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Christina M. Braccio	Date

Assessing barriers to WASH behavior change in high-fidelity *Andilaye* intervention communities in Amhara, Ethiopia

By

Christina M. Braccio
Master of Public Health

Hubert Department of Global Health

_____

Matthew C. Freeman, MPH, PhD
Committee Chair

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By

Christina M. Braccio
Bachelor of Science
Boston University
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Thesis Committee Chair: Matthew C. Freeman, MPH, PhD

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
In partial fulfillment of the requirements for the degree of
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2019

Abstract

Assessing barriers to WASH behavior change in high-fidelity *Andilaye* intervention communities in Amhara, Ethiopia

By Christina M. Braccio

***Background**:* Water, sanitation and hygiene (WASH) behavior change is notoriously difficult to sustain long-term after intervention implementation, and behavioral slippage – reverting back to pre-intervention behaviors – is common. Community-led total sanitation and hygiene (CLTSH) is a behavior change approach currently used in Ethiopia to improve rural sanitation and hygiene practices; however, the program lacks long-term behavioral maintenance activities. The *Andilaye* project, currently being conducted by Emory University, is an attempt to implement strategies to facilitate behavioral maintenance and prevent behavioral slippage, addressing some of the gaps in the CLTSH approach.

Objective: To conduct a qualitative process evaluation to qualify the barriers to behavioral uptake that remained after the first year of *Andilaye* intervention implementation in households with high behavioral adoption in communities with high intervention fidelity.

***Methods**:* In-depth interviews were conducted with eight high behavior change uptake female caregivers across two high fidelity *kebeles*. Four focus groups were held across the same two high fidelity *kebeles* among high behavior change uptake and low behavior uptake change female caregivers. Observational surveys of the homes of high behavior change uptake female caregivers were also conducted.

***Results**:* Most respondents (85.7%) reported that lack of time as a barrier to behavior change. More than half of all respondents (57.1%) reported financial constraints, lack of availability of construction materials and soap as their biggest barriers to behavior change.

Conclusion: The findings of this study corroborate previous studies on barriers to behavior change in the CLTSH model. Noticeably, more barriers were reported in the *kebele* farther from a paved road and with lower education levels. Residents from the *kebele* located on the paved road reported a lack of time to dedicate to hygiene practices as their only barrier to behavior change. It can be inferred that behavior change may be more successful in communities with greater infrastructure and access to resources.

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Table of Contents

Chapter 1: Literature Review

Introduction

The aim of this literature review is to synthesize existing research on community-led total sanitation behavior change methods, behavioral slippage of water, sanitation and hygiene (WASH) interventions, and on barriers and facilitators of sustained WASH behavior change. The literature review also focuses specifically on research related to WASH interventions in Ethiopia when available, as the following intervention and study that are the focus of this thesis took place in Amhara, Ethiopia.

This literature review is divided into five sections that:

1. Examines traditional WASH intervention approaches and behavior change methods, as well as the weaknesses in these approaches.
2. Presents studies that examine the effectiveness of community-led total sanitation behavior change interventions.
3. Examines research related to Community-Led Total Sanitation and Hygiene behavioral slippage, barriers to behavior change maintenance, and gaps in behavior change interventions and research that address behavior maintenance.
4. Presents the *Andilaye* project in Amhara, Ethiopia, and how it attempts to address the issues in behavior change maintenance; and
5. Presents the aims and goals of the process evaluation sub-study, explained in further detail in Chapter 3 of this thesis.

WASH Behavior Change Approaches

Inadequate sanitation and hygiene are major causes of disease globally, and poor WASH practices are associated with contributing to the spread of neglected tropical diseases (NTDs), malnutrition and childhood stunting, and diarrheal illnesses and related deaths [1, 2]. Improving

sanitation and hygiene behaviors is the most efficient and cost effective approach to reduce diseases related to the fecal-oral pathway – some of the most common diseases and most associated with morbidity in the developing world.

Studies have shown that by improving sanitation and hygiene behaviors and practices – increasing exclusive latrine usage and eliminating open defecation, increasing handwashing practices, and increasing household cleanliness – can have positive health outcomes. WASH behavior change interventions can reduce incidence and control transmission of diarrheal illnesses, such as cholera, with estimates in diarrheal reduction rates ranging from 15 to 50 percent [3-6]. Studies have also shown that WASH interventions can have an effect on the prevalence of parasitic infections such as soil-transmitted helminths [7-9]. More recent, similar studies, however, have failed to reproduce the positive results, finding no evidence that behavior change interventions reduced the prevalence of STH infections [1, 10]. Additionally, the evidence for WASH interventions directly reducing rates of malnutrition in children is inconclusive, with some studies finding no significant effect, and some finding a small effect on stunting [11, 12].

Behavior change is essential to any WASH intervention, but for these interventions to lead to meaningful improvements in health, those behaviors must be maintained over time. However, evidence of sustained behavior adoption and maintenance is mixed, and sustained behavior change has many limitations. These limitations are further explored in the following section entitled '*Behavioral Slippage and Barriers to Sustained Behavior Change*.'

Community-Led Total Sanitation

The Ethiopian Government has adopted the CLTSH method as its main approach to address issues of sanitation and hygiene in rural regions. CLTSH is a behavior change approach used mainly in developing countries to improve sanitation and hygiene practices, with the goal of ending open defecation through spontaneous and long-lasting behavior change of an entire community [13, 14]. The

approach focuses on mobilization of communities to change their behaviors through "triggering," a way to ignite community interest in improving sanitation facilities and ending open defecation, usually through attempting to provoke shame and disgust about open defecation practices [14].

The CLTSH approach to improving WASH in rural regions of Ethiopia has been shown to facilitate substantial behavior change. The evidence that exists demonstrates that CLTSH approaches to behavior change have proven effective to varying degrees, but the majority of studies are examining shorter-term or immediate outcomes. A study of CLTSH outcomes conducted in 2012 showed that after conventional CLTSH facilitation in rural Ethiopia, private latrine use increased by 9.0 percentage points [15]. The study also reported that open defecation decreased by 22 percentage points, and the number of households with handwashing materials at their latrines also increased by 4.5 percentage points. A similar study conducted in 2016 in Ethiopia found that after CLTSH implementation, latrine usage increased by 16.2 percentage points, and the presence of fresh human excreta in the household decreased by 19.6 percentage points [16].

Although evidence exists to show that these CLTSH behavior change interventions do have some impact on the communities in which they are implemented, there is little evidence demonstrating the sustainability long-term effects of interventions like CLTSH that promote construction of latrines and sanitation and hygiene behavior change [17, 18].

Behavioral Slippage and Barriers to Sustained Behavior Change

Despite the initial successes that the CLTSH interventions had in Ethiopia and elsewhere, behavioral slippage – reverting back to pre-intervention behaviors – is common. The very few studies conducted on long-term sustainability of CLTSH behavior change have not shown promising results for long-term behavior maintenance and, in fact, report high rates of behavioral slippage.

In 2012, Plan International conducted a sustainability study across four countries (Ethiopia, Kenya, Sierra Leone, and Uganda) to evaluate behavior maintenance two years after a CLTSH

intervention declared communities open defecation free [19]. The evaluation found dramatic reversion rates, finding large percentages of intervention communities were openly defecating and had notable lack of handwashing facilities. Slippage across the study, measured as households having a functional latrine and every household member consistently using it, was reported at 21 percent. Slippage based on the criteria of all CLTSH intervention factors (no open defecation, presence of functioning latrine with a lid, handwashing station with soap or ash) was 92 percentage points.

In Ethiopia specifically, the Plan study found that for the presence of a functioning latrine in the household, the average slippage rate was 8.5 percentage points, and the slippage rate of open defecation was measured at 15 percentage points (measured as percentage of households with visible excreta regardless of latrine status). In the study villages in Ethiopia, slippage based on the criteria of all CLTSH intervention factors (no open defecation, presence of functioning latrine with a lid, handwashing station with soap or ash) was an average of 95 percentage points.

One study conducted in Ethiopia and Ghana in 2016 [20] did conclude that, one year after the CLTSH intervention ended, three of the four study sites maintained their reductions in open defecation. The majority of latrines were still unimproved pit latrines, but latrine usage was reportedly intervention levels one year post-intervention. The authors concluded that these particular CLTSH interventions led to more sustainable outcomes and less slippage than previously seen, but could not provide evidence as to why. Additionally, this study was the only published article with such results.

A community may slip back to old behaviors for a number of reasons, including socioeconomic shifts, climatic events, limited access to water, perceived inconveniences, or an unsuccessful transition of ownership from intervention leaders to the community [21, 22]. The most common causes of behavioral slippage after WASH interventions appear to be financial constraints and lack of availability of land or resources necessary for latrine construction and handwashing [19, 21]. Studies from Bangladesh, Ethiopia, Uganda, Kenya and Sierra Leone have all shown that lack of affordability of

resources for latrine construction or handwashing is the top reason why behavior slippage occurs after CLTSH programs are implemented [19, 23].

These studies also showed that security of land or land-ownership status also affected whether people would invest in improving their latrines – if they rented land from the government, they were much less likely to engage in any intervention requiring household improvements. Another significant barrier identified in these studies was the changing seasons. Participants were much more likely to abandon the intervention practices during rainy season, when construction was difficult and flooding made keeping the home clean. One other barrier identified across all studies was the lack of support for behavior change from local healthcare workers once the CLTSH intervention ended [19, 21, 23].

Andilaye Project Approach

Andilaye, a project conducted by Emory University, is an attempt to implement strategies to prevent behavioral slippage, addressing some of the gaps in the CLTSH approach. The project is a three-year assessment of the effectiveness of a novel, enhanced, demand-side sanitation and hygiene intervention based on sustained behavior change and health in Amhara, Ethiopia, which is being implemented by Emory University from 2016 – 2019. This WASH behavior change intervention focuses specifically on behavioral maintenance and was designed to be incorporated into the existing CLTSH programmatic infrastructure in Amhara. *Andilaye* also includes an evaluation of the intervention's impact on other critical outcomes of WASH improvements: behaviors that prevent transmission of and exposure to neglected tropical diseases (NTDs) and improvements to sanitation access on mental health.

The *Andilaye* intervention operates at four levels: 1) the district level; 2) the community level; 3) the group level; and 4) the household level. Different behavior change catalyzing and maintenance methods are used at each level, and this review will focus only on those relevant to this sub-study process evaluation – which was conducted only at the household level. Table 1 includes the relevant behavior change techniques used at each level.

Table 1: List of *Andilaye* intervention activities at each level relevant to this sub-study process evaluation

Level	Activities
District	• Sensitization and action planning workshops • Skills-based training of trainers for health extension workers (HEWs), community health center HEW supervisors, and district officials • Skills-based refresher training for supervisors and facilitators
Community	• Skills-based training of community health workers (Women's Development Army Leaders, or WDALS) • Community mobilization and commitment event • Skills-based review meetings and refresher trainings for WDALs
Household	• Counselling visits with caregivers, conducted by WDALs • Behavioral maintenance counseling visits

This intervention focuses specifically on community-oriented motivators of behavioral change, promoting incremental improvements within three behavioral themes: 1) exclusive utilization of safely managed sanitation facilities for defecation; 2) improved personal hygiene practices; and 3) improved household environmental sanitation. There are eleven specific behaviors within the three themes that the intervention specifically targets, which are listed in Table 2.

Table 2: List of all behaviors targeted by *Andilaye* for behavior change and behavior change maintenance

Sanitation	**Personal hygiene**	**Household environmental sanitation**
1. Construct a long-lasting latrine that is comfortable and hygienic **2.** All household members use a latrine every time they defecate **3.** Immediately dispose of children's feces into the latrine **4.** Repair your latrine whenever it is damaged **5.** Upgrade your latrine so it becomes more long lasting, comfortable, and hygienic **6.** Close your pit when it becomes full and reconstruct a new latrine	**7.** All household members wash their hands with water and soap or soap substitute after handling animal and human feces, even children's feces **8.** All household members wash their hands with water and soap or soap substitute before handling food **9.** All household members wash their faces with water whenever they are dirty and use soap when it is available	**10.** Keep animals separated from the house **11.** Keep the household compound clean by disposing of all animal feces and other waste on a daily basis

At the household level, several activities take place to attempt to ensure behavior change is taking place and is being maintained. First, after the community healthcare workers (known in Ethiopia

as Women's Development Army Leaders, or WDALS) have received training on the *Andilaye* intervention and tools, they are to conduct an initial household visit with the female caregivers under their purview. During this initial visit, WDALs introduce and explain the *Andilaye* intervention and behavioral themes to the female caregivers. The WDALs then assist the female caregivers in choosing a behavioral theme to work on, and set incremental goals to achieve, progressing towards the larger goal of changing all targeted behaviors under the selected behavioral theme. Following the initial counselling visit, WDALs should return to each household monthly to monitor the household's progress towards achieving its behavior change goals, as well as provide additional counselling or support towards achieving those goals.

WDALs have three tools to assist in the monitoring of behavior change progress in each of their female caregivers' households. The first is the goal card, a tool designed to hang in the caregiver's home and to show the progress the household is making towards their overall goal. It should be demarcated to show which behavioral theme the household is working on, and when each targeted behavior changed, the card will be marked to show the household's progress. The second tool is the monitoring matrix, a tool designed to show the WDAL how many visits they have made to the home and on what behavioral theme they gave counsel. The purpose of these tools is to monitor and assess, at the household level, intervention fidelity, dose delivered and dose received. The third tool is a 40-page illustrative flipbook which contains information regarding the ideal way to perform the eleven targeted WASH behaviors of the *Andilaye* intervention. The flipbook should be used by WDALs to guide monthly counseling visits with caregivers at their households.

Aims and Objectives

The aim of this sub-study was to assess and qualify the heterogeneity of household-level behavioral uptake in communities (*kebeles*) that have high intervention fidelity, defined as communities with a high quality and integrity of dose delivered and determined by the process evaluation. This work examined what factors and motivators contributed to behavioral uptake and what barriers to uptake still exist after the first quarter of project implementation. This was accomplished through exploring to what extent that household-level heterogeneity exists, as well as how and why it exists.

Research questions addressed were:

1. In households with high behavioral uptake, why is behavior change taking place? What motivators are driving behavioral uptake?
2. In households with high behavioral uptake, what barriers still remain? What are the main challenges still preventing households from behavior change uptake? What could help households overcome these barriers?
3. Why are some households more successful than others with behavioral adoption

Chapter 2: Manuscript

Abstract

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By Christina M. Braccio

***Background**:* Water, sanitation and hygiene (WASH) behavior change is notoriously difficult to sustain long-term after intervention implementation, and behavioral slippage – reverting back to pre-intervention behaviors – is not uncommon. Community-led total sanitation and hygiene (CLTSH) is a behavior change approach currently used in Ethiopia to improve rural sanitation and hygiene practices; however, the program lacks long-term behavioral maintenance activities. The *Andilaye* project, currently being conducted by Emory University, is an attempt to implement strategies to facilitate behavioral maintenance and prevent behavioral slippage, addressing some of the gaps in the CLTSH approach.

Objective: To conduct a qualitative process evaluation to qualify the barriers to behavioral uptake that remained after the first year of *Andilaye* intervention implementation in households with high behavioral adoption in communities with high intervention fidelity.

***Methods**:* In-depth interviews were conducted with eight high behavior change uptake female caregivers across two high fidelity *kebeles*. Four focus groups were held across the same two high fidelity *kebeles* among high behavior change uptake and low behavior uptake change female caregivers. Observational surveys of the homes of high behavior change uptake female caregivers were also conducted.

***Results**:* Most respondents (85.7%) reported that lack of time as a barrier to behavior change. More than half of all respondents (57.1%) reported financial constraints, lack of availability of construction materials and soap as their biggest barriers to behavior change.

Conclusion: The findings of this study corroborate previous studies on barriers to behavior change in the CLTSH model. Noticeably, more barriers were reported in the *kebele* farther from a paved road and with lower education levels. Residents from the *kebele* located on the paved road reported a lack of time to dedicate to hygiene practices as their only barrier to behavior change. It can be inferred that behavior change may be more successful in communities with greater infrastructure and access to resources.

Introduction

WASH behavior change is notoriously difficult to sustain long-term after intervention implementation, and behavioral slippage – reverting back to pre-intervention behaviors – is not uncommon [20, 25]. A community may slip back to old behaviors for a number of reasons, including socioeconomic shifts, climatic events, limited access to water, perceived inconveniences, or an unsuccessful transition of ownership from intervention leaders to the community [21, 22].

Inadequate sanitation and hygiene are major causes of disease globally, and poor WASH is associated with contributing to the spread of neglected tropical diseases (NTDs), malnutrition and childhood stunting, and diarrheal illnesses and related deaths [1, 2]. There is also evidence that poor WASH has an adverse economic impact on communities and disproportionately affects the safety and health of women [26]. According to a 2018 systematic review, the average prevalence for childhood diarrhea in Ethiopia is 22 percent, and the cases were significantly associated with a lack of latrine availability and a lack of maternal handwashing practices [27]. Ethiopia has the highest prevalence of trachoma - a bacterial infection that affects the eyes and can cause blindness - globally, carrying 30 percent of the disease burden in Sub-Saharan Africa, with an estimated 75 million people, or nearly 71.4 percent of the population, at risk for the disease [28]. Additionally, the estimated prevalence of schistosomiasis in Ethiopia is 36.5 percent, with the majority of those infected being pre-school children, and more than 77 percent of Ethiopia's population lives in areas endemic for soil-transmitted helminths (STHs) [29]. All of these diseases are preventable through sustained WASH behavior change and improved sanitation and hygiene practices.

Recognizing the heavy burden of preventable diseases associated with poor WASH and the adverse impacts, in 2013, the Ethiopian government made WASH behavior change interventions a priority with the roll-out of its One WASH National Program. The program's objective is to improve the health and well-being of communities in rural and urban areas in an equitable and sustainable manner

by increasing access to water supply and sanitation and adoption of good hygiene practices [30]. However, the Ministry of Health's main initiative for improving rural WASH is Community-Led Total Sanitation and Hygiene (CLTSH) [30].

CLTSH is a behavior change approach used mainly in low-income countries to improve sanitation and hygiene practices, with the goal of ending open defecation through spontaneous and long-lasting behavior change of an entire community [13, 14]. The approach uses "triggering" as a way to ignite community interest in improving sanitation facilities and ending open defecation, usually through attempting to provoke shame and disgust about open defecation practices [14]. The CLTSH method has been adopted as the Ethiopian Ministry of Health's national approach for addressing rural sanitation and hygiene behaviors, and was implemented in the Amhara region of Ethiopia in 2006 [31]. An evaluation of CLTSH in 2011 showed a decrease in open defecation and an increase in unimproved latrine use between 2008 and 2010 [32]. However, there was no evidence of a change in improved sanitation facilities coverage in the region [32]. An outcome evaluation in 2016 showed that 24.7 percent of households that received the CLTSH intervention were still practicing open defecation, and 85.1 percent of households were still using traditional pit latrines [33]. Another CLTSH evaluation conducted in 2017 suggests that, while open defecation practices generally are decreasing, long-term behavior maintenance is uncertain. One year after implementation, open defecation had increased from endline by eight percent, and two years after implementation, open defecation practices were up 13 percent [19, 20].

The *Andilaye* project, currently being conducted by Emory University, implements strategies to facilitate behavioral maintenance and prevent behavioral slippage, addressing some of the gaps in the CLTSH approach. *Andilaye* is a three-year assessment of the effectiveness of a novel, enhanced, demand-side sanitation and hygiene intervention based on sustained behavior change and health in Amhara, Ethiopia, which is being implemented by Emory University from 2016 - 2019. Unlike CLTSH,

Andilaye brings improved WASH behavioral promotion together with NTD-preventive behavioral promotion. The intervention focuses on community-oriented motivators of behavioral change, promoting incremental improvements within three behavioral themes: 1) exclusive utilization of safely managed sanitation facilities for defecation; 2) improved personal hygiene practices; and 3) improved household environmental sanitation. The aim of this sub-study is to qualify the barriers to behavioral uptake that remain within the first year of implementation in households with high behavioral adoption in communities with high intervention fidelity. Through evaluating additional barriers at the household level, recommendations can be made on the intervention strategy to address those barriers in an attempt to prevent behavioral slippage and maintain behavior change.

Table 1: Definitions of *Andilaye* Project Terms

Definitions of *Andilaye Project Terms*	
Kebele	Village or community in rural Ethiopia
Households	A home or compound and all of its occupants; those who all dwell under the same roof and eat from the same bowl or platter
Health Center	The healthcare facility operating at the district level; oversees and manages Health Posts and Health Extension Worker program
Health Post	The healthcare facility operating at the *kebele* level, providing primary care to rural Ethiopians
Health Center Head	The person in charge of the Health Center and its staff
Health Extension Worker (HEW)	A salaried, trained healthcare worker stationed at a Health Post, providing primary care and preventative services to the *kebele* residents; oversees the Woman's Development Army Leaders in the *kebele*
Woman's Development Army Leader (WDAL)	Volunteer community healthcare workers who make routine visits to households and focus on prevention and behavior change practices.
Female caregivers	The female in the household who is tasked with the majority of household chores, such as cleaning, cooking, and looking after children
Counseling visits	Routine visits made by WDALs to households to provide advice, support and encouragement for behavior change
Goal cards	An *Andilaye* behavior change communication tool focused on demarcating and tracking household behavior change goals progress
Monitoring matrix	An *Andilaye* behavior change communication tool that tracks the frequency of WDAL visits and topics on which they provide counsel
Flipbook	An *Andilaye* behavior change communication tool containing information regarding the ideal way to perform the eleven targeted WASH behaviors of the *Andilaye* intervention; used by WDALs to guide monthly counseling visits with caregivers at their households
Andilaye training	Training on the *Andilaye* intervention and behavior change tools
WDAL training	Training WDALs receive on *Andilaye* from their HEWs
On-the-job training	Trainings WDALs receive from HEWs while on supervised counseling visits

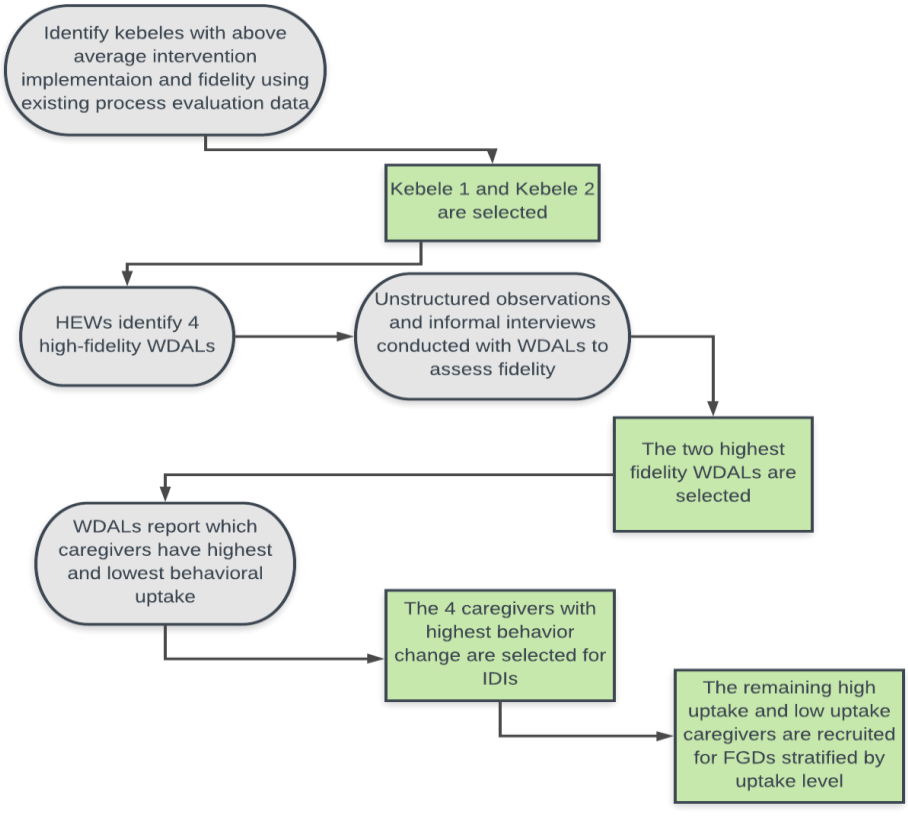
Methods

Study Design

This sub-study used a cross-sectional qualitative design. Eight unstructured observations and informal interviews, eight in-depth interviews (IDIs), and four focus group discussions (FGDs) were conducted with program stakeholders to determine perceived barriers and motivators to intervention uptake; to describe the heterogeneity of barriers and motivators across households with high and low behavioral uptake; and to understand why that heterogeneity exists. Households with high behavioral uptake were defined as those who have received goal cards and have had two or more counseling visits from their Women's Development Army Leader (WDAL), a community health worker. Households with low behavioral uptake were defined as those who have received goal cards and have not received counseling visits. High fidelity WDALs were defined as those who have received proper *Andilaye* training from HEWs, distributed and utilize goal cards as intended, utilize the monitoring matrix, and conduct monthly counseling visits with household caregivers.

Sampling Strategy

Picture 1: Flow diagram of study design sampling strategy



The research team at Emory Ethiopia (a university-derived non-governmental organization in Ethiopia) worked to choose which *kebeles*, WDALs and female caregivers would participate in this study. Using data from the larger qualitative process evaluation and the knowledge of the *Andilaye* project staff, two *kebeles*, Kebele 1 and Kebele 2, were selected for above average intervention implementation and fidelity. High fidelity *kebeles* were defined as having three or more of the following criteria: 1) the health center head and the HEW supervisors attended and helped HEWs during the WDAL training and/or the HEW supervisors provided supportive supervision to the HEWs at least once since the WDAL training; 2) during the WDALs' first counseling visits, HEWs visited households with the WDALs; 3) HEWs supervised and/or provided on-the-job training for WDALs at least once per month; and 4) more than half of the study households received goal cards from their WDALs prior to midline data collection.

Within each of these two *kebeles*, four high fidelity WDALs were identified with the assistance of the Healthcare Extension Workers (HEWs). Unstructured observations and informal interviews were conducted to assure that the selected WDALs have high implementation fidelity. These observations were conducted by the interviewer and field staff. The interview and field staff also visited households for which the WDAL is responsible and observed their goal cards for marks. They also observed the WDAL's monitoring matrix to understand how many home visits she made by the time of data collection. The interviewer also asked six general questions regarding training and home visits. A total of eight observations were conducted, four in each *kebele*.

The two highest fidelity WDALs in each *kebele* assisted in the selection of female caregivers under their care with high behavior uptake for the IDIs. WDALs also assisted in selecting focus group participants, based on the female caregiver's level of behavioral adoption (high or low). Goal cards and monitoring matrices were also observed to determine households with high and low uptake.

Participant Recruitment

Participants were recruited with the help of the high-fidelity WDALs in each *kebele*. Inclusion criteria were limited to female caregivers who were receiving the *Andilaye* intervention. The two highest fidelity WDALs in each *kebele* were asked to provide the names of women under their care who had high behavior uptake and who had low behavior uptake. They were then asked to identify the two female caregivers who had the highest behavior uptake, and those women were selected as participants for the IDIs. The remaining high behavior change female caregivers and the low behavior change female caregivers were recruited with the WDALs' help as focus group participants.

Data Collection

Data were collected from July 6 – July 20, 2018. Qualitative data collection was conducted by a team of one interviewer, one note-taker and the student researcher. A semi-structured in-depth interview guide, a semi-structured focus group discussion guide, and an unstructured observational guide were used for this study (see Appendixes A, B and C). The data collection tools were created in English, reviewed with field staff, translated into Amharic, and piloted by the interviewer and student researcher. Piloting took place in an *Andilaye* intervention *kebele* that was not selected to be part of this sub-study. After piloting, revisions to the Amharic translations were made by the interview and field staff prior to data collection.

Eight IDIs total were conducted with female caregivers from households with high behavior change uptake within Kebele 1 and Kebele 2. The main IDI objectives were to determine at the household level the motivations for behavior adoption and barriers to behavior adoption that still exist in areas with high intervention fidelity, and to understand how motivations and barriers differ between households. Four FGDs total were conducted with female caregivers from households with low and high behavioral uptake, and were stratified by level of uptake. The main FGD objective was to assess and qualify the heterogeneity of behavioral uptake within and between the communities with high

intervention fidelity. Each FGD had between six and seven participants. One FGD for each stratum was conducted in each of the *kebeles*, for a total of four FGDs (two of low behavioral uptake and two of high behavioral uptake).

IDIs were conducted at the participants' homes, and their goal cards and monitoring matrices were also observed. FDGs were conducted at a central location within the *kebele* neighborhood, but separate from any other members of the community to allow for privacy. Interviews and focus groups were conducted in Amharic and were recorded using a password-protected voice memo app on a smartphone. A notetaker was also present for focus groups, and kept notes in Amharic for the transcriber and translator.

Data Management

The interviewer recorded all interviews and focus group discussions with a password-protected voice memo application on a smartphone. Audio files were then transferred to a password protected file on the student researcher's computer. All audio files were shared on a password protected USB drive that was given to the translator for transcription and translation. All transcripts were also password protected, and upon completion of transcription and translation, the translator deleted all files from his devices. The interviewer, notetaker and transcriber/translator were also trained on the importance of confidentiality.

Data Analysis

Data, comprised of digital recordings of all interviews and focus groups, were transcribed verbatim and translated from Amharic to English. Microsoft Word was used for data analysis of the transcripts, which consisted of code development and identification of common themes across interviews. Inductive codes were developed based on the direct responses of the study participants, and

deductive codes were informed by academic and scientific literature regarding barriers and motivators to WASH behavior change.

Ethical Considerations

Ethical approval was obtained for this study from Emory University's Institutional Review Board. Informed consent was obtained from each participant prior to each interview and focus group, and each participant was assured that their participation in the study was voluntary and their identity would remain anonymous.

Results

Demographic Data of Kebele 1 and Kebele 2

Demographic data from each *kebele* was collected and summarized in Table 3.

Table 3: Demographic information from Kebele 1 and Kebele 2

Demographic	**Kebele 1**	**Kebele 2**
Age of female caregiver in years (average; median)	35.2; 35.5	38.1; 38.0
Age of male head of household (HOH) in years (average; median)	43.9; 42.0	46.1; 45
% of female caregivers who are at least literate and/or have had any amount of formal education	3 %	37 %
% of male HOH who are at least literate and/or have had any amount of formal education	38 %	72 %
Number of people per household (average; median)	6.1; 6.0	5.9; 6.0
Distance in kilometers to paved road	24.6 km	0 km
Time it takes for one trip to collect water, in minutes (average; median)	16.1; 15.0	41.9; 30.0
% of households with regular latrine access	53 %	100 %
% of households whose main income source is agriculture	100 %	100 %

Qualitative Results

Across both study *kebeles*, female caregivers expressed similar motivations for their sustained behavior changes. However, the results of this study showed varied barriers to sustained behavior change with a clear difference from Kebele 1 to Kebele 2. The motivators are presented below,

organized by themes that emerged in the transcripts. The barriers are presented below, organized within the intervention's behavioral themes. Four female caregivers were interviewed in Kebele 1, and three were interviewed in Kebele 2.

Table 2: List of Evaluation Activities

Method	Population	Number of events
Observations	WDALs	4
In-depth interviews	Female caregivers (high fidelity households only)	8
Focus group discussions	Female caregivers	4
	Total	16

Motivators to Behavior Change

Overall, female caregivers in both study *kebeles* expressed similar motivations for their behavior change: a desire to improve their health and household cleanliness and encouragement from their WDALs.

Motivator 1: Desire to improve health and household cleanliness

Nearly all of the female caregivers interviewed named preventing diseases as an important reason why they are continuing to practice their intervention behaviors, regardless of which behavioral theme they chose to pursue. Most of the caregivers also expressed knowledge that improved sanitation and hygiene practices are somehow related to disease prevention. Approximately half of the caregivers indicated that improved sanitation and hygiene practices reduce the presence of flies and mosquitos in their homes, which can spread disease.

> "When the cow dump stays in the compound, it attracts insects like mosquito and house fly. This brings infection and disease to human. So this [sanitation] has health benefit." – Caregiver 3

In Kebele 2, women also showed understanding of the importance of purchasing and prioritizing soap usage for personal hygiene, even if soap is expensive.

General household cleanliness also appeared to be an important motivator to practice intervention behaviors such as cleaning feces from the home and consistent latrine use. Many caregivers stated that they continue the intervention practices they have learned because they want a clean home, free from animal and human fecal matter. Most indicated that they already clean their homes daily, and it does not cost them any money or much time to clean.

> "It is important to keep clean, to make my children neat, to be healthy, and to get more benefit from cleanliness." – Caregiver 1

> "I like cleaning; I will be happy when my home and compound becomes neat and clean. When it is dirty, it is not comfortable for every activity. Besides this, it doesn't take time and money. I clean my home every morning." – Caregiver 5

Motivator 2: Encouragement from their WDALs

Nearly all caregivers indicated that home counseling visits and trainings provided by their WDALs are what have been most helpful for meeting their household behavior change goals. Most caregivers described the monthly counseling visits from WDALs as "helpful" and "important" for effective change and staying active in their chosen behavioral themes. Follow-up visits from WDALs appear to be a valuable motivational tool: the majority of caregivers said that in follow-up their WDALs gave advice on how to improve their hygiene and sanitation practices, and that they provided encouragement to keep trying.

> "The lesson I got from group leader help me a lot to be effective in my personal hygiene…she helps me a lot. She explains to my family about personal hygiene, and the lesson and support I get from group leader help me a lot to actively participate in personal hygiene." – Caregiver 5

WDAL perception of the caregivers also seemed to motivate behavior change; a few caregivers indicated their main motivation was to make their WDAL proud of them and to earn her respect. However, several caregivers indicated that they were only motivated to change their behaviors and continue those practices because their WDAL told them it was important to do so.

Motivator 3: Environmental and cultural factors

Nearly all caregivers in both *kebeles* indicated that water was easily accessible in their neighborhood, which made following some of the intervention behaviors such as handwashing, face washing and latrine cleaning easy to accomplish. Nearly all caregivers also showed an understanding that water is important for personal hygiene. They also indicated that, as water is not a scarce resource in their neighborhoods, it is easy to spare water for hygiene activities. Additionally, none of the caregivers interviewed indicated that water was difficult to obtain.

In Kebele 2, nearly all of the caregivers interviewed had already achieved the third behavioral theme, household environmental sanitation, prior to the *Andilaye* intervention. In the Farta District, where Kebele 2 is located, it is common cultural practice to separate animals from the human living space within the compound. Nearly all pastoral homes have separate enclosed structures for livestock to stay at night, and during the day, the livestock are herded away from the main compound.

Prior CLTSH programming seemed to aid in the adoption of the *Andilaye* behavior change interventions. Several participants mentioned familiarity with improved hygiene and sanitation practices from previous government programs. Two participants reported that the information given in the *Andilaye* information and in prior government interventions is the same, which helped with understanding the behavior change methods.

Barriers to Behavior Change

In Kebele 1, female caregivers expressed that their main barriers to sustained behavior change were unavailability of resources such as construction materials and soap, and a lack of time to dedicate to hygiene and sanitation practices. Caregivers in Kebele 2 reported very few challenges to sustaining behavior change.

Sanitation and latrines

The cost of construction materials for new latrines and latrine upkeep appear to be a large barrier to improving sanitation at the household level in Kebele 1. Half of caregivers interviewed said recently costs of cement and corrugated tin have increased, leaving many unable to purchase materials for improved pit latrines. Nearly all also reported that, due to the remote location of the *kebele*, construction materials are difficult to obtain. One caregiver said her family started constructing a new latrine, but costs became prohibitive, so they ceased the improvement project.

A lack of private land for latrine construction appears to be another common barrier in Kebele 1. Not all residents in Kebele 1 own their homes, but rather they rent from the *kebele* and use shared common latrines. Caregivers indicated that the common latrines are owned by the *kebele* and the households cannot improve them. Several of the caregivers that did own their land stated that they do not have enough space to build a latrine and utilize the common latrines instead.

> "We have no land for toilet building. If we have land, we want to have private toilet because this is very useful… This toilet we use is a common toilet constructed by the [*kebele*] officials. We have a shortage of land to build toilet." – Caregiver 5

Time also appears to be a significant barrier to latrine construction, repair and use. Most of the caregivers in reported that cannot construct a latrine alone, and farming, childcare and household duties consume most of their time. Half of the caregivers in Kebele 2 also stated that occasionally their

workload or social obligations prevent them from cleaning daily. Several caregivers also stated that, between school and farming, their children do not have time to help with latrine construction or upkeep.

> "My responsibility in my family is raising children. In my extra time, I work in the field removing weeds from farm land, cooking food, helping my husband in agricultural activities, working in the garden and washing clothes. All home activities are done by me. Nobody helps me…. We want to build new toilet, but all my children are student and they are busy. The youngers are work in agricultural fieldwork with their father." – Caregiver 6

Personal Hygiene

Lack of soap availability was reported as one of the greatest barrier for the caregivers to achieve sustained personal hygiene behavior change. Every caregiver interviewed in Kebele 1 stated that soap is usually not available to purchase in the *kebele*, nor is there a market nearby where it could be purchased. Additionally, they indicated that when soap is available for purchase in the *kebele*, the high cost is prohibitive. Nearly all of the caregivers said they prefer to wash hands and faces with just water to save money by not buying soap. One caregiver also said "soap is not well-known in our culture," and indicated that people are unlikely to use it even when it is available.

> "Washing by using soap after getting contact with dirt is difficult. This is because we couldn't get soap easily and washing hand frequently with soap is not well known in our culture. There is no market to buy soap in our village." – Caregiver 4
>
> "Washing hands with soap and water is hard to me because it has extra expense for soap. If we wash only with water we can save money." – Caregiver 5

However, in Kebele 2, no female caregivers reported lack of soap availability as a barrier to handwashing or personal hygiene.

Household Environmental Sanitation

The apparent major barriers to household environmental sanitation are similar to those for sanitation and latrine construction. Most caregivers in Kebele 1 reported that materials for constructing animal enclosures are cost-prohibitive, that their other responsibilities prevent them from finding time to construct an enclosure, and that there is a lack of space and land for such an enclosure.

> "Separating animals from us is more difficult because we have not enough space. We also have shortage of money. If we had money, we could buy a better house." –Caregiver 7

Several of the caregivers in Kebele 1 and Kebele 2 also said that during the rainy season, cleaning the compound of animal feces is difficult. Some also reported that, with the extra responsibilities of farming during the rainy season, finding time to clean the compound is difficult. One caregiver suggested that more frequent follow-up visits from WDALs are needed to keep the participants accountable.

Discussion

The current, limited body of research on CLTSH and behavior maintenance demonstrates that behavioral slippage is very common in intervention communities, and that most barriers to sustained behavior change appear to be financial constraints and a lack of availability of resources for construction [19-21, 23, 34]. The findings of this study corroborate the previous research on WASH behavior change barriers, as most respondents reported their main barriers to achieving the eleven behaviors *Andilaye* targets are financial restraints and a lack of resources within their community.

Respondents from Kebele 1 reported that the cost of construction materials for latrine construction and maintenance, as well as for separate animal enclosure construction, was prohibitive and limited their ability to participate fully in the behavior change activities. Because Kebele 1 is much farther from a paved road, respondents have difficulty accessing construction materials, as it would take several hours to reach a market where materials are available. Respondents also said they have

difficulties acquiring soap because of their distance from a market, and when soap is available in their community, it is too expensive for most to purchase. These barriers suggest that, as reported in previous literature [19, 21], despite the *kebele* receiving a high dose delivered and dose received, the limited access to resources may cause difficulty for households in sustaining the behaviors learned from the *Andilaye* intervention once the program is complete.

Kebele 2 did not report the same kind of barriers as Kebele 1. Because Kebele 2 lies on a paved road, resources may be more readily available there, thus eliminating some of the barriers faced in Kebele 1. Respondents in Kebele 2 reported that materials for handwashing and for latrine construction were easily accessible. When discussing motivators for behavior change with respondents, those from Kebele 2 stated they understood the importance of purchasing and prioritizing soap usage for personal hygiene, even if soap is expensive, and that practicing good hygiene would lead to a reduction in disease in their household. This prioritization of hygiene and purchasing of materials was not a sentiment expressed in Kebele 1, and may be related to the overall higher education level in Kebele 2. The higher education level of female caregivers (37% educated vs 3% in Kebele 1) and heads of household (72% educated vs 38% in Kebele1) in Kebele 2 may also play a part in the overall lack of barriers for the households; however, without further investigation, it is unclear how education level may be associated with the lack of barriers.

All respondents in both *kebeles* did report that a lack of time due to other household responsibilities often prevented them from consistently practicing or completing the *Andilaye* behavior change activities. However, they did all also express a desire to keep their homes clean and to reduce illness within their families as a main motivator for continuing to make attempts at achieving their behavior change goals. Regular support from their WDALs appears to help keep households on track towards achieving what goals they can despite limited resources, as does the desire to please their

WDAL. However, once these visits cease, it is unclear if households will continue their progress without support from WDAL visits.

Limitations

This study examined barriers and motivators as reported by participants in qualitative in-person interviews. Because the interviewer was a known enumerator of the *Andilaye* study, it must be noted that social desirability bias may be present in the results of this study. Although there are no direct benefits to participants for maintaining their behavior change, participants may have felt that there was respect or social capitol to be gained by reporting they had no difficulty in participating in the behavior change activities.

There was also a loss of data during this study that may have skewed the results slightly. While conducting in-depth interviews in Kebele 2, the smartphone recording device was dropped and one interview could not be recovered and thus was lost. Therefore, Kebele 2 only had usable data from three in-depth interviews, while Kebele 1 had usable data from all four in-depth interviews.

Chapter 3: Conclusions, Recommendations

Conclusions

The *Andilaye* intervention has encountered many of the same barriers to behavior change as previous studies on CLTSH and behavior change sustainability. Among households with high rates of behavior change in these high-fidelity *kebeles*, the main barriers to change were still financial constraints and lack of available resources that hindered households' abilities to construct and maintain latrines and separate animal pens.

Motivators for behavior change were the same across both *kebeles* in this study. Main motivators for behavior change reported by respondents were a desire to have a clean and healthy household, free of disease, and to please the WDALs who were administering the intervention and monitoring household progress. However, there was a noticeable difference in barriers reported across both *kebeles*. Kebele 1 respondents reported financial constraints, lack of resources, lack of free time and lack of land as major barriers to behavior change. Kebele 2 respondents also reported a lack of free time to dedicate to behavior change activities, but also reported there were no financial constraints or lack of resources prohibiting residents from latrine construction or personal hygiene behaviors.

This difference in barriers may be due to the educational level of residents, but needs further investigation to find any association. The difference also may be likely due to the location of the *kebeles*. Kebele 2 is located on a main road, and thus has easier access to resources and more infrastructure, versus Kebele 1, which is 24.9 kilometers away from a paved road and a day trip to any market selling soap or construction materials.

Key Recommendations

While the *Andilaye* intervention focuses on reasons why behavior change can help make a healthier community, there seems to be a lack of emphasis on prioritizing taking time towards making these changes. One main barrier female caregivers across both *kebeles* identified was a lack of time to dedicate to personal hygiene (such as handwashing or face washing) and to environmental hygiene (such as removing all animal feces from the compound). It is recommended for new iterations of CLTSH studies to place an emphasis on time management and the amount of time it takes for personal hygiene and household cleanliness activities, in addition to the health benefits.

Based on the fact that this intervention appeared to have fewer barriers in the *kebele* with more resources available, it is recommended that a study be done to compare behavioral slippage in rural communities with greater access to resources and higher education levels to those with less access and lower education levels. Behavior change maintenance may only be successful in communities that have the means and infrastructure to support it.

Chapter 4: References

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