 10 households have slipped back to OD in that sub county. Both intra-household and CLTS program characteristics are correlated to that slippage, although the former is more important than the latter.

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.0 Introduction

Following the recognition of the fact that sanitation can antecede the incidence of multiple preventable communicable diseases is not well managed; the past decade has witnessed a Srenewed global interest in the health impacts of its improvement (Headey, 2019). This is evidenced in the prioritization of sanitation in the sustainable development agenda, particularly under goal 6, which seeks to guarantee clean water and sanitation for all, with emphasis ending open defecation (Pan American Health Organization, 2019). The achievement of Goal 6, along with all its targets (6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6A, and 6B) (United Nations, 2019; UN water, 2019) is actually mediated by the ending of open defecation, making the ending of open defecation arguably the most important target in the goal. In addition, ending open defecation has implications for almost all other Sustainable Development Goals (SDGs) especially the health SDG (Goal 3) given that open defecation can directly affect maternal and child health.

As such, health promotion interventions notably the Community Led Total Sanitation (CLTS) program that have been in place for more than a decade have now been spread out more, following their proven efficacy in combating open defecation (Yeboah-Antwi, 2019 Gebremariam et al., 2019). Indeed following the increasing implementation of CLTS, many previously triggered villages in numerous countries have been declared Open Defecation Free (Kashiwase, 2019). However, the public health challenge currently at hand is that whereas that it is the case, the end to open defecation happens to not be near because of slippage of some of the areas previously declared ODF, back to open defecation. This has been recognized as the biggest obstacle to achieving goal 6, and SDG 3.2 for child mortality reduction.

1.2 Background of the study

Open defecation is one of the largest proponents of waterborne diseases, given its high pathogen composition (UNICEF, 2019). One gram of faeces contains up to 10,000,000 viruses, 1,000,000 bacteria, and 1,000 parasite cysts (UNICEF, 2019), all of which, combined or singly, are responsible for the disease causing propensity that open defecation has. The pathogenic composition of human feces makes it a primary source of pathogens that cause diarrheal diseases such as cholera, typhoid and amoebic dysentery (Kimberlin, 2018; Ayalew, 2018; Njuguna, 2016). Due to its viral component, open defecation is correlated with the incidence of Hepatitis A (Giribabu et al., 2019), and hepatitis E, that is spreads through drinking water contaminated by human feces. Soil-transmitted Helminths are another health risk associated with open defecation (Giribabu et al., 2019), with the most affected demographic being children and youth (CLTS Foundation, 2018). Children particularly, who are exposed to human faeces interfaced with following being openly defecated risk being stunted and wasted (CLTS Foundation, 2018; (Spears, 2018; George, 2016). That impairment in child growth is an independent risk factor for childhood morbidity and mortality (Headey, 2019), reduced cognitive, physical, and sensorimotor development, and poorer school performance and economic productivity (Prendergast, 2014).

Most of the effects of open defecation on child health arise from environmental enteropathy, a subclinical condition of the small intestine characterized by increased intestinal permeability and inflammation and malabsorption of nutrients, leading to growth failure (Prendergast, 2014; George, 2016). Besides, effects on child health, open defecation also affect maternal health, especially during pregnancy when geophagia gets common, increasing chances of ingesting intestinal parasites that can increase risk of anemia during pregnancy (Azeez, 2019; Saleem et

al., 2019). The environment is not spared either; fecal contamination results in increased nutrient loadings to water bodies like lakes, streams, and reservoirs, affecting ecosystems and causing loss of biodiversity (Giribabu et al., 2019), with a ripple effect on human health. The effect of open defecation on child, maternal and environmental health combined lead to economic losses in excess of 100 billion dollars annually (World Bank, 2018). These economic costs arise from premature deaths, the cost of health care treatment, lost time and productivity seeking treatment, and lost time and productivity finding access to sanitation facilities. Pollution resulting from improper disposal and treatment of wastewater and domestic fecal sludge also affects both water resources and ecosystems (World Bank, 2018).

With the maternal, child, environmental health and ultimately economic effects of open defecation observed over the years, governments and Non-Governmental Organizations (NGOs) started providing free or subsidized latrines to households (Venkataramanan, 2018), in a bid to eliminate open defecation. However, that was not efficacious, because intended users appeared not to value, use or maintain facilities (Zuin et al., 2019). This created a shift from subsidy based to behavioral approaches meant to stimulate demand for and use of sanitation facilities (Venkataramanan, 2017), Community-Led Total Sanitation (CLTS) being the most widely deployed of these behavioral interventions. (Zuin et al., 2019). As opposed to delivering latrine construction to households, CLTS relies on behavioral change and community self-enforcement to end OD and prompt the personal construction of latrines (Zuin et al., 2019).

The community led total sanitation has now spread worldwide (Montero, 2018) since its genesis in Bangladesh in 1999, and is now implemented at least at some scale in 59 countries in Asia, Africa, and Latin America (Zuin et al., 2019), with some 31 having it as their national strategy or policy for rural sanitation (IDS, 2019b). The program has been found to be effective in

eliminating open defecation (Crocker 2016b; Crocker, 2016c; Pickering, 2015; Yeboah-Antwi, 2019; Gebremariam et al., 2019). As a result of CLTS, the world nearly halved the number of people practicing open defecation from 1.3 billion to around 670 million between the year 2000 and 2017 (Kashiwase, 2019) following the declaration of many implementation areas as open defecation free. An area is generally 'open defecation free' (ODF) all members therein have access to and use a latrine at all times of defecation (Okullo et al., 2017). However, there has been a rise in cases of OD, despite wide implementation of CLTS and the declaration of many areas as ODF. The new cases of OD are substantially contributed by slippage to OD in former ODF declared villages.

Thus, there has been a more than 30% increase from the 2017 number of OD practitioners to more than 800 million people (UNICEF, 2019; UNICEF, 2019; WHO, 2019; World Bank, 2018). More than of them being from South Asia and Sub-Saharan Africa (Mukherjee et al., 2019; UNICEF &WHO, 2017), in which CLTS is most implemented with many villages declared ODF (World Bank, 2019). Most developed countries having rates ranging from 0% to 1%, while in Africa, countries therein exhibit the highest OD rates of up to 68%. African countries like Niger (68%), Benin (54%), Burkina Faso (47%), Chad (67%), Eritrea (67%), Madagascar (45%), Namibia (49%), Togo (48%) (World Bank, 2019).

Despite significant achievements in increasing the number of villages designated as open defecation free (ODF) in targeted areas in Uganda, OD is still practiced widely (Gibson et al., 2018). The World Bank (2019) put the OD rate in Uganda at 6%, however some districts have exhibited OD rates that exceed the national average twice and even thrice (Gibson et al., 2018). Mbarara is one of these districts, in which villages in sub counties like Rubaya still exhibit higher than national average OD rates, despite CLTS implementation.

1.2 Statement of the problem

Mbarara's rural sanitation improvement program that incorporates the community led total sanitation approach meant to eliminate open defecation won national acclaim starting from the year 2016 (Gibson et al., 2018), based in part on the numerous numbers of villages that have been declared ODF over the years. However, the challenge the district has faced over the same period of time is the sustenance of the gains in OD elimination in ODF villages, as some have been reported to slip back to OD (Gibson et al., 2018). One of sub counties that have registered the most rampant evidence of slippage to OD is Rubaya. According to the district health office, Rubaya has had up to 14 villages previously declared ODF; but that in some of these villages water pollution by human waste has become evident. In the second quarter of the year 2019, the district health inspector's office recorded cases of visible faeces in vicinities of households in Rwobuyenje, Kagyera, Ndarura and Rubumba villages, yet they are some of those that had been earlier declared open defecation free. This is evidence of the fact that open defecation in Rubaya is a reality, particularly even in villages that were ODF, which is symbolic of slippage.

However, whereas that is most likely to the case, and perhaps more wide spread in the sub county, there has been neither district mounted investigations, nor independent investigations made to determine the level of slippage back to OD in formerly ODF villages in Rubaya. What is known is evidence of possible slippage in Rubaya Sub County, as mentioned above, and not its prevalence. Similarly, there is not statistical evidence of what the correlates of slippage back to OD could be in the context of Rubaya. What is known to that effect, still, is by and large not based on evidence in study, which was a knowledge gap. Given that available funds CLTS programs are meant for until a village become ODF, slippage could imply persistence of OD, if slippage is not prevented, hence justifying the need to fill the gap and inform intervention.

1.3 Research questions

1. What is the prevalence of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district?
2. What are the intra-household correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district?
3. What are Community Led Total Sanitation Program related correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district?

1.4 Objectives of the study

1.4.1 General objectives

To assess the correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

1.4.2 Specific objectives

1. To determine the prevalence of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district
2. To identify the intra-household correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

3. To determine Community Led Total Sanitation Program related correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

1.5 Justification of the study

Sanitation is now considered to be a human right (Okullo et al., 2017), in part because of the fact that every living human being deserves to have access to and live in health environments. It thus has an entire sustainable development goal dedicated to achieving it. However, the greatest obstacle to achieving goal 6 in its entirety is open defecation, which is a known fact, cognizance of which has led to the implementation of behavior change driven programs like CLTS in all communities practicing OD. This has undeniably led to the declaration of many of the beneficiary villages as open defecation free (ODF), which by the year 2017 led to the reduction of OD practitioners from 1.3 billion to 670 million, as a result of increased toilet coverage. However, an upwards trend was noticed last year, when the number of OD practitioners increased to more than 800 million, with most from communities that were declared open defecation free. This implies that they slipped back to open defecation, a regressive practice which can undermine the efforts of CLTS and achievement of Goal 6. The practice can hamper progress if not prevented especially given that funding for CLTS programs applies only until an ODF status is achieved and not after, meaning that funding for tackling slippage is not allocated.

However, so far, most of the studies that have tackled the issue of open defecation have focused on correlates of OD incidence (Bhatt, 2019; Yogananth, 2018; Gupta et al., 2018; Kawale, 2018; Osumanu, 2019), sustainability of OD (Patwa, J., & Pandit, 2018; and the effectiveness of CLTS. Very few studies have focused on the issue of slippage back to OD in communities previously

declared ODF, with majority of them being from countries like Indonesia (Odagiri et al (2017), Ghana (Crocker, 2017), Kenya (Njuguna et al., 2019), Wilbur (2014) and non from Uganda. That is despite of the fact that the government of Uganda (GoU) has strongly emphasized eradicating open defecation; particularly through funding support for rural CLTS (Gibson et al., 2018), yet it has persisted in districts like Mbarara in part due to slippage back to OD in villages that were previously ODF. There is therefore absolute need to have the correlates of slippage studied in the context of districts like Mbarara in order to inform interventions that will be set up in order to have sustainable ODF status in the district and particularly sub counties like Rubaya.

1.6 Significance of the study

One of the challenges that the local government of Mbarara is currently struggling with the sustainability of open defecation free statuses in villages were CLTS has had impact. The local government has gone ahead to increase budgetary allocations for OD elimination to little avail, perhaps due to the non-availability of evidence for what anteceded slippage. The findings of this study, including intra-household and CLTS program related correlates may therefore be of significance to the local government of the district, as the findings have indicated the characteristics that are protective of slippage back to OD, which the local government can capitalize for minimization in future interventions.

The coordinators and implementers of the community led total sanitation program in Mbarara district, and perhaps the entire country might also benefit from the study, given that it has particularly highlighted the CLTS program correlates of slippage back to OD, findings which will be used to augment triggering and follow up phases of the program when implemented in other villages, in order to prevent slippage.

From a health promotion perspective, the findings of this study will empower household heads in Rubaya Sub County with information related to the characteristics of their own households that promote slippage. With that information, it is expected that that the household heads will be able to proactively step in and instate modifications in inhabitant behavior, for purposes of sustaining ODF status.

This study being among the few that have focused on the prevalence and correlates of slippage back to OD in communities that were formerly ODF is expected to trigger the conduction of similar studies in districts that have reported cases of Slippage, for instance in Arua and Lira districts.

1.7 Scope of the study

1.7.1 Geographical scope

The study was conducted in Mbarara district, the choice of which was informed by the fact that that Mbarara was in the recent past considered to have one of the most efficacious community led total sanitation programs in Uganda, given the number of villages that had been declared open defecation free in the district, yet, it still struggles with the vice that is open defecation. Most of the areas including Rubaya Sub County, where open defecation is still prevalent have villages that were ODF, which indicates that some villages slipped back to OD. Mbarara district boarders Ibanda and Kiruhura Districts to the north; Kiruhura and Isingiro districts to the east; Isingiro and Ntungamo Districts to the south; and Sheema District to the west. Rubaya Sub County where the study was conducted is comprised of 7 parishes, and a number of villages, some of which were triggered and declared ODF. The composition of the sub county is shown in table 1 below;

Table 1: Administrative composition of Rubaya Sub County

Parish	Villages
Bigaaga	Kabere, Kagogo, Kasumo, Kitahurira, Murandamo, Mushenyi A, Mushenyi B, Nyinabirere, Rubumba, Rusisiro, Rutare, Rwara
Bunenero	Bunenero, Ekigando, Ekitete, Kaburamuriro, Kabwera, Kahoma, Mutonto, Rubaya, Ruburara I, Ruburara Ii, Rugarama, Rukukuru, Ruyonza, Rwantsinga
Buramba	Biringo, Bwaya, Hakabungo, Kacereere, Karambo, Muhenvu, Mukabaya, Nganzo, Nyamugabi, Nyinamuhomberi, Rutooma I, Rutooma Ii, Rwanganiro, Rwemihanga
Itara	Ekirehe I, Ekirehe Ii, Ekyera I, Ekyera Ii, Ekyera Iii, Itara Kyarwamaganda, Rukukuru
Kahungye	Kamuganguzi, Cyahafi, Kanzhobe, Kabale, Bubale, Rubanda, Kisoro Ngoma, Rubaare
Karujanga	Buhekyenya, Buhinga, Kabeho, Kibigwe, Kikingo, Kitabarwa A, Kitabarwa B, Kitojo, Mushenyi, Nyakabungo, Nyinamuronzi Nyinarushengye, Ruhita, Rushaki A ,Rushaki B, Rushebeya, Rwashoshone, Ryanyakahama
Kibuga	Kamugangui, Kanzhobe, Kabale, Bubale, Cyahafi, Rubanda, Kisoro Ngoma, Rubaare
Kitooma	Katamba, Kibwera, Kinyaza, Koranorya, Koranotunga, Kyempisi, Migamba, Nyakanengo, Nyakinengo, Nyamabare, Rwabukwire, Rwagaju, Rwemikunyu, Rwobuyenje
Kishasha	Habugarama, Itara, Kagasha, Kagugo, Karengyere, Kashenyi, Kashungyera, Kigoro, Kirwa, Mburashasho, Mukoni, Nyabigore, Nyakabungo, Rwabarera, Rwabihindu
Mugandu	Kacerere, Kagyera, Kigarama, Kihiira, Muguri A, Muguri Nyakitokoli, Nyamabale, Nyinasunzu, Rukore
Nyabuhama	Biharwe T. C, Kasharara, Katojo, Kyanyarukondo, Mairo-rugarama, Rwebishenye, Rwemirabyo, Rwenkanja
Ruhunga	Ekiyayo, Geitemba, Kaguhanzya, Kaigoshora, Kaiho, Kasheenyi, Katete, Katete, Nyakibungo, Rugyerera, Ruhunga Central, Ruhunga I, Ruhunga Ii
Rushozi	Kakono, Kanga, Kyamatambarire I, Kyamatambarire Ii, Muko, Nyantungu, Rwabaranga, Rwenkanja
Rwanyena	Bugomora, Hakakingo, Hamuhambo, Kabirago, Kantambara, Katabura, Kigarama, Kihorongwa, Ishaze, Mukiyanja, Murungu, Musamba, Ndarura

Source: Mbarara district local government (2019)

1.7.2 Content scope

This study was delimited to assessing slippage back to open defecation, among households in Rubaya Sub County, of which slippage was the dependent variable. The assessment of slippage back to open defecation was done in consideration of an entire household because according to Kar (2008), the developer of the CLTS program, a village is declared Open Defecation Free if no member in a given household constituting a triggered village defecates anywhere but in a designated toilet or latrine. It thus follows that open defecation free status does not consider individuals but rather individuals in a household as a whole, hence the use of that approach in

this study. In addition, status of being defecation free was further categorized as ODF+ if there was no visible human waste around a homestead, and no one in the household had defecated anywhere but in a toilet in the past three months, and 85% of the households had functional toilets. A household was declared ODF++ if was no visible human waste around a homestead, no one in the household had defecated anywhere but in a toilet in the past three months, and if 95% of the households had a functional latrine

There were two independent variables that were considered, following the suppositions of the socio ecological theory (Bronfrenbrenner, 1998), which supposes that health behavior like open defecation is anteceded by five factors, two of which are at an interpersonal (intra household) or an institutional level (CLTS program) levels.

1.7.2 Time scope

The assessment of slippage back into open defecation was assessed over a three months retrospective period. The three months period was used on the presumption that a household that has not slipped back into OD would have its ODF status maintained for at least a quarter of a year, more so prior to the study. In addition, most of the villages in Rubaya Sub County had had the ODF status for less than a year, which made a three months period more likely to avoid data bias that would have arisen due to assessment of slippage even in a time when a given village had not been declared OD.

1.8 Conceptual framework

The figure below shows the conceptual framework that was been developed based on the two constructs that were adapted from the socio ecological theory. The two constructs formed the independent variables (intra-household, and CLTS characteristics). The dependent variable,

which was conceptualized as being affected by the two independent variables is slippage back to open defecation by persons in a household, which was indicated by a Household currently having no functional latrine and a household having a member who practiced OD in the previous three months.

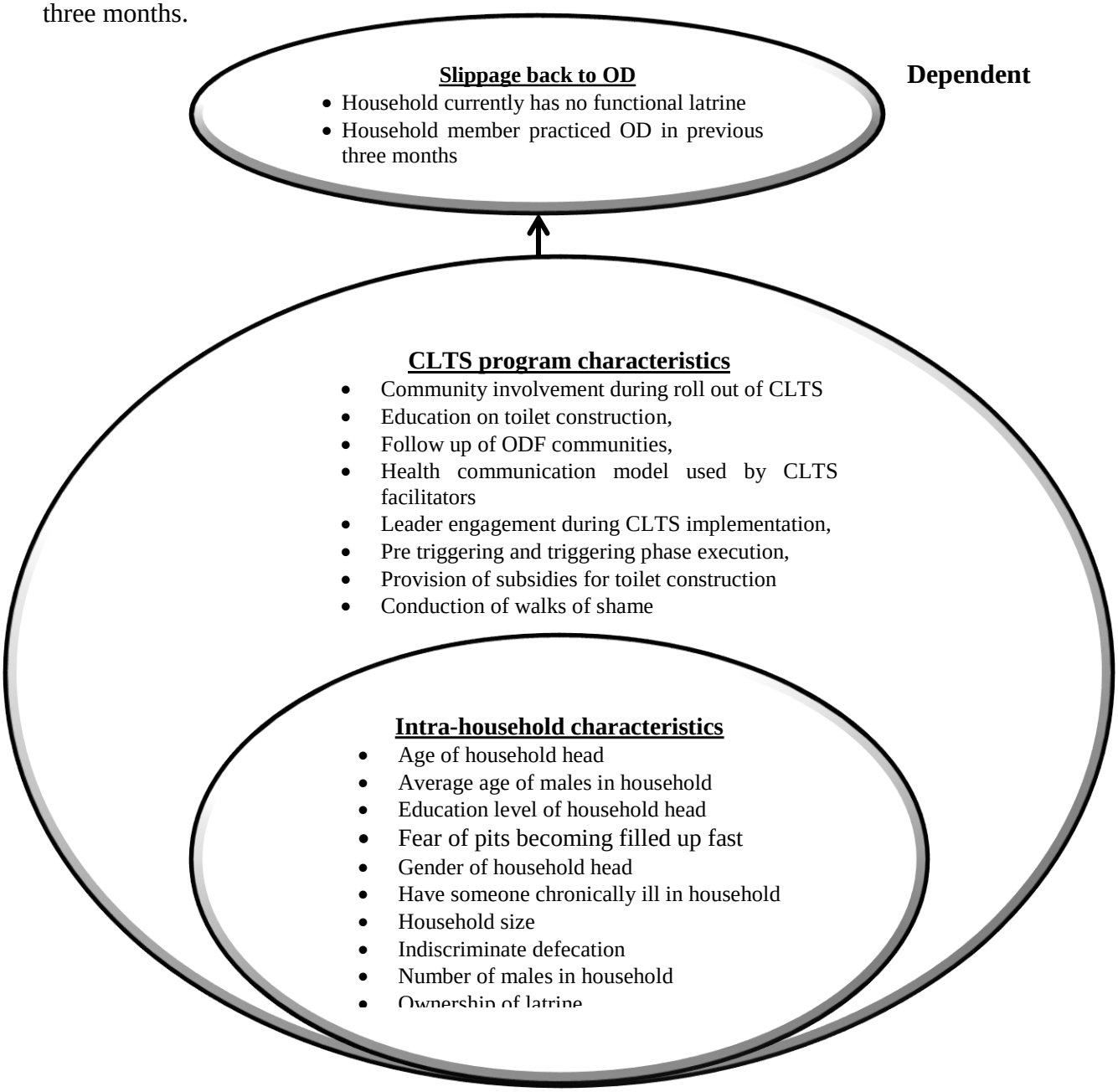


Figure 1: Conceptual framework Adapted from Bronfrenbrenner (1989)

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of literature related to the three objectives that the study, organized in the heading; 2.1 Prevalence of slippage to OD, 2.2 intra-household correlates of slippage to OD and 2.3 CLTS program correlates of slippage back to open defecation. To obtain the literature, a review of the literature was conducted in PubMed and EMBASE using search terms for OD in LMICs. The search terms that were used to filter out the literature were identified through medical subject headings (MeSH) (PubMed), Emtree terms (EMBASE) and from those used for systematic reviews on similar topics. LMIC were defined based on the World Bank definition of low-, lower middle-, and upper middle-income countries. The search was limited to peer-reviewed articles published in English and were performed through 2013 to 2019 with no restriction on the year of publication.

2.1 Prevalence of slippage back to open defecation

The elimination of open defecation is prioritized by both international and local organizations for purposed of improving health, nutrition and productivity of developing country populations, and is actually explicitly mentioned in SDG target 6.2 (JMP, 2018). It enables the communities to conduct their own sanitation profile through appraisal, observation, and analysis of their practice of OD and its effects (Tessema, 2017). The heart of this approach lies on having a paradigm shift from providing sanitation facilities to achieving collective behavioral changes with growing evidence on open defecation and creating open defecation-free (ODF) environments (Andres, 2013).

Recent years have witnessed an increase in latrine construction and access among rural households in Asia (Swachh Bharat Mission, 2019) and the world over (WHO, 2019), which has increased the number of villages declared ODF. Open defecation free status has two main categories, them being ODF when no one defecates in the open, and there are no visible faeces in the vicinity, ODF+ when no one defecates in the open, there are no visible faeces in the vicinity, and 85% of the households have functional toilets, and ODF++ when no one defecates in the open, there are no visible faeces in the vicinity, and 95% or more of the households have functional toilets. However, the transition from defecating in the open to using latrines appears to be slower, as slippage happens even when toilets are available (Gupta, 2019). A previous survey of rural north Indian states (Bihar, Madhya Pradesh, Rajasthan, and UP) completed in late 2018 found that the rate of open defecation among people who owned a latrine was at 23% (the same as four years prior to the survey), indicating 23% slippage and that the overall open defecation rate among rural people across these states was 44% (Gupta et al., 2018).

A survey conducted by the Research Institute for Compassionate Economics (RICE) contradicted the Indian government's claims that open defecation had been eliminated from certain states (Gupta et al., 2019) following massive toilet construction. It reported that between 42% and 57% of rural people in Uttar Pradesh, Bihar, Rajasthan and Madhya Pradesh over two years of age defecate in the open, with a preferred estimate of 43%. Another finding indicated that 40% of households with a latrine have at least one person who defecates in the open, and 56% of all households have at least one person who defecates in the open in rural areas in these states, indicating higher slippage, than earlier reported.

Another study conducted in Dharmapuri, a district that has the highest rate of open defecation in Tamil Nadu also found that 54.8% of the respondents chose to defecate in the open despite

having access to a latrine (Yogananth & Bhatnagar, 2018). A survey conducted done by the World Bank in five districts in the Indian state of Uttar Pradesh found that 40% of people who had toilets did not use them (Gauri, et al., 2018).

Similar levels of slippage rates have been reported one to two years after completion of CLTS programmes; for instance, from 17% of households practicing open defecation at the end of the intervention to 26% in one CLTS intervention in Ethiopia (Crocker, 2017), from ODF status to 13% of households without a functional latrine in Ethiopia, Kenya, Uganda, and Sierra Leone (Cameron, 2015), and from 20% of households without a sanitation facility at the end of the intervention to 31% in Mozambique (UNICEF, 2014)

In Rural Indonesia, Odagiri (2017) assessed the sustainability of verified Open Defecation Free (ODF) villages and explored the association between slippage occurrence and the strength of social norms through a government conducted cross-sectional data collection in rural Indonesia. The findings of that study showed that the levels of slippage were relatively similar in five ODF villages, ranging from 3.7 to 13.8%, with exception of one Village (51.9%). On average, slippage was found to be 14.5% of households. That study further established that among respondents that were classified as having slipped back, 64.7% owned a private latrine and 16.5% used a shared toilet, not exclusively. The remaining 18.8% reported to not own a private latrine, and to not use a shared toilet, but to practice open defecation usually.

In India, Gupta (2018) studied changes in open defecation in rural north India between 2014 - 2018. He noted that although rural latrine ownership increased considerably over that period, open defecation remained very common, with approximately 40 to 50% of rural people in the sampled states defecated in the open in late 2018. Much of the reduction in open defecation was

a result of new latrine construction, but that the fraction of people who own a latrine, but who nevertheless defecated in the open, did not change between 2014 and 2018: it was about 23% in both years, due to slippage to OD regardless of having latrines constructed.

Still in India, a survey of Sanitation Quality, Use, Access and Trends (SQUAT) in rural north India, was revealing: it found that 40 per cent of respondents preferred OD even when their household had a working toilet, and that toilet, handwashing or other hygiene practices varied substantially even within households (Coffey et al 2014). The Plan study (Tyndale-Biscoe et al 2013) also revealed that even in households that maintained their toilets, some household members could still be practicing OD.

Tyndale-Biscoe (2013) conducted a study of factors affecting the sustainability of open defecation free (ODF) status in rural villages following Community-Led Total Sanitation (CLTS) triggering. The study investigated results in CLTS programs operated by Plan International in four countries in Africa; Ethiopia, Kenya, Uganda and Sierra Leone. Data was collected in 4960 households in 116 villages where CLTS had been triggered and communities declared ODF. The findings of the study showed that 87% of the 4960 Phase 1 households still had a functioning latrine, and the authors added that if ODF status was equated with a household having a functioning latrine then the study found that the rate of reversion (or 'slippage') was just 13%. It has been reported that on the basis of just the presence of a latrine, Ethiopia has been the most successful with reversion rates of just 8%. Kenya has the highest reversion rates on this basis – around 22% overall, with the other two countries (Uganda and Sierra Leone) hovering around the average.

UNICEF (2015) conducted a study with a main objective of assessing the sustainability of ODF status post ODF certification in a total of 42 ODF certified villages in Kenya. The study was conducted in 7 districts namely: Rachuonyo, Nyando, Kisumu West, Bondo, Siaya, Busia and Nambale. According to the findings, the identified OD households were spread out across villages, so there was some level of reversal from ODF status in more than 60% villages. In most cases (57% of the villages) this was measured as partial reversal (less than 10% households with OD behaviour) and only 5 villages were measured as severe reversal (more than 10% households with OD behaviour). The authors also noted that Nambale sub-county which had been certified as 100% ODF in 2012 had the lowest levels of reversal with over 75% of villages still fully ODF.

2.2 Intra-household predictors of reversal to open defecation among persons in villages that were formerly declared ODF

By the time a village is declared ODF, it implies that each household in that village has no member that practices OD. However, a number of studies (Coffey et al., 2014; Routray et al., 2015) have linked numerous individual characteristics of household members and the characteristics of the household as a whole to slippage or reversal to OD after prior declaration of the village they are in, as ODF. In Uganda and Zambia, it has been reported that a person who is older, disabled, or chronically ill is more likely to defecate in the open (Wilbur and Danquah, 2015; Cavill et al., 2016).

In a study by Bicchieri (2017) which was conducted in rural and urban Bihar and Tamil Nadu, India, and another study by Coffey et al., (2014), men were have been found more likely to defecate in the open as compared to women. Bicchieri (2017) also noted that young men

between the age of 30-35 years were defecating in the open more despite owning a latrine compared to men 20-25 years old. The author also noted that those older than 60 in Bihar and 50 in Tamil Nadu had slightly higher open defecation rates despite owning latrines, but that there were no significant differences between male and female latrine usage.

Some studies have however noted gender differences in reversal to OD in areas that were formerly ODF. According to House and Cavill (2015) and Roose et al (2015) women have many reasons for using toilets which do not apply to men. In South Asia, toilets remove the physical and mental stress of having to go before dawn and the loss of sleep entailed, or of having to hold out until dark. The SQUAT survey (Coffey et al 2014) found that in households with toilets, men were less likely to use them than women. On the contrary though, a study in the subsequent year by Routray et al., (2015) found that women unlike men reported that OD gave them a rare opportunity to leave their homes and have time away from chores and responsibilities.

More studies have however linked men to OD and women to sustained ODF. A study in Bihar, India by the Water, Sanitation and Hygiene Institute (2015) in that country tried to shed light on the choice of OD among men. The findings of that study showed that men chose OD to relieve queuing or pressure on a toilet in the morning, for instance when children their children were getting ready for school. In that study, a man in an ODF Indian village said he habitually went for OD, using the cat method (digging a hole and burying his faces), for this reason because men wanted or needed to take longer defecating than women or children and want to avoid the embarrassment of being seen to take longer. Bhatt et al (2019) also reported that for women the issues with privacy and issues refraining women to use the same latrine as men compelled women to look for open defecation places

Kawale (2018) also conducted a cross sectional, hospital based study among people attending tertiary care hospital in India; to find out the socio-demographic factors affecting utilization of toilets constructed. The findings of that study showed that the utilization of toilets was more among females, among younger age group i.e. less than 30 years among literate participants and family headed by literate person.

The other intra-household characteristics that have been found to be correlated to slippage back to open defecation is the presence of young children in a household. Young children have been reported to be constantly slipping to OD in formerly ODF villages in South Asia (Majorin et al., 2014). Among household that own latrines, open defecation is common in young children who generally defecate freely until they learn how to use a latrine around 5 or 6 years of age. Kawale (2018) also reported that peoples who were unmarried and living in a family having more than 5 members, and family not having under 5 year children had more toilet utilization, and no slippage to children.

In a study by Budhathoki (2017) that was conducted in Eastern Nepal, it was concluded that the presence of child below 5 years of age at home, functional latrine, frequency of cleaning and latrine constructed with self-initiation was factors significantly associated with the utilization of the latrine. In that study, the households having children less than 5 years were less likely to use latrine than those without child.

In Kenya, UNICEF (2015) found that factors that appeared to most influence the sustainability of ODF status were the use of latrines by children (over 3 years old) and strong social norms. A high proportion of the villages which had sustained ODF also had a high proportion of households whose children always used a latrine. This was in contrast to the villages which had

reverted to OD behaviour, in which a high number of children who had reached the age of using a latrine were defecating in the open.

Toilet ownership itself has been reported to matter. Budhathoki (2017) reported that households with functional latrines were 27.37 times more likely to utilize latrines than those without a functional latrine. It was reported that people from households who always cleaned their latrine were 3.66 times more likely to utilize latrine than those who rarely clean latrine. The people from households who built latrine on self-initiation were 4.22 times more likely to use the latrine.

In the study by Odagiri et al (2017) the findings showed that of the respondents that were classified as having slipped back, 64.7% owned a private latrine and 16.5% used a shared toilet, not exclusively. The remaining 18.8% reported to not own a private latrine, and to not use a shared toilet, but to practice open defecation usually.

In his cross sectional study to understand various socioeconomic factors associated with OD practice in Lodwar's human settlements in Turkana County, Busienei (2017) revealed that latrine presence and education level of the household head, latrine sharing, and occupation of the household head. In Mozambique, Harter (2018) showed that people in a relationship were 2.35 times more likely to own a latrine than those who were not.

Besides demography of households, the individual perceptions of household members have also been suggested to be influencers of reversal to OD. In Indonesia for example, Odagiri (2017) explored factors associated with overall slippage to OD, and found that respondents' perceptions around latrine ownership in their community and acceptance of open defecation near a water body were significant factors. Specifically, he noted that respondents disagreeing that most people lack access to a toilet in their community and disagreeing that it is acceptable to defecate

on the beach or in a river were significantly less likely to have slipped back. In Mozambique, Harter (2018) concluded that feeling less vulnerable to becoming infected with diarrhea increased chances of OD or slippage into it.

Odagiri et al (2019) found that the motivation to use a latrine for cleaner and healthier living in their home was also found be associated with lower odds ratio of respondents having slipped back. The same applied to having access to all year-round water access for household needs were associated with lower odds of households having slipped back. There was also nearly significant evidence that satisfaction with a latrine as a place for defecation was associated with consistent latrine use behaviour

The fear of pits becoming full, among members of a given household has also been cited as one that can dissuade people from using toilets in ODF villages (Chambers, 2016). Emptying a filled pit is difficult for many people, and could result in reversion to OD. According to Myers (2016), and Gupta et al. (2016), fear of pits becoming full and the spiritually 'polluting' nature of faeces can also dissuade people from using them, or only using them occasionally. In Odisha, Routray et al (2015) found a fear that single three ringed pits would quickly fill up if used all the time, and in rural Northern India, people want deep, large pits, typically septic tanks that will last a lifetime (Shah et al 2013; Coffey et al 2015), short of which they tend to slip to OD. Alarmingly, the slowest rates of progress are among the poorest quintiles of society (WHO/UNICEF, 2015).

The cost of emptying is one factor: the availability and perceived affordability of pit emptying services has been found to be a key issue in sustaining toilet usage and ODF conditions in Bangladesh (Hanchett et al 2011). In the Lao People's Democratic Republic , households unable to afford the average emptying cost of US$50 have reverted to OD (Opel and Cheuasongkham

2015); and in Cambodia, increased risk of reverting was noted in households that could not afford emptying services. The poorest and most marginalized often also have a high use of unhygienic, unimproved latrines (Mukherjee, 2016; Hanchett, 2016), and reversion to OD has also been found to be higher costs (Robinson and Gnilo, 2016b).

2.3 Program related predictors of reversal to OD in villages formerly declared ODF

The social context is formed by broad parameters such as culture, laws, policies, and the information available (e.g. CLTS events) (Mosler, 2018). In steering a community towards becoming and remaining open defecation free (ODF), programs like CLTS need to concentrate "on the whole community rather than on individual behaviors" (Kar, 2008). The interaction of community members and the social environment is crucial for the success of CLTS programs (Harter, 2018). Therefore, the concepts of social capital, social dilemma and social identity need to be considered, while rolling out the program in its initial phases. The construct of social capital groups together such factors as trust, cooperation, communication, and social cohesion. Social dilemma describes situations in which an individual is better off when not behaving in a way that benefits the whole group (Mosler, 2018). Latrine construction can be seen as such: one can save costs and the effort of maintenance by defecating in the open, but this creates a risk for the whole community (Bicchieri, 2016; Alzua, 2014).

Follow-up and reinforcement are critical for sustainable ODF status but have been widely neglected. ODF certification has often been treated as a final event, leaving post-ODF sustainability to take care of itself (UNICEF, 2014). During follow up, it is usually for an implementing organization to offer external support to all beneficiaries. The Plan study (Tyndale-Biscoe et al 2013) found that external support and encouragement influenced

household decisions: OD households gave lack of support as the third most important factor in their decision to abandon their toilets.

UNICEF's evaluation of CATS (2014) again highlighted the need for reinforcement activities to ensure that the new ODF behaviours are sustained. Thomas and Bevan (2013) recommend post-certification visits at least once per month during the first year. The WSP study in Bangladesh (Hanchett et al 2011) found that the households that reported having been exposed to a follow-up program were more likely to have an improved or shared toilet than those without one. In Bangladesh, long-term sanitation programs have been established to support behaviour change, including a sanitation secretariat in government and celebrations in a sanitation month. Again and again evidence points to the conclusion that sustained ODF status is more likely with continuing external encouragement and support and where those engaged in follow-up are supportive and empathetic of communities and households rather than judgmental or lecturing

Recent experience has also highlighted the importance of integrating post-ODF follow-up into programming from the outset (UNICEF, 2014; Cavill et al., 2015). Post-ODF follow-up, support and encouragement have been shown to help maintain ODF and support progression (Tyndale-Biscoe et al., 2013; UNICEF, 2014).

Besides follow up, subsidy provision has also been reported to been reported to be important in sustaining ODF in areas that previously benefited from CLTS activities, but some studies have found it to be insignificant. Guiteras et al. (2015) reported that the CLTS-like latrine promotion program was not effective without a concurrent subsidy.

Further still, Abireham (2018) noted that despite a high level of awareness and a positive attitude towards latrines, sustaining ODF status over time was a challenge that has also been linked to the

poor implementation of CLTSH post-triggering follow-up and post-ODF activities. In Ethiopia, it was also reported that despite the availability of a clear national strategy to scale up CLTSH all over rural Ethiopia and government commitments at the national level (FMOH Ethiopia, 2013), the lack of strong local leadership at the lower level negatively impacted its effectiveness, showing the need to strengthen local capacities.

According to Venkataramanan (2018) a key participant in CLTS is the natural leader, typically a community member who emerges in the triggering process as someone particularly motivated to improve sanitation. One study reported that training of leaders led to greater participation and better sanitation outcomes in Ghana (Crocker et al. 2016a), and practitioners in Madagascar reported that training helped motivate natural leaders to be more active in their communities (SEED Madagascar 2016).

It has also been reported that multiple behavior change frameworks employed in CLTS, like shame and disgust, although popular are not universal motivators that trigger communities (Sigler et al., 2015), as compared to improved health, dignity, and pride were cited more often. Skilled facilitators in CLTS programs adapt their triggering techniques based on cultural considerations (Venkataramanan 2016). Less-skilled facilitators on the other hand resort to either lecturing communities on health benefits or falling back on conventional shaming or disgust-inducing triggering techniques, regardless of their appropriateness in that context, which has no effect on sustainable behavior change (Venkataramanan 2016).

CHAPTER THREE: METHODS

3.0 Introduction

This Chapter presents the description of the research process. It provides information concerning the methods that were used in undertaking this research as well as a justification for the use of each of the methods. The Chapter also describes the various stages of the research, which includes the study design, population, and selection of participants, sample size calculation, the data collection methods, data collection tools, quality control techniques, data management and data analysis, and ethical considerations. The Chapter ends with a discussion of the ethical considerations and a how the findings will be disseminated.

3.1 Study design

In view of the fact that the aim of this study will be to assess the prevalence and correlates of slippage back to open defecation, with two of the study objectives being analytical in nature, the study had to adopt a quantitative study design. Thus, a cross sectional survey design was used in which a representative sample of household heads was sampled and studied at one point in time, in Mbarara district. One of the defining features of a cross-sectional survey design is that it can compare different population groups located over a large geographical area at a single point in time. There was therefore be no need to follow up the household heads after engaging them in an interview, to find out whether their households had regained an ODF status. The benefit of a cross-sectional survey design and one of the reasons for which it was used in this study is that it allows researchers to compare many different variables at the same time, which was a key feature in this study, since the study had two independent variables each with more than 8 attributes therein, that had to be analyses against the dependent variable.

3.2 Study Population

The target population in this study included household heads and/or adults in any sampled households in the villages of Rubaya Sub County. Both household heads and adults were targeted because the interest of the study was to assess slippage back to OD using indicators including the absence of functional latrine, and presence of a person who practiced OD in the previous three months, information that only an adult in a household could provide. This is in addition to the fact that those persons can ably provide information related to the intra-household characteristics of their households, and the CLTS program characteristics that their household benefited from previously. Considering only household heads in this study would have limited obtainment of the required sample of households since some household heads were usually unavailable at times when households were sampled, due to various engagements, including work. Thus the fact that another adult was in position to provide the required data, and most likely be available, both were considered.

3.2.1 Eligibility criteria

Inclusion criteria

This study included;

- Household heads or adults who were familiar with the CLTS program activities that were carried out in the village. This criteria was considered because objective three of the study required that information about the CLTS program activities that were implemented in the village was fully known by the respondent, in order for them to provide valid data to that effect

Exclusion criteria

- The study excluded household heads who expressed reluctance in talking about the apparent open defecation characteristics of their households, even after consenting

3.3 Sample size calculation

The calculation of sample size in this study was conducted on the basis of the fact that the prevalence of slippage to open defecation (p) was not known in the context of formerly ODF villages of Rubaya Sub County and yet the number of households in the sub county (N) was known. Therefore, a formula that incorporates the target population size (N) as the main substitution entity was most suitable, hence the choice for the formula by Krejcie and Morgan (1970). The formula is given by;

$$n = \frac{Z^2 N P (1-P)}{d^2 (N-1) + Z^2 P (1-P)}$$

Where;

n = required sample size

Z^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size = number of households in villages that were declared ODF in Rubaya sub county = 260 Households.

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

$$n = \frac{Z^2 N P (1-P)}{d^2 (N-1) + Z^2 P (1-P)}$$

$$n = \frac{3.841 \times 260 \times 0.5 (1-0.5)}{0.0025 (260-1) + 3.841 \times 0.5 (1-0.5)}$$

$$n = \frac{3766.1005}{0.6475 + 0.9604}$$

$$n = \frac{249.704}{1.6079}$$

n = 155 households

Since only one person (household head or adult) was interviewed per household, each household represented one such person. Therefore, 155 household heads and/or adults were targeted in the villages of Rubaya Sub County.

3.4 Sampling procedures

Rubaya Sub County is constituted by 14 parishes, of those however, 7 parishes have villages that have ever been declared open defecation free, and they include and each of them has a number of villages that were declared ODF and ODF+ by the end of the year 2018. Since this study was focused on achieving as much external validity as possible, a simple random of sample of the parishes in the sub county was not done to choose a representative sample of them, but rather all

the seven parishes were stratified so that villages from each can be sampled. Stratified random sampling is a method of sampling that involves the division of a population into smaller groups known as strata. In stratified random sampling, the strata are formed based on members' shared attributes or characteristics. A random sample from each stratum was taken in a number proportional to the stratum's size when compared to the population. These subsets of the strata are then pooled to form a random sample.

As such the parishes in Rubaya Sub County were stratified into six strata, that is; stratum 1 for, Bigaaga parish, Strata 2 for Kibuga parish, Strata 3 for Kitooma parish, Strata 4 for Kishasha parish, Strata 5 for Mugandu parish, Strata 6 for Rushozi parish and Strata 7 for Rwanyen parish. After stratifying, a sample of half of all villages that had been declared ODF per stratum was sampled using the simple random sampling technique to avoid bias. To carry out the simple random sample of villages per stratum (parish), the names of the villages per stratum were written on pieces of Manila paper with the same color, folded and put in boxes representing each stratum. For each box, the required number of papers (half the number) was picked after each consecutive ruffle has been made per box. The names on the resultant picked papers were the names of the villages that were sampled per stratum, and they are shown in table 2 below;

Table 2: Villages sampled

Parish	Previously ODF Villages	Villages sampled
Bigaaga	Kabere, Nyinabirere, Rubumba, Rusisiro, Rutare, Rwara	Kabere, Nyinabirere, Rubumba
Kibuga	KamuganguiKisoro, Rubaare, and , Bubale,	Kamugangui, Bubale
Kitooma	Koranotunga, Kyempisi, Migamba,, Rwabukwire, Rwemikunyu, Rwobuyenje	Koranotunga, Kyempisi, Migamba
Kishasha	Kagugo, Kirwa, Mukoni, Nyabigore, Nyakabungo, Rwabarera, Rwabihindu	Kirwa, Mukoni, Nyabigore
Mugandu	Kacerere, Kagyera	Kacerere
Rushozi	Kakono, Kanga, Rwabaranga, Rwenkanja	Kanga, Rwenkanja
Rwanyena	Katabura, Kigarama, Murungu, Musamba, Ndarura	Musamba Murungu, Ndarura

After sampling the villages, the researcher proceeded to sampling the households in each of the sampled villages. In sampling households, both random and non-random sampling techniques can be used; however, random sampling methods are limited to households that have a systematic form of arrangement that can allow for randomization. That was however not the case for households in village settings like those in Rubaya sub county where households are situated at distances from each separated by farmland. Therefore, a convenience sampling method (nonrandom) was used, wherein; a household was sampled for as long as the researcher has access to it in any sampled formerly ODF village, followed by another in that order. At each household sampled, the researcher first established whether the household head is present, after which rapport was established and the consenting process initiated. If no household head was found present, the researcher went ahead to find out if there was an adult in the household, and if present, rapport was still established and the consenting process initiated. In case more than one adult is found in the household, the eldest was purposively sampled for the purpose of interview, on the premise that the eldest inhabitant was in better position to accurately report about the intra-household, and CLTS program characteristics.

Although the number of households per village that was sampled was not available, the researcher requested each local council 1 chairperson of the villages sampled, to provide him with an estimate of the number of households per villages, so that proportionating could be done, to ascertain how many households could be sampled from each village. The formula that was used in proportionating is;

$N_R = N_A / N_T \times n$

Where;

N_R = Number required per village

N_A = Number of households available

N_T = Total number of households available in all the sampled villages

n = Sample size

Table 3: Number of households that were sampled per village

Parish	Villages sampled	Estimated number of households in each villages N_A	Total number of households in the sampled villages N_T	Sample size n	Number of households required from village N_R
Bigaaga	Kabere, Nyinabirere, Rubumba	38	260	155	23
Kibuga	Kamugangui, Bubale	31	260	155	18
Kitooma	Koranotunga, Kyempisi, Migamba	42	260	155	25
Kishasha	Kirwa, Mukoni, Nyabigore	45	260	155	27
Mugandu	Kacerere	23	260	155	14
Rushozi	Kanga, Rwenkanja	34	260	155	20
Rwanyena	Musamba Murungu, Ndarura	47	260	155	28

3.5 Data collection methods

The fact that this study adopted an analytical cross sectional survey design implies that it had to make use of a survey data collection method that could be able collect quantifiable data, and not respondent narratives. Structured interviews are such a method, and using that type of interview,

the researcher asked the respondents a series of pre-determined response format questions that all interviewees answered in the same order. Moreover, using these interviews the researcher had direct control over the flow of primary data collection process and also had a chance to clarify certain issues during the process if need arose. The other reason why structured interviews were used was because analysis of data that arises from structured interviewed usually tends to be more straightforward compared to other forms of interviews, because the researcher was able to compare and contrast different answers given to the same questions. Most importantly, since structured interviews collected close ended responses, the data collected by them can be easily quantified, which was an advantage in this study since all the three study objectives that the study had required quantitative data to be answered. All respondents were asked the same questions in the same manner. This made it easy to replicate the discussion. In other words, this type of data collection method was easy to regulate and thus it increased accuracy of the responses. The interviews with each sampled household heads between 30 – 40 minutes.

3.6 Data collection tool

For this study, interviewer administered structured questionnaires were used to capture the quantitative data. The instructions in the structured questionnaire was made quite simple, clear and concisely written. The sections in the tool were constructed in such a way to answer the research question and the questions were also constructed in an attempt to obtain honest answers and details from respondents. The structured questionnaire was employed in this study also because of its simplicity and probability to obtain relevant information within a short span of time. This was of an advantage given that interviews were mainly conducted between 9:30 Am and 12:00 Pm per day, a time within which most household heads were rushing to go about their

occupations, meaning that they The questionnaire was designed with five sections, and those sections plus their composition are shown in the table below

Section	Composition	Number of questions
Section A	Questions seeking to obtain socio demographic characteristics of the respondents	6
Section B	Questions assessing open defecation status of each of the households	3
Section C	Questions assessing the intra-household characteristics of the households sampled	12
Section E.	Questions assessing the characteristic of the community led total sanitation program that was previously implemented in the village	13

3.7 Quality control

3.7.1 Research assistant training

This study was community based, and was conducted in more than 10 villages in Rubaya Sub County, with the implication that the researcher needed some assistance when it came to the data collection exercise for the sole purpose of covering more ground and carrying out the interviews in a timely manner. For that purpose, four graduate research assistants with substantial experience in survey data collection were recruited. Although their main role was to sample and conduct interviews in the sampled health facilities, it did not take away the researchers role as a principal investigator. That is because as the principal investigator, I too had to conduct interviews, in addition to overseeing the entire process of data collection.

The research assistants were graduates, with some experience in survey research, and they were oriented and trained further about the study in a session that lasted for a whole day. The facets that were covered during orientation and training of the assistants included; the objectives of the study, the variables, how open defecation status, and CLTS program characteristics were to be assessed, the data collection methods, and the ethics that were to be observed. The training session also included simulation of the actual data collection process, in which the assistants were asked to role play and demonstrate their readiness to conduct the interviews.

3.7.2 Pretesting

Two weeks prior to the actual data collection exercise, the developed questionnaire was pretested in one of the ODF villages in Bubaare Sub County, in Mbarara district. The pretest was conducted in one of the ODF villages in Bubaare Sub County, because Bubaare Sub County just like Rubaya Sub County has had villages declared ODF, with some still exhibiting open defecation. That means that households in Bubaare had almost similar characteristics to those in the sampled villages in Rubaya Sub County and so were a suitable pretest area. The aim of the pretest was to; find out the comprehensibility of the questions in the tool, the simplicity of the questions included, identify any errors in wording, find out how long the interview was, and to ascertain whether any relevant questions could be added. After the pretest, some adjustments were made to the questionnaire before being used in the main study. The adjustment was only one, and it was the inclusion of the words “if you have not stopped child bearing and still want to give birth to children in the near future” to question 16 of section B of the questionnaire.

3.7.3 Validity and reliability

Validity

When an instrument is developed, psychometric testing is needed and the first step of doing so is to conduct content validity. In this study, content Validity was established using a three step process 1) Soliciting expert participation, 2) A selection of the Subject Matter Experts (SME) 3) and an analysis of expert ratings. The experts were solicited, based on two criteria, familiarity with open defecation and the community led total sanitation programs in Uganda, nd statistical analysis experience. The experts were given a rating scale; having three domains; 3 – for very relevant, 2 for somewhat relevant, and 1 for not relevant. The experts were also furnished with the study objectives as well, and after each of them rating the items in the questionnaire, they were requested to indicate their ratings in a content Rating Review form. The quantitative analysis for content validity was calculated using the Content validity Index, CVI which is given by the formula;

$$CVI = \frac{\text{Number of items rated 3 or 2}}{\text{Total number of items}}$$

The questionnaire had 34 items, and of those the first expert rated 32 questions as either 2 or 3, the second rated 33 as 2 or 3 and the third rated 35 as 2 or 3. Therefore, the number of questions rated as 2 or 3 were = 32 + 33 / 2 = 33. Therefore, CVI = 33/ 34 = 0.970, which showed that the tool was valid.

Reliability

On top of calculating the validity of the questionnaire, which was done manually, its reliability was also established using SPSS version 25 software. This was done using the Cronbach Alpha, which is the average of all possible split-half coefficients resulting from different ways of splitting the scale items (Malhotra 2005). Data from the pretest was used to test for reliability. Suggestions vary as to what constitutes the acceptable level of coefficient alpha. A Cronbach's alpha of at least 0.7 is the criterion used to establish an acceptable level of reliability. A commonly-accepted rule of thumb is that an alpha of 0.6-0.7 indicates acceptable reliability, and 0.8 or higher indicates good reliability (Nunnally 1978). When reliability was tested by running scale statistics in SPSS v 25, it was found that the alpha was 0.785, which is acceptable.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
16.4000	7.874	2.80608	34

Reliability Statistics

Cronbach's Alpha	N of Items
.718	34

3.8 Data management and analysis

3.8.1 Data management

Once all research assistants had returned all the questionnaires, the first step was to collate them and scrutinize them for any omissions, response errors, missing responses, and invalid responses. When any shortcoming was located, it corrected and if that was not possible, the tool with more

than two invalid responses was discarded and compensated for by sampling an extra respondent. Once all questionnaires had been deemed cleaned and ready for analysis, data entry was done directly in the data screen of SPSS version 20.

After data entry, the researcher switched to the data screen view of the software in order to look out for any coding errors that might have happened during data entry. Once the visual inspection was finished, actual descriptive analysis was done in order to find out whether there are any entry errors or outlier, since with descriptive frequency analysis that is possible, as reflected in total frequencies displayed. If any were identified, they were rectified, and then univariate analysis was done at first level, for all variables.

3.8.2 Data analysis

Descriptive analysis was conducted for each variable in each of the two objectives with the sole purpose of obtaining the frequencies and valid percentages of each of the variables, before relationship analysis could be done for any of them.

Following univariate analysis, bivariate analysis was done in order to obtain preliminary relationships between the independent variables and the dependent variable in objectives 2. The relationships at this stage were preliminary because their purpose was to indicate which of them could be considered for the final stage of analysis (multivariate analysis). The bivariate analysis was conducted using a generalized linear model, because in a situation where the prevalence is greater than 10% as was the case in this study (Slippage > 10%), the Odds Ratio estimated in logistic regression can overestimate the Prevalence Ratio. Therefore, in this study the log-binomial model, which is a generalized linear model with a binomial distribution and logarithmic

link function (Barros, 2003; Wacholder, 1986; Deddens, 2008), was used in the analysis of relationships between the independent variable and the dependent variable.

Using that model, it yielded crude prevalence ratios, and p values both of which were used to report the findings. Statistical significance at this level was established at an alpha level of 5%. Variables that were significant at bivariate level were fitted in the log- binomial model, so adjustment for confounders could be made, in order to find out the actual independent correlates of slippage back to OD. At this stage, adjusted prevalence ratios were yielded plus p values, both of which were used to report the findings. Statistical significance at this level was established at an alpha level of 5%

3.9 Ethical considerations

Several ethical considerations were taken into account to ensure that the study was conducted in an appropriate manner (Babbie& Mouton, 2001). They included; approvals and permissions, informed consent, voluntary participation, ensuring of privacy, confidentiality and anonymity of the respondents.

Approvals and permissions: After obtaining approval from the university ethics committee, the introductory letter provided was used to seek permission from the district chief administrative officer, then to the Sub county chief of Rubaya Sub County so as to legally conduct the study among the locals of the sampled villages. The authorization that was obtained from the district health office was presented to the local council 1 chairperson of the respective sampled villages so as to allow the researcher access the households.

Informed consent: To comply with ethical considerations in conducting research, all participants had to provide verbal consent to be interviewed and to participate in the research. The participants therefore willingly participated in the study after which they were approached by the researcher (Leedy, 2000; Neuman, 2000) and the research purpose and process were explained to them. While it is common practice to request written consent, Silverman (2009) states that highly formalized ways of securing consent should be avoided in favour of fostering relationships in which ongoing ethical regard for participants is sustained. Therefore, in this study verbal consent was deemed appropriate. The consent form that was used as a guideline for the research/consent process is attached as Appendix A.

Voluntary participation and right to withdraw: During the consenting process, the purpose of the research was explained to the participants and the participants were told that they could only participate if they were comfortable with it, and that they would not be given any incentives for their participation. They were also informed that should they wish to withdraw at any point during the interview they were able to do so, without any current or future consequences whatsoever.

Privacy, confidentiality and anonymity: All interviews were conducted in total privacy at each of the study sites; all interviews were conducted in a place within the premises of the health facility, ensuring that only the sampled woman and the interviewer are present. Privacy was also ensured during the sampling process; any woman sampled was in incognito, located and called upon to the private place where the interviews were conducted from. It was further explained to the participants that their information would remain confidential and that the specific content of individual interviews would only be discussed with the supervisor and some few other stake

holders who were unknown to each other. In the final report the identity of the participants was removed and pseudonyms were used for the participants.

3.10 Dissemination plan

After completion of the study, a report will be prepared for submission to the university; another will be given to the district health office, and the district health inspectors office, plus to the office of the sub county chief. The researcher also plans to prepare a publication to be uploaded to BMC and PlosOne, after completion

CHAPTER FOUR: FINDINGS

4.0 Introduction

This chapter presents the findings of the study, with the presentation done for each of the study objectives, starting in section 4.2 to section 4.4. Findings for the first objective have been presented descriptively in section 4.2, while findings for objectives 2 and 3 have been presented inferentially in Tables 3 and 5.

4.1 Socio demographic characteristics

Table 4: Socio demographic characteristics of the household heads interviewed

Variable	Category	Frequency n = 155	Valid percentage
Current age			
	18 - 25 years	16	10.3
	26 - 33 years	32	20.6
	34 - 41 years	53	34.2
	42 - 49 years	48	31.0
	> 49 years	6	3.9
Gender			
	Male	100	64.5
	Female	55	35.5
Current marital status			
	Married	63	40.6
	Single	49	31.6
	Cohabiting	43	27.7
Received any formal education			
	Yes	137	88.4
	No	18	11.6
School level attained			
	Primary (Lower)	16	11.9
	Primary (Upper)	54	40.3
	Secondary (O level)	48	35.8
	Secondary (A level)	11	8.2
	Post-secondary education	5	3.7
Position in household			
	Household head	50	32.3
	Eldest child	39	25.2
	Other adult left in charge currently	66	42.6

In table 1 above, the findings of the study related to the socio demographic characteristics of the respondents who were sampled from each of the households that were sampled in Rubaya Sub County. More than a third of them were beyond the youth age bracket, aged between 34 - 41 years (53/155) (34.2%), with close to two thirds of them being male 100/155 (64.5%). More than a third of them were married, 63/155 (40.6%), and more than three quarters of them reported that they had received some formal education 137/155 (88.4%). More than a third of the respondents who had received education had attained Primary (Upper) education 54/155 (40.3%). More than a third of the respondents that met the eligibility criteria of the study per household were adults who had been left in charge 66/155 (42.6%)

4.2 Slippage assessment

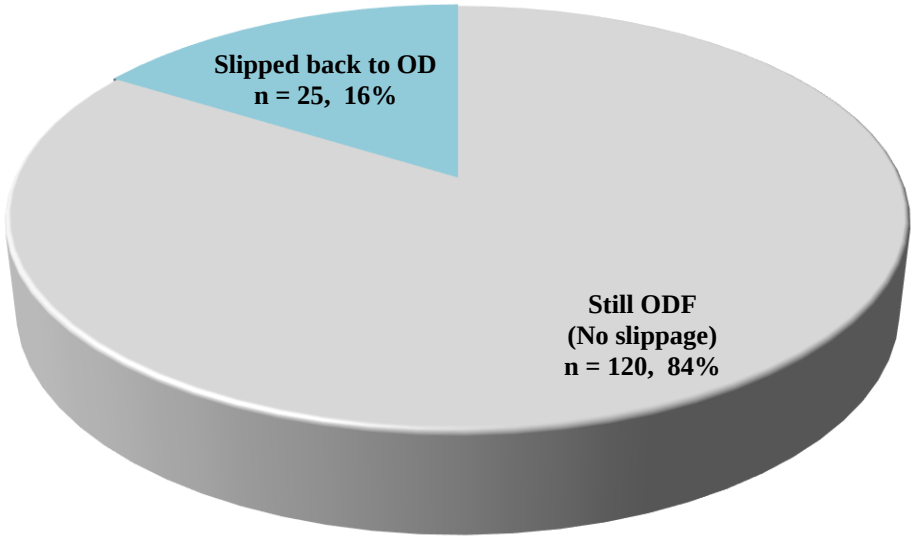
Table 5: Open defecation status assessment

Variable	Category	Frequency	Valid percentage
Household currently has a designated latrine			
	Yes	117*	75.5
	No	38	24.5
	Total	**155**	**100.0**
Latrine or toilet currently usable			
	Yes	103*	88.0
	No	14	12.0
	Total	**117**	**100.0**
Any member of household defecated in any place around this house, but not the toilet or latrine, In the past three months			
	Yes	132*	85.2
	No	23	14.8
	Total	**155**	**100.0**

Indicators of sustained ODF status / non-slippage to OD

Table 5 above shows findings related to the status of maintenance of ODF per household in the sampled villages, to find out the number of those which had slipped back to OD and those which had maintained ODF status. The assessment was done based on the classifications of ODF+ and ODF++, and following that, it was found that more than three quarters of the households currently had a designated latrine 117/155 (75.5%), which was currently usable 103/155 (88.0%). More than three quarters of the households had no member who had defecated in any place around th3 house, but not the toilet or latrine, In the past three months 132/155 (85.2%).

Figure 2: Prevalence of slippage back to OD



Based on the presence of a toilet at household level, that is functional and having no one practicing open defecation, it was found that 16% (25) of the households had slipped back to OD by interview time, putting slippage at 16%.

4.2 Intra-household characteristics and slippage

Table 6: Intra-household characteristics and slippage back to open defecation (Unadjusted)

Variable	n	%	Slippage status: Slipped back to OD n = 25	Slippage status: Still ODF n = 130	cPR (95%)	P value
Gender of the head of this household						
Male	95	90.5	19(20.0%)	76(80.0%)	2.000 (0.298 - 13.404)	0.475
Female	10	9.5	1(10.0%)	9(90.0%)	1.000	
Age of household head						
18 - 25 years	32	28.6	5(15.6%)	27(84.4%)	0.979 (0.439 - 2.184	0.648
26 - 33 years	8	7.1	0(0.0%)	8(100.0%)	0.976 (0.462 - 2.065)	0.918
34 - 41 years	44	39.3	12(27.3%)	32(72.7%)	1.370 (0.354 - 5.295)	0.950
42 - 49 years	27	24.1	5(18.5%)	22(81.5%)	0.962 (0.462 - 2.002)	0.959
> 49 years	1	.9	0(0.0%)	1(100.0%)	1.000	
Household size						
Less than five	46	29.7	8(17.4%)	38(82.6%)	1.115 (0.518 - 2.400)	0.481
More than five	109	70.3	17(15.6%)	92(84.4%)	1.000	
Children under five years in this household						
Yes	128	82.6	25(19.5%)	103(80.5%)	1.564 (1.095 - 4.628)	0.031*
No	27	17.4	0(0.0%)	27(100.0%)	1.000	
Number of children do you have in this household						
One	44	34.4	8(19.0%)	34(81.0%)	1.545 (0.364 - 6.555)	0.555
Two	67	52.3	12(18.5%)	53(81.5%)	1.522 (0.376 - 6.168)	0.556
More than two	17	13.3	2(11.8%)	15(88.2%)	1.000	
Children or that child practice indiscriminate defecation						
Yes	44	35.5	8(18.2%)	36(81.8%)	1.039 (0.473 - 2.282)	0.924
No	80	64.5	14(17.5%)	66(82.5%)	1.000	
Number of males in this household						
One	26	16.8	2(7.7%)	24(92.3%)	0.519 (0.124 - 2.170)	0.369
Two	48	31.0	11(22.9%)	37(77.1%)	1.547 (0.741 - 3.230)	0.245
More than two	81	52.3	12(14.8%)	69(85.2%)	1.000	
Average age of all males in this household						
Less than 18 years	122	78.7	12(9.8%)	110(90.2%)	0.250 (0.126 - 0.495)	0.000*
More than 18 years	33	21.3	13(39.4%)	20(60.6%)	1.000	
Think emptying a latrine is expensive						
Yes	87	56.1	18(20.7%)	69(79.3%)	2.010 (0.891 - 4.533)	0.093
No	68	43.9	7(10.3%)	61(89.7%)	1.000	
Ownership status of the latrine that this household uses						
Privately owned by household	122	78.7	20(16.4%)	102(83.6%)	1.639 (0.245 - 10.983)	0.611
Government owned	23	14.8	4(17.4%)	19(82.6%)	1.739 (0.221 - 13.669)	0.599
Communal toilet	10	6.5	1(10.0%)	9(90.0%)	1.000	
Ever fear about the pit of the toilet you use getting full becoming filled up fast						
Yes	44	28.4	7(15.9%)	37(84.1%)	0.981 (0.441 - 2.184)	0.963
No	111	71.6	18(16.2%)	93(83.8%)	1.000	

From an intra-household perspective, the findings revealed that almost all the respondents of the study were male 95/155 (90.5%), and were older persons aged between 34 - 41 years 44/155 (39.3%). More than two thirds of the persons who were sampled were from households that had more than five members 109/155 (70.3%). More than three quarters of the respondents were from households that had children under five years 128/154 (82.6%), with those households having two children 67/155 (52.3%). However, close to two thirds of the respondents who were from households that had children under five years reported that their children or that child did not practice indiscriminate defecation 80/155 (64.5%).

More than half of the respondents were from households which had more than two male members 81/155 (52.3%), with more than three quarters of the households having an average age of that is less than 18 years 122/155 (78.7%). More than half of the respondents reported that they thought emptying a latrine was expensive 87/155 (56.1%). More than three quarters of the respondents reported that their households privately owned a toilet 122/155 (78.7%), and never feared about the pit of the toilet they use getting full becoming filled up fast 111/155 (71.6%).

The findings show that two intra-household characteristics had statistically significant relationships with slippage back to open defecation. They included; having children under five years in the household (cOR = 1.564, CI = 1.095 - 4.628, P = 0.031), and the average age of all males in the household (cOR = 0.250, CI = 0.126 - 0.495, p = 0.000). The findings showed that the prevalence of slippage back to OD was 1.5 times more among households that had children under five years as members (cOR = 1.564, CI = 1.095 - 4.628, P = 0.031). The prevalence of slippage back to OD was least among households whose average age among male members was less than 18 years old (cOR = 0.250, CI = 0.126 - 0.495, p = 0.000).

Table 7: The intra-household correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

Variable	cPR (95%)	P value	aPR (95%)	P value
Children under five years in this household				
Yes	1.564 (1.095 - 4.628)	0.031*	1.411 (1.011 - 4.628)	0.033*
No	1.000		1.000	
Average age of all males in this household				
Less than 18 years	0.250 (0.126 - 0.495)	0.000*	0.237 (0.118 - 0.475)	0.000
More than 18 years	1.000		1.000	

The findings in table 4 above show that both variables that were significant at bivariate level remained significant after adjustment for confounders for each relationship. The findings showed that the prevalence of slippage back to OD was 1.5 times more among households that had children under five years as members (aPR = 1.411 (1.011 - 4.628, p = 0.033). The prevalence of slippage back to OD was least among households whose average age among male members was less than 18 years old (aPR = 0.237 (0.118 - 0.475, p = 0.000).

4.3 CLTS characteristics and slippage

Table 8: CLTS characteristics and slippage back to open defecation (Unadjusted)

Variable	n	%	Slippage status		cPR (95%)	P value
			Slipped back to OD n = 25	Still ODF n = 130		
First sensitized about the program and what it was supposed to achieve						
Yes	115	74.2	20(17.4%)	95(82.6%)	1.391 (0.559 - 3.462)	0.478
No	40	25.8	5(12.5%)	35(87.5%)	1.000	
Pre triggering and triggering phase execution						
Yes	55	35.5	8(14.5%)	47(85.5%)	0.856 (0.395- 1.854)	0.693
No	100	64.5	17(17.0%)	83(83.0%)	1.000	
CLTS officials facilitated a 'Walk of Shame' with any member in household						
Yes	72	46.5	14(19.4%)	58(80.6%)	1.467 (0.711 - 3.026)	0.299
No	83	53.5	11(13.3%)	72(86.7%)	1.000	
Were taught about how flies move between food and feces						
Yes	110	71.0	21(19.1%)	89(80.9%)	2.148 (0.781 - 5.905)	0.139
No	45	29.0	4(8.9%)	41(91.1%)	1.000	
CLTS officials put some feces into a water bottle and asked any community member whether they would drink it						
Yes	40	25.8	12(30.0%)	28(70.0%)	0.654 (0.321 - 0.830)	0.006*
No	115	74.2	13(11.3%)	102(88.7%)	1.000	
CLTS officials worked with any member of the community during roll out of CLTS						
Yes	122	78.7	22(18.0%)	100(82.0%)	1.984 (0.632 - 6.223)	0.240
No	33	21.3	3(9.1%)	30(90.9%)	1.000	
Leaders engaged during CLTS implementation						
Yes	132	85.2	22(16.7%)	110(83.3%)	1.278 (0.416 - 3.924)	0.669
No	23	14.8	3(13.0%)	20(87.0%)	1.000	
Were provided with technical support on latrine construction by CLTS officials						
Yes	130	83.9	18(13.8%)	112(86.2%)	0.495 (0.231 - 1.058)	0.070
No	25	16.1	7(28.0%)	18(72.0%)	1.000	
Were provided with subsidies for toilet construction, by CLTS officials						
Yes	44	28.4	9(20.5%)	35(79.5%)	1.419 (0.678 - 2.969)	0.366
No	111	71.6	16(14.4%)	95(85.6%)	1.000	
CLTS official ever provided incentives or rewards to villages for ODF status						
Yes	17	11.0	3(17.6%)	14(82.4%)	1.107 (0.370 - 3.312)	0.856
No	138	89.0	22(15.9%)	116(84.1%)	1.000	
Form of behavior change communication used during CLTS program						
Interpersonal	17	11.0	1(5.9%)	16(94.1%)	0.368 (0.053 - 2.578)	0.314
Mass media	19	12.3	5(26.3%)	14(73.7%)	1.648 (0.699 - 3.887)	0.254
Community mobilization	119	76.8	19(16.0%)	100(84.0%)	1.000	
Follow up by CLTS officials to check ODF status						
Yes	126	81.3	17(13.5%)	109(86.5%)	0.489 (0.234 - 1.022)	0.057
No	29	18.7	8(27.6%)	21(72.4%)	1.000	

Almost three quarters of the household representatives reported that before the implementation of the previous CLTS program, they were first sensitized about the program and what it was supposed to achieve 115/155 (74.2%). Almost two thirds of the respondents reported that pre triggering and triggering phases were not executed 100/155 (64.5%), and more than half of them reported that the CLTS officials did not facilitate a 'Walk of Shame' with them or any member in the household to show them the sites of Open Defecation in this community 83/155 (53.5%). More than two thirds of the representative reported that where taught about how flies move between food and feces 110/155 (71.0%). Almost three quarters of the respondents reported that CLTS officials did not put some feces into a water bottle and asked them or any community member whether they would drink it 115/155 (74.2%).

However, more than three quarters the respondents reported that CLTS officials worked with some members of the community during roll out of CLTS 122/155 (78.7%), and engage some of the leaders during CLTS implementation 132/155 (85.2%). More than three quarters of the respondents reported that they were provided with technical support on latrine construction by CLTS officials 130/155 (83.9%). The majority of the respondents reported that they were not provided with subsidies for toilet construction, by CLTS officials 111/155 (71.6%). More than three quarters of the respondents reported that CLTS officials had never provided incentives or rewards to villages for achieving ODF status 138/155 (89.0%). During CLTS program implementation, the form of behavior change communication that officials used, according to more than three quarters of the respondents was community mobilization 119/155 (76.8%). More than three quarters of the respondents reported that CLTS officials had ever returned to check on whether all triggered communities were still ODF 126/155 (81.3%).

The findings show that only one CLTS program characteristic had a statistically significant relationship with slippage to OD, it is the putting of some feces into a water bottle and asking any community member whether they would drink it (cPR = 0.654, CI = 0.321 - 0.830, P = 0.006). Slippage to OD, was least prevalent among household in which the household head or adult member witnessed the putting of some feces into a water bottle by CLTS officials following which they asked any community member whether they would drink it (cPR = 0.654, CI = 0.321 - 0.830, P = 0.006).

Table 9: Community Led Total Sanitation Program related correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

Variable	cPR (95%)	P value	aPR (95%)	P value
CLTS officials put some feces into a water bottle and asked any community member whether they would drink it				
Yes	0.654 (0.321 - 0.830)	0.006*	0.411 (0.178 - 0.689)	0.004*
No	1.000		1.000	

Slippage to OD, was least prevalent among household in which the household head or adult member witnessed the putting of some feces into a water bottle by CLTS officials following which they asked any community member whether they would drink it (aPR = 0.411 (0.178 - 0.689,P = 0.004).

CHAPTER FIVE: DISCUSSION

5.0 Introduction

5.1 The prevalence of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

The fact that open defecation has far reaching effects on both the environment and personal health, all of which have in the past half a decade been fully acknowledged (Clasen et al., 2014; Coffey et al., 2017a; Hathi et al., 2017; Padhi et al., 2015; Patil et al., 2014). Therefore, the elimination of open defecation has in the recent past been top on the agenda of all organizations with a bias on sanitation and hygiene. With the health promotion interventions that such organizations have adopted and implemented over the years, notably CLTS, many beneficiary villages have been declared Open defecation Free (ODF), with some being declared ODF+ and ODF++. Those have been great achievements, and have certainly contributed to the reduction of child mortality, childhood chronic malnutrition, and the incidence of gastrointestinal infections. However, were as some village and/or areas that were triggered globally, have and still do experience those benefits of being ODF, some experience them intermittently, due to reversal to OD, a state from which they had earlier being declared free. That is one of the greatest if not the greatest health promotion intervention dilemmas that CLTLS program implementers are currently facing.

Such was the case in Rubaya Sub County in Mbarara district, in which the study findings showed that slightly more than a tenth of the households in Rubaya Sub County had reversed to open defecation 25(16%). The implication of this finding is that about 2 in every 10 households in Rubaya Sub County either had visible feces in its premises, had no functional latrine, or had a

member who had in the past three months prior to the study defecated somewhere other than a latrine or toilet. In addition, of every 10 households in the sub county, 2 is currently at risk of having members that will most likely suffer from preventable gastrointestinal infection, stunting and poorer cognitive development if any of the members is below five years, and (Mbuya, 2016), and an increased risk of adverse pregnancy outcomes such as preterm birth and low birth rate if any of the members is a pregnant woman (Janmohamed et al, 2016).

Although the level of reversal to open defecation among households in Rubaya Sub County was at only 16%, a figure that is seemingly low, it is one of the highest rates of reversal to OD in the world as acknowledged by UNICEF (2018). However, the level of reversal to OD in this study is lower that what has been in some studies especially in India and Indonesia. Studies in India having higher rates of reversal to OD is not at all surprising, given that India is still regarded as the open defecation capital of the world. Odagiri (2017) reported a slippage of 14.5% among households In Rural Indonesia, and Gupta (2018) reported a slippage of 23% in India. Tyndale-Biscoe (2013) also reported a higher rate of reversal to OD in Kenya (22%). Inconsistent findings were also reported by UNICEF (2015) were the level of reversal from ODF status was in more than 60% villages. The difference between the findings of those studies and the findings of the current study could be due to two main methodological factors, one being the difference in the duration of assessment of reversal to open defecation, which was retrospectively done over a period of three months in this study, yet the other studies used different time frames. The other difference could be related to the extent to which CLTS program activities that were implemented previously in each of the study sites. For instance, whereas it is evident from findings in Table 8 that almost CLTS activities were implemented in Rubaya Sub County, the same was not true in India and Kenya, which could led to a difference in outcomes.

Ethiopia is one of the countries which have reported a lower rate of reversal to open defecation (8%) (Tyndale-Biscoe, 2013). Ethiopia's low rate of reversal to open defecation is related to the country's health promotion programs that are quite different from other areas were CTLS has been implemented. In Ethiopia, the Community-Led Total Sanitation and Hygiene Program (cltsh), is implemented by school health clubs and water committees at the kebele level and it does not only give a boost to the construction of toilets, but also ensures the long-term sustainability of the practice (Sengupta, 2017). The country also has open defecation-free verification and certification guidelines and has committees, set up at every administrative level, from kebele to the national (Sengupta, 2017), to verify that the guidelines are being followed, something that is not the case in many countries.

In the assessment of the status of open defecation, it was found that almost a quarter of the participants reported that their households had no designated toilets and that in the past three months, someone in their households had defecated in a place other than a toilet. These findings show that reversal to OD was mainly due to household having no designated latrine followed by having a member who had defecated in a place other than a toilet. That therefore makes the Rubaya sub county to be just ODF and neither ODF+ or ODF++ as the latter to categorizations require that only less than 5% and 0% of the households respectively have no toilets or have any one that defecates in a place other than a toilet. The implication of these findings is that many more villages and households in Rubaya could be at a high risk of slipping back to OD (given that they are at the ODF level), in case no action is taken by responsible authorities to ensure that the sub county moves into the ODF+ or ODF++ status.

5.2 The intra-household correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

Consistent with findings by Budhathoki (2017) and UNICEF (2015), the findings of this study showed that the prevalence of slippage back to OD was 1.5 times more among households that had children under five years as members (aPR = 1.411 (1.011 - 4.628, p = 0.033). This finding was expected, and so was anything but surprising. Children below five years especially in village settings receive toilet or potty training in later years, and so tend to engage in indiscriminate defecation, unintentionally, going by their age. Having them as household members in a household located in a previously ODF declared village implies that chances of that particular household having visible human feces in this premises increase, yet that is one of the signs of slippage. In addition, children below five years, especially in villages are prohibited from using household or communal latrines for safety reasons, given most of the latrines in those settings are constructed using mud and wattle or temporary structures. Thus, children of that age are usually provided with an improvised potty, so that they can defecate somewhere in the compound, hence increasing chances of fecal visibility, which is a sign of slippage back to open defecation.

The study also found a relationship between household member gender characteristics and slippage to OD, similar to findings by Bicchieri (2017) and Coffey et al., (2014), House and Cavill (2015), Roose et al (2015), Water, Sanitation and Hygiene Institute (2015) and Kawale (2018), Bhatt et al (2019), and Routray et al., (2015). However, the findings of this study showed that the prevalence of slippage back to OD was least among households whose average age among male members was less than 18 years old (aPR = 0.237 (0.118 - 0.475, p = 0.000), which was precisely consistent with findings by Bicchieri (2017) and Bhatt et al (2019). This finding in

other words implies that there was a higher prevalence of slippage in households with older men. This finding is related to the fact that compared to younger men, older men tend to be more culturally conservative as opposed to liberal, and in so doing hold on to and observe cultural beliefs more. In the context of Mbarara and particularly sub counties like Rubaya Sub County, there is a belief and cultural practice that men do not share toilets with in-laws and certain women, and that in such a circumstance, they would rather defecate or urinate openly in order to preserve culture. Such a tendency, is very unlikely among younger men (Kawale, 2018), who tend to be more liberal when it comes to cultural practices and norms, and hence use a toilet at all defecation instances without cultural restrictions. Thus, a household in Rubaya with more of such demography of males is less likely to slip back to OD, hence the finding.

5.3 The Community Led Total Sanitation Program related correlates of slippage back to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County – Mbarara district

The findings obtained in this study regarding the predictors of reversal to open defecation among households in villages formerly declared open defecation free within Rubaya Sub County - Mbarara district confirmed the finding that disgust, has an effect on reversal to OD. The findings showed that slippage was least prevalent among household in which the household head or adult member witnessed the putting of some feces into a water bottle by CLTS officials following which they asked any community member whether they would drink it (aPR = 0.411 (0.178 - 0.689,P = 0.004). Basically, disgust of that nature was the only CLTS program characteristic that had a significant effect on reversal to open defecation, in Rubaya Sub County. This finding is inconsistent with findings by Sigler et al., (2015), Venkataramanan (2016), Venkataramanan (2018), Abireham (2018), UNICEF, (2014), Cavill et al. (2015)**,** Bicchieri (2016), Alzua (2014)

and Mosler (2018), were other program characteristics for instance follow up, were linked to reversal to OD. The difference in the findings is because of the varying level of implementation of CLTS program activities in Rubaya and the other settings, at least going by the descriptive responses of the respondents. In Rubaya, the responses obtained seemed to suggest that most of the CLTS activities had been highly implemented in its last leg, which was not the case in the other studies. That could have led to the other studies reporting more program characteristics as significant, yet in this study only one was statistically significant.

It is however important to note that the program characteristic that was found to be significant is one of the most if not the most important program characteristic in any CLTS program, that is creation of disgust among the beneficiaries. The CLTS approach is inspired by participatory rural appraisal (PRA), yet it is more forceful in highlighting the disgust associated with OD (Noy and Kelly, 2009). The program is distinct from other approaches due to its emphasis on 'shame' and 'disgust' to trigger behavior change (Noy and Kelly, 2009). Triggering activities, specifically the 'shit calculation' and disgust activities are ranked as very important for sustainability of the program outcomes. Studies like one by Lawrence et al. (2016) reported that disgust was particularly powerful in preventing reversal to OD in relation to the exercise where flies are observed moving between feces and food. The difference in this study was however the exercise where feces are placed in drinking water and people are asked whether they can drink it. That alone is very likely to foster behavior change among persons who see it; that is to curtail them from ever defecating in the open. This explains why households which viewed that activity were less likely to have reversed to OD.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter presents the conclusion of the study, derived from the significant findings of the study as were obtained from each of the three objectives of the study. The chapter also includes a section for recommendations for action, and recommendations for further studies, and as well as strengths and limitations.

6.1 Conclusion

Objective 1

Slippage back to open defecation among households in villages that were previously declared ODF within Rubaya sub county is prevalent then, at a level of 16%, implying that approximately 2 in 10 households have slipped back to OD in that sub county.

Objective 2

Slippage back to open defecation among household in villages that were previously declared open defecation free within Rubaya Sub County is correlated with two intra-household characteristics. They are; having children under five years as household members, and the average age of males in the household.

Objective 3

Slippage back to open defecation among household in villages that were previously declared open defecation free within Rubaya Sub County is correlated with only one CLTS program

characteristic; it is the putting of some feces into a water bottle by CLTS officials and asking any community member whether they would drink it

6.2 Recommendations

Of the three indicators of slippage to open defecation, non-availability of a designated latrine or toilet was more pronounced, and thus independently contributed to the increment in prevalence of slippage. Therefore, one of the very first interventions that should be instated if slippage to OD is to be prevented is the push for toilet / latrine construction at household level, alongside communal toilets, by the local government of the district. If possible, part of the budget that the district has allocated to eliminate open defecation in the district could be aligned towards the provision of subsidized latrine construction materials for households in previously ODF declared villages. In the short term however, sensitization of household heads in those villages could be made by district health inspectorate, in order to have them make a personal initiative to construct the latrines.

Having children that are under five years in a given household is almost inevitable; however, the effect of their presence on slippage back to open defecation can be minimized by the promotion adoption of early potty training by parents in villages that have been declared open defecation free such as those in Rubaya sub county. With early potty training starting at about 1 and half years, chances a child indiscriminately defecating will be greatly minimized or almost nullified, so that no household will have visible feces in their vicinity. In cases when potty training has not been effected, parents in ODF villages are urged to at least adopt the use of low cost pampers (modern or local) especially for children who have reached an age of mobility, so as to eliminate cases of indiscriminate defecation.

The district health office, lower local governments at large along with the implementation and coordination committees of the community led total sanitation programs in Rubaya Sub County should make it a point to preach against cultural beliefs and practices that make older men to desist from using toilets and/or latrines, especially when they have been supposedly used by in-laws. Doing so will enable households composed of mainly older men, to increase their chances of sustaining ODF status

Persons charged with the implementation and coordination of the community led total sanitation programs in Mbarara district ought to know or be reminded that the implementation of CLTS and its effectiveness is based on its ability to perpetuate behavior change, in part through the creation of disgust among the beneficiaries. They are therefore urged to always carry out a demonstration of how open defecation can affect the water they drink, that is by showing community members what a mixture of feces and water could like and asking them whether it could be drinkable.

6.3 Recommendations for further studies

It would be worthwhile to conduct a study about the correlates slippage back to open defecation, with consideration of societal characteristics and potential correlates of slippage, with a mixed methods approach.

6.4 Strengths and limitations of the study

The first strength that this study has is that it was carried out in only villages that were previously declared open defecation free, implying that the findings of slippage that were obtained are reliable and valid. Secondly, the assessment of slippage was restricted to the previous three

months prior to the study, which was about 5 months after most of the villages had been declared ODF. That meant that the assessment window was appropriate enough to rule out data bias, which further increased the reliability of the study.

The limitation that was perhaps the most important in this study was the fact that the assessment of slippage status was not based on observation, which in its self was impossible given that it would take a longitudinal design to execute, but rather self-reports of ODF sustenance or slippage. It is therefore possible that perhaps some household heads concealed slippage indicators when interviewed, which may have affected slippage prevalence estimation.

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APPENDIX A: CONSENT FORM

Title of the study: CORRELATES OF SLIPPAGE BACK TO OPEN DEFECATION AMONG HOUSEHOLDS IN VILLAGES PREVIOUSLY DECLARED ODF IN RUBAYA SUB COUNTY – MBARARA DISTRICT

Introduction

Good morning/afternoon. My name is……..and I would like to first thank you for agreeing to meet with me. We are conducting a study to analyze the correlates of slippage back to open defecation among households in villages previously declared ODF within Rubaya Sub County – Mbarara district. This form provides you with information about the study so that you can decide whether you want to participate or not. After you listened to this information you may ask questions about the study, what you are expected to do and anything else that is not clear to you.

Purpose of the study:

This study is aimed at collecting information that will help us know the correlates of slippage back to open defecation among persons in villages formerly declared open defecation free within Rubaya Sub County - Mbarara district

If you decide to take part

I will request you to be interviewed and this interview will take about one hour. During this interview, I will ask you about the sanitation characteristics of this household, your individual characteristics, and the characteristics of CLTS program that this household was a beneficiary

Confidentiality

The interview is strictly confidential. Any information you give will not be shared with anyone else and our records and report will not contain your name. All the information collected and recorded will be kept in a locked cabinet and no one else will have access to it. We will keep any quotations that we use in our report or other publications from your interview anonymous and ask for your permission prior to using them. You are free to stop the interview at any time or not

answer any questions you feel uncomfortable with. There is no right or wrong answer, we are interested in your opinion so you can talk freely.

Risks and benefits

There are no risks to you for taking part in this study. There are also no direct benefits to you. However, the information you give will be to the local government of the district, as the findings have indicated the characteristics that are protective of slippage back to OD, which the local government can capitalize for minimization in future interventions.

The coordinators and implementers of the community led total sanitation program in Mbarara district, and perhaps the entire country might also benefit from the study, given that it has particularly highlighted the CLTS program correlates of slippage back to OD, findings which will be used to augment triggering and follow up phases of the program when implemented in other villages, in order to prevent slippage.

From a health promotion perspective, the findings of this study will empower household heads in Rubaya Sub County with information related to the characteristics of their own households that promote slippage. With that information, it is expected that that the household heads will be able to proactively step in and instate modifications in inhabitant behavior, for purposes of sustaining ODF status.

Are there any incentives for participating?

You will not receive any payment for participating in this study, participating is strictly voluntary

Voluntary participation and withdraw

Participation in this study is voluntary, your participation is based on solely your discretion, and if you decide to stop your participation even in the middle of the interview for any reason, you will not be penalized for whatsoever. Your position or the household's position as a beneficiary of the CLTS program in Mbarara district will not be affected in any way.

Problems or questions

If you have any questions about this study, please contact the principal investigator Mr. Shaidi, on Tel; +243 818 554 933

PARTICIPANT CONSENT PAGE

I confirm that I have read and understand the participant information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered fully.	
I understand that my participation is voluntary and I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.	
I agree for my quote to be used in the publication or report released on the study once my permission has been sought and I have agreed.	
I agree to take part in the above study	

APPENDIX B: QUESTIONNAIRE

PART A: Socio demographic characteristics

Number	Question	Filter options	Choice code
1	How old are you currently (in complete years)	…….. …….....	
2	Gender	1. Male 2. Female	
3	What is your current marital status	1. Married 2. Cohabiting 3. Single 4. Other……..	
4	Have you received any formal education?	1. Yes 2. No	
5	If yes, what school level did you attain?	1. Primary (Lower) 2. Primary (Upper) 3. Secondary (O level) 4. Secondary (A level) 5. Post-secondary education	
6	To what religious denomination do you subscribe?	1. Catholic 2. Anglican 3. Muslim 4. Born Again 5. Other…….	
6	What is your position in this household?	1. Household head 2. Eldest child 3. Other adult left in charge currently	

PART B: ODF status

Number	Question	Filter options	Choice code
8	Does this household currently have a designated latrine?	1. Yes 2. No	
9	If yes, is the latrine or toilet currently usable?	1. Yes 2. No	
10	In the past three months, has any member of this household defecated in any place around this house, but not the toilet or latrine?	1. Yes 2. No	

PART C: Intra-household characteristics

Number	Question	Filter options	Choice code
11	Within the past three months, have you had anyone in this household in a chronic illness state?	1. Yes 2. No	
12	If your response to question 6 is not 1, what is the gender of the head of this household?	1. Male 2. Female	
13	If your response to question 6 is not 1, how old is the household head	…… ……	
14	If your response to question 6 is not 1, what is the education level of household head	1. Primary (Lower) 2. Primary (Upper) 3. Secondary (O level)	

		4. Secondary (A level) 5. Post-secondary education	
15	How many members are you in this household, generally	1. Less than five 2. More than five	
16	Are there any children under five years in this household	1. Yes 2. No	
17	If yes, how many such children do you have in this household?	1. One 2. Two 3. Three 4. More than three	
18	Do those children or that child practice indiscriminate defecation	1. Yes 2. No	
19	How many males are they in this household?	1. One 2. Two 3. Three 4. More than three	
20	What is the average age of all males in this	…….	

	household	……	
21	Do you think emptying a latrine is expensive	1. Yes 2. No	
22	What is the ownership status of the latrine that this household uses?	1. Yes 2. No	
23	Do you ever fear about the pit of the toilet you use getting full becoming filled up fast	1. Yes 2. No	

PART B: CLTS program characteristics

Number	Question	Filter options	Choice code
24	Before the implementation of the previous CLTS program, where you first sensitized about the program and what it was supposed to achieve Pre triggering and triggering phase execution	3. Yes 4. No	
25	Did the CLTS officials facilitate a 'Walk of Shame' with you or any member in this household to show them the sites of Open	1. Yes 2. No	

	Defecation in this community		
26	Where taught about how flies move between food and feces	1. Yes 2. No	
27	Did any of the CLTS officials put some feces into a water bottle and asked you or any community member whether they would drink it	1. Yes 2. No	
28	Did the CLTS officials work with any member of the community during roll out of CLTS	1. Yes 2. No	
29	Did CLTS officials engage any of the leaders during CLTS implementation	1. Yes 2. No	
30	Were you provided with technical support on latrine construction by CLTS officials	1. Yes 2. No	

31	Did CLTS officials put in place any community enforcement measures for household that revert to open defecation	1. Yes 2. No	
32	Have CLTS official ever provided incentives or rewards to villages for ODF status	1. Yes 2. No	
33	Were you provided with subsidies for toilet construction, by CLTS officials	1. Yes 2. No	
34	During CLTS program implementation, what form of behavior change communication did the officials use	1. Yes 2. No	
36	Have CLTS officials ever returned here to check on whether all triggered communities were still ODF	1. Yes 2. No	

END