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Assessing the heterogeneity of intervention fidelity in *Andilaye* Communities

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Bachelor of Science
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Thesis Committee Chair: Matthew Freeman, PhD, MPH
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An abstract of
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Abstract

Background

Amhara, Ethiopia is typified by poor WASH coverage and high rates of behavioral slippage following sanitation interventions. To address these challenges, Emory University is conducting a three-year study to develop and test the effectiveness of demand-side sanitation and hygiene interventions on sustained behavior change and health called *Andilaye* (Amharic for "togetherness"). This thesis will be assessing the heterogeneity of intervention fidelity in *Andilaye* communities.

Methods

We assessed the effectiveness of sanitation and hygiene interventions on sustained behavior change in Amhara, Ethiopia. We used quarterly monitoring data to monitor process evaluation indicators among caregivers, women's development army leaders (WDALs) and heath extension workers (HEWs). Half of the enrolled *Andilaye* households (n=1,589) were randomly selected to be included in the first round of quarterly monitoring data collection. Households not selected for the first round were selected for the second round of quarterly monitoring. All twenty-five intervention *kebeles* were classified into low, medium or high fidelity based on six criteria. Gaps and challenges resulting in heterogeneity among *kebeles* were identified in pre-households counseling visit *Andilaye* components.

Results

We found considerable heterogeneity in delivery among intervention clusters. We found changes in fidelity of the intervention *kebeles* from the first to second quarter. Significant gaps existed in WDALs ability to recall key *Andilaye* components and messages, ability to discuss barriers to improvements in behaviors, goal card engagement, and supportive supervision that have created suboptimal fidelity.

Conclusion

Data collected for this sub-analysis were used to iteratively inform program delivery. The key gaps and weaknesses identified in the results were addressed in refresher trainings with both HEWs and WDALs and should be included in endline evaluation. The components of the *Andilaye* intervention focus on skills and tools to aid in behavioral maintenance for caregivers, through repeated household visits, not just behavior change that can potentially result in behavioral slippage.

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ABBREVIATIONS AND ACRONYMS

Abbreviation	Definition
CHW	Community Health Worker
HEP	Health Extension Package
HEW	Health Extension Worker
SDG	Sustainable Development Goal
WASH	Water, Sanitation and Hygiene
WDAL	Women's Development Army Leader
WHO	World Health Organization

Chapter 1: Comprehensive Review of the Literature

1.1 Introduction

This chapter provides a review of literature by exploring existing research on community-based approaches within public health, specifically focusing on caregiver visits at the household and their impact as a driver for behavior change. This section will look at the utilization of community health workers as the actor for conducting household visits within various health and development initiatives. More specifically it examines caregiver visits within Ethiopia by discussing the Health Extension Package, a community- based health service delivery system aiming to provide equitable access to promotive, preventative and curative health services. Health Extension Workers (HEWs) operate within the Health Extension Package under the principle of transferring health knowledge and skill at a community level equips households in taking responsibility for producing and maintaining their own health. The review will provide detail on the scope of HEWs, addressing both strengths and challenges that have developed due to the program. The greatest challenge being the over extension of HEWs and thus the creation of the Women's Development Army operating under the notion that creating "model women" in regard to health behaviors will have impact at the community level as well as lessen the burden of work on HEWs.

Finally, this literature review introduces *Andilaye* a three-year assessment of the effectiveness of an enhanced, demand side sanitation and hygiene intervention on sustained behavior change and health in Amhara, Ethiopia. This section explores the approach taken by the study to integrate behavior change theory and how caregiver visits fit into the program's effort to minimize the burden on HEWs and maximize capacity building with community change agents. This literature review and thesis focus on caregiver visits conducted by the Women's

Development Army. The counseling visits are specific to sanitation, personal hygiene and environmental household behaviors.

1.2 Behavior Change and Household Caregiver Visits

Behavior change is central to the prevention of population health concerns. A major limitation of many behavior change programs is lack of clarity surrounding the process of change and implementation (Aunger and Curtis, 2007). Public health programs tend to focus mainly on changing behaviors and neglect to incorporate components supporting the maintenance of improved behaviors once they have been learned. Ensuring behaviors become habitual is crucial in effectively preventing behavioral slippage. This section will review different studies suggesting the consistency of repeated household visits and how they can improve both behavior change and behavior maintenance outcomes (Delea et al, 2018).

Household visits by community health workers (CHWs) can be particularly effective in hard to reach subpopulations. A population can be hard to reach or inaccessible to health facilities due to physical or cultural barriers (Curry et al, 2013). Health outcomes will be slow to improve and Sustainable Development Goals (SDGs) hard to achieve unless there is an increase in community-based interventions in low resource settings. Caregivers are not often likely to seek treatment for themselves or their children at health facilities. Both prevention and curative resources, including behavior change communication, only implemented at health facilities are often not reaching the most vulnerable populations (Perez et al, 2009). As a result, there has been a shift to utilizing CHWs within different health sectors to create community-based approaches to delivery health services. The World Health Organization (WHO) defines CHWs as “members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but

not necessarily a part of its organization, and have shorter training than professional workers" (WHO, 2007).

Studies across all sectors of health have shown incorporating education with mothers who are mostly likely to be the caregivers of the household is an effective way to influence behavior change (Kung'u et al, 2009). This was the approach taken in a study in Malawi assessing caregiver's uptake of recommended hygiene and sanitation practices. The observed practices focused on food preparation after participating in household education visits. Caregivers were trained on recommended hygiene practices as well as negative consequences of not observing hygiene on the health and nutrition of children and family members. There were six main categories of training, two of which were personal hygiene and water hygiene (including handwashing at key times, getting water from protected and safe sources, and keeping animals away from sources of drinking water to prevention contamination) (Numeri et al, 2018). The results of the study show a significant difference in caregiver's hygiene practices. This study and the findings were similar to the results of other studies conducted in South Africa (Phaswana-Mafuya et al, 2005), Indonesia (Greenland et al, 2013), and Pakistan (Saleem et al, 2014) where mothers demonstrated significant behavior change after the interventions. Each of these studies support the notion that targeting individuals with training and education on specific health behaviors may result in the adoption of positive practices and improved outcomes of health (Numeri et al, 2018). Implementing these interventions at the community and household level to caregivers further removes barriers to health information.

In 2002, UNICEF implemented public health programs in multiple countries in West Africa. The programs were specifically targeting rural population that have barriers preventing them from accessing health facilities. Researchers assessed Mali's use of CHWs in delivering

these services and communicating for behavior change among household caregivers. The findings revealed the effectiveness of incorporating flipcharts, pictures card techniques and role playing in aiding the education in each household visit. By implementing these components, interventions are often more successful because they take into account the socio-demographic characteristics of the caregiver's in the communities. Caregivers in rural communities are often mothers with low levels of education. Not taking education level into consideration can create limitations and challenges (Huicho et al, 2005). Although the CHWs work in Mali did result in behavior change among caregivers, CHWs only covered 40% of the houses they planned and indicated a heavy workload (Numeri et al, 2018). Over extension of HEWs and increased work burdens are gaps with most CHW programs and is addressed later in this literature review *(see "Gaps and weaknesses with the HEW and WDAL program structure")*.

1.3 Caregiver Visits within Ethiopia

Development of the Health Extension Program in Ethiopia

Ethiopia's population is dispersed throughout the country with only 20% of individuals living in an urban area (World Bank, 2018). Health services in the country are extremely limited, the WHO estimates there are only 0.03 physicians and 2.4 nurses per 1,000 population (WHO, 2011). Less than half (49%) of households have access to an improved water source and almost a third are living below the international poverty line (WHO, 2015). Ethiopia had high rates of maternal and child mortality in comparison with other African countries and the country had a lack of community level health workers in 2004 (with fewer than 700 health officers serving a population of over 700 million) (Maes et al, 2018).

In efforts to increase public access to basic health services, Ethiopia implemented a nationwide primary health program, the Health Extension Program (HEP) in 2003. HEP is a

community- based health service delivery system aiming to provide equitable access to promotive, preventative and curative health services. Through this program, the government is trying to adhere to the needs of lower income, rural populations (Damtew et al, 2018). Since implementation of the program, the government has trained, deployed and supervised more than 40,000 salaried female HEWs (Maes et al, 2018). In each *kebele* within HEP, a health post was established and staffed by two HEWs who have completed high school and one year of training (Damtew et al, 2018). Efforts to enhance both training and supportive supervision for HEWs are continually being implemented. The goal of this is to improve quality of service delivery and promotion retention (FMOH, 2014). Due to the need of CHWs in Ethiopia, HEWs became overburdened with a high workload. This resulted in the creation of the Women's Development Army Leaders (WDALs) incorporating up to 90% of the adult women living in Ethiopia's rural *kebeles* to be "model women" to serve under the direct supervision of HEWs (Maes et al, 2018).

Utilization of HEWs and WDALs in Ethiopia

Creating CHW programs has been a prominent goal in global health development with the hopes of achieving the SDGs. The HEW model in Ethiopia was created under the principle that if "the right health knowledge and skill is transferred, households can take responsibility for producing and maintaining their own health" (FMOH, 2014).

Although HEWs in Ethiopia are often working or available to *kebele* members at their health posts, in order to attain high-quality surveillance, prevention, and promotion of specific diseases and behaviors, the system must extend beyond the health posts (Curry et al, 2013). Community based care improves access to primary health. Moving primary care services to the community level, has enabled Ethiopia to reach more households. This has resulted in reaching more caregivers that dictate the behavior and health decisions of the household, by making their

homes and *kebeles* the point of care (FMOH, 2014). When assessing the effects of household visits on maternal behavior, households with the most frequent contact with CHWs were the most successful. Additionally, the study suggested that the duration of the visit might be less important than the frequency of services, suggesting that short-term intensive interventions could be the most effective (McDonald et al, 2012).

Gaps and Weaknesses with the HEW and WDAL program structure

Although the HEP has been successful and created improvements in health outcomes in Ethiopia, there are numerous weaknesses of the structure and development of both HEWs and WDALs. A few weaknesses include: low health service utilization, weak referral systems, low service quality, shortage of drugs, medical supplies and equipment, as well as a lack of career trajectory for the women working as HEWs or WDALs. One of the biggest weaknesses among HEWs is the increasing number of tasks allocated to HEWs compromising their ability to complete tasks effectively (FMOH, 2007). This weakness is not only found among CHWs in Ethiopia but also in other countries that have adopted similar frameworks. Additionally, trust and confidence in women from the community to assist during specific health activities of needs was identified as a concern due to HEWs and WDALs often being younger women (FMOH, 2007).

Lastly, although HEWs are paid health workers, WDALs are not. This has brought questions of ethics and sustainability as WDALs are increasingly asked to provide more and more services. Although this point goes much deeper into the political economy, it is an important gap to bring up (Maes et al, 2015).

Gaps and challenges within programs utilizing HEWs and WDALs in Ethiopia

In addition to HEP, HEWs are utilized in programs such as Community Led Total Sanitation and Hygiene (CLTSH). The HEP has sixteen packages of preventive and curative health services. Seven packages fall under hygiene and environmental sanitation, including excreta disposal, solid and liquid waste disposal, water supply and safety measures, food hygiene and safety measures, health home environment, control of insects and rodents, and personal hygiene (Yitayal et al, 2014). The 16-component HEP program in addition to HEW carrying out CLTSH steps at the community level has led to overburdened HEWs and poorer intervention implementation.

CLTSH was implemented in Amhara, Ethiopia in 2006 by the Amhara Regional Health Bureau (ARHB), the USAID-funded Hygiene Improvement Project, and the Water and Sanitation Program (Ministry of Health, 2011). It is based on the concept of triggering a collective behavior change and sensitizing communities to the consequences of poor sanitary practices (Gerbremariam et al, 2018). HEWs work with communities and households to promote behavior change, including the use of improved sanitation facilities, hygiene promotion and eradicating open defecation. Although CLTSH addresses improvements in latrine coverage and reduced open defecation, there is limited changes in handwashing practices and gaps in sustainability of the interventions and health impacts (UNICEF, 2016). In areas where triggering has not been successful or sustainable, water, sanitation and hygiene (WASH) specific behavioral adoption have been neglected (Berhe et al, 2018).

Additionally, results from the *Andilaye* formative research suggests there is behavioral slippage occurring in communities that are verified open defecation free (ODF). This is likely due to the approach CLTSH takes in promoting behavior change but failing to equip

communities for behavior maintenance in the absence of further refinement and when encountering personal or environmental challenges (Berhe et al, 2018).

1.4 Andilaye Approach

Amhara is a region in Ethiopia in which WASH conditions are poor and behavioral slippage (relapse back to unimproved WASH practices) is common. There are current gaps in knowledge in the effectiveness of current sanitation and hygiene programming in fostering sustained WASH behavioral adoption and maintenance. To address gaps in programs such as CLTSH already implemented in Ethiopia, Emory University and implementing partners developed the *Andilaye* intervention based on formative research.

Andilaye, Amharic for "togetherness", is a three-year assessment of the effectiveness of an enhanced, demand side sanitation and hygiene intervention on sustained behavior change and health in Amhara, Ethiopia. The *Andilaye* intervention has been designed to focus on three behavioral domains: sanitation, personal hygiene, and household environmental sanitation by placing an emphasis on positive, community-oriented motivators of behavioral change. The intervention promotes achievable incremental improvements and incorporates strategies that facilitate behavioral maintenance. *Andilaye* addresses issues related to over-extension of HEWs and over- saturation of HEP messaging through the engagement of additional community change agents as mechanisms for intervention delivery (e.g. WDALs, religious leader, community managers, etc.).

Andilaye's theory of change includes several intervention functions and approaches across multiple intervention levels. *Andilaye* operates at the district, community (*kebele),* group, and household level. The study assesses and tracks changes in sanitation and hygiene behavioral antecedents (e.g., attitudes; perceived capabilities, including self- and collective efficacy; norms)

and behavioral outcomes, water and sanitation insecurity, respondent-reported diarrhea, and mental well-being at multiple time points. *Andilaye* focuses on the benefits of improvements to WASH access, attitudes and norms on WASH-related behaviors.

Andilaye utilizes HEWs and WDALs in Ethiopia to conduct household counseling visits with caregivers in enrolled *kebeles*. The purpose of the Andilaye household counseling visits is to provide personalized counseling to caregivers to equip them with knowledge, skills, and the motivation necessary to develop improved WASH practices. Additionally, they are incorporated to foster action capacity, self-efficacy, and identify barriers to behavior change so caregivers can maintain their improved WASH practices. Barriers to behavior change and behavior maintenance are addressed through continuous follow-up household visits. A weakness of the HEP is the burden it puts on HEWs. To help mitigate over extension of HEWs, Andilaye has trained WDALs for household counseling visits under the supervision of HEWs.

This thesis will focus on the household- level counseling visits that focus on achievable, incremental goals set by household caregivers themselves. WDALs tailor these visits to the needs of each household by first conducting a transect walk of the household compound, discussing what is seen with the caregiver, and having the caregiver set monthly goals for the household to work toward. During the household visits, the WDAL employs skills-based counseling that includes behavioral maintenance strategies, action and barrier planning will be the main strategy discussed in this project. These behavioral maintenance components work to mitigate behavioral slippage. Continuous household follow up and supportive supervision from HEWs and woreda-level health center supervisors are additional components of the *Andilaye* intervention.

1.5 Project Purpose

Fifty *kebeles* (communities) were enrolled and randomly were assigned the *Andilaye* intervention (25 *kebeles*) or control (25 *kebeles*). Following enrollment and implementation, community follow-up and data collection (baseline and midline) was conducted at all households to assess the intermediate and long-term impacts and changes in WASH behaviors. Incorporating two rounds of quarterly monitoring into the *Andilaye* study, longitudinal data is collected to track how study households are responding to the intervention activities over shorter time points. Additionally, the process evaluation data collected during quarterly monitoring provides insight on fidelity and program uptake within each community. This allows strengths, gaps and challenges to be identified within Andilaye and specific intervention components.

The purpose of this analysis is to generate data that aid iterative decision making to improve ongoing program delivery. It will accomplish this purpose by describing the heterogeneity of intervention fidelity and identify the critical gaps and challenges in intervention in *Andilaye kebeles.* Our analysis explores caregiver household visits and identifies areas of heterogeneity or variability among *kebeles* and between the two rounds of quarterly monitoring. The following research questions guided the development of this thesis project:

1. To what extent is there heterogeneity in the fidelity of Andilaye counseling visits with caregivers across intervention clusters? Additionally, does fidelity change overtime (from QM1 to QM2)?
2. Based on fidelity classification, what critical gaps and challenges for completing Andilaye counseling visits as designed? Additionally, looking at if critical gaps and challenges were addressed over time (between QM1 and QM2)?

Chapter 2: Manuscript

Abstract

The objectives of this manuscript are to determine if there is heterogeneity, and to what extent, in fidelity among *Andilaye* households specifically looking at household counseling visits and to identify what gaps and challenges occurred in implementation to result in heterogeneity and low vs. high fidelity.

Half of the enrolled *Andilaye* households (n=1,589) were randomly selected to be included in the first round of quarterly monitoring data collection. Households not selected for the first round were selected for the second round of quarterly monitoring. All twenty-five intervention *kebeles* were classified into low, medium or high fidelity based on six criteria. Gaps and challenges resulting in heterogeneity among *kebeles* were identified in pre-households counseling visit *Andilaye* components.

We found there is heterogeneity among intervention clusters and fidelity does change within *kebeles* overtime (i.e. changes in fidelity classification from the first to second quarter). Lastly, gaps were identified in WDALs ability to recall key *Andilaye* components and messages, discussing barriers to improvements in behaviors, goal card engagement, and lack of supportive supervision have created gaps and challenges in fidelity.

Introduction

Public health programs that only focus on behavior change and fail to adequately incorporate strategies of behavioral maintenance does not ensure improved behaviors become habitual. This is a crucial component in effectively preventing behavioral slippage that is often neglected (Jerneck et al, 2016). In Amhara, Ethiopia behavioral slippage for water, sanitation and hygiene (WASH) practices is common, undermining government and development sector efforts to improve conditions (Jerneck et al, 2016). Poor sanitation and hygiene among individuals contributes to a cycle of disease and poverty among the poorest communities (WHO, 2013). The World Health Organization has identified WASH as critical components for accelerating and sustaining progress on NTDs if access to and utilization of sanitation facilities and proper hygiene behaviors are adopted and sustained (WHO, 2015). This coupled with Ethiopia's disperse population (only 20% of individuals living in an urban area) often prevents rural communities from receiving health information and seeking consistent care at health facilities (World Bank, 2018). To address these issues, the Government of Ethiopia (GoE) implemented the Health Extension Program (HEP) in 2003 to provide equitable access to promotive, preventative and curative health services at the community level. The program is tailored to supporting the health and needs of lower income, rural populations (FMOH, 2007).

HEP uses health extension workers (HEWs) and women's development army leaders (WDALs) in *kebeles* under sixteen different health packages. The program operates under the principle of creating health "models" within communities to transfer health knowledge and encourage community members to improve and maintain their own health (FMOH, 2014). In *kebeles* enrolled in HEP, two HEWs were stationed at community health posts. However, in order to achieve the highest quality surveillance, prevention and promotion of specific disease

and behaviors, the system must extend beyond the health posts into the community (Curry et al, 2013).

Recognizing the need to address poor WASH practices, seven of the sixteen preventative and curative health packages under HEP fall under hygiene and environmental sanitation. Additionally, the Amhara Regional Health Bureau (ARHB) with additional health partners implemented an intervention approach known as Community Let Total Sanitation and Hygiene (CLTSH) in 2006. Although CLTSH was implemented at the community level utilizing HEWs and adequately addressing latrine coverage, it failed to do the same in regard to handwashing practices (UNICEF, 2016).

Emory University and the ARHB developed the *Andilaye* intervention to address gaps in CLTSH by focusing on community-oriented motivators of behavior change, promoting incremental improvements, and incorporating strategies that facilitate behavioral maintenance. *Andilaye* focuses on the behavioral change and maintenance of improved WASH practices and how that impacts NTDs in the Amhara region. Formative research for *Andilaye* took place in the fall and winter of 2016-2017, baseline and enrollment followed in the spring of 2017. Midline, conducted in the spring of 2018, was the first data collection once *Andilaye* intervention components were implemented. The first round of quarterly monitoring took place in the summer of 2018 and the second round in the winter of 2019. The purpose of quarterly monitoring was twofold: to collect longitudinal data beyond summative evaluation (i.e. endline) and to inform on process evaluation. The process evaluation data collection has provided insight on fidelity and program uptake, assisted in the identification of strengthens and weaknesses as well as gaps and challenges within each *kebele*.

Methods

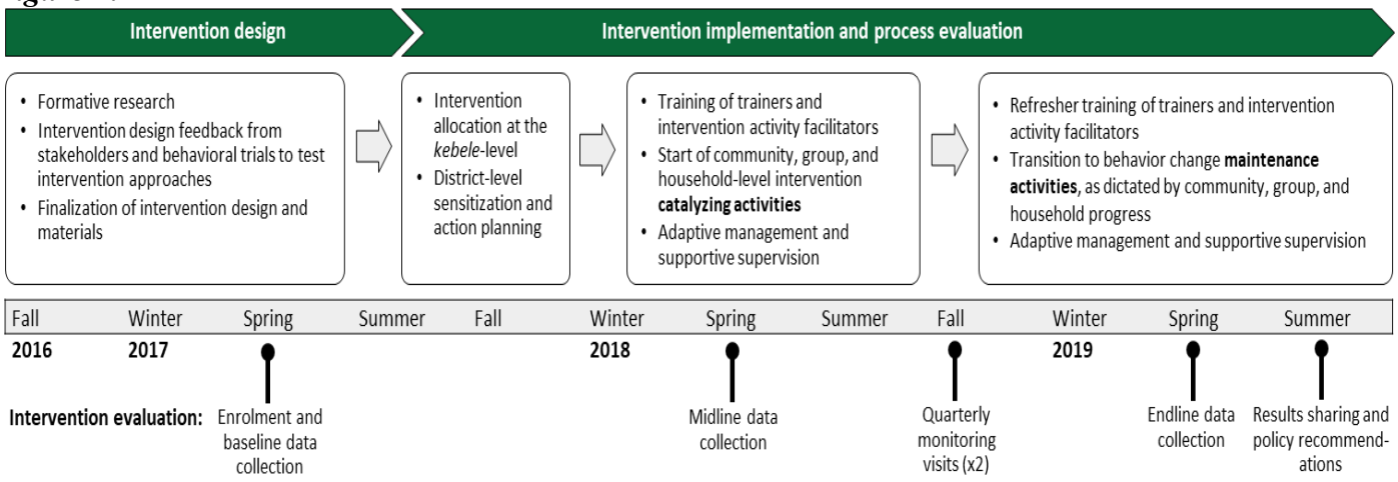
Andilaye Study

Emory University and consortium partners from the ARHB enrolled local households (N=1,589) to participate and organized the household into 50 clusters (*kebeles*) of 30-36 households each. The team then randomly assigned each cluster to receive either the *Andilaye* intervention (25 clusters) or a control (25 clusters). Following enrollment and intervention implementation, the research team conducted community follow-up and data collection at all study households to assess the intermediate and long-term impacts and changes in WASH behaviors.

Sampling

Two rounds of monitoring were conducted in between the study's midline (March 2018) and endline (March 2019) data collection (figure 1).

Figure 1:



Households that were loss to follow up following midline data collection (i.e. moved out of the study site or a child aged 1-10 in the household) were not targeted for monitoring. All remaining eligible study households were visited once for monitoring data collection. Half of the study households (n=794) were randomly selected to receive a monitoring visit in the first round of

quarterly monitoring data collection (July 2018). Households not selected for the first round (n=793) were selected for the second round of quarterly monitoring (December 2018). Enumerators focused first on surveying randomly selected households for the first quarter list. Only after exhausting that list did they move on to households allocated for the second quarter. Households from the second quarter list were visited in order of randomization to ensure respondents were still randomly selected instead of convenient sampling. All households not visited during the first quarter were surveyed during the second. The primary caregiver of the index child (aged 1-10) at each household was the survey participant for the household level surveys which include process evaluation indicators. Additionally, one (of two) HEWs and three to four (of ten) WDALs trained on *Andilaye* counseling visits with caregivers were randomly selected from each intervention *kebele* to be surveyed on process evaluation modules.

Data Collection

The survey used during the quarterly monitoring was adopted from midline survey tools to measure behavioral uptake; specifically focusing on behavioral adoption and slippage of improved practices promoted via the *Andilaye* intervention. A process evaluation framework was used to guide the development of the survey tools administered to HEWs, WDALs, and caregivers in intervention *kebeles* (Saunders, 2005). This specific framework was used to monitor and document program implementation and assist in understanding the relationship between specific program elements and program outcomes (figure 2). *Andilaye* used the Saunders et al, 2005 to inform tool development for process evaluation. The following components were incorporated into each process evaluation survey: fidelity, dose delivered, dose received, reach, recruitment and context (Saunders, 2005).

Table 1: Process Evaluation Framework within Andilaye

Indicator	***Means of Verification***	***Respondent***
Reach		
The percentage (%) of caregivers who reported their WDAL visited them at least once	Survey Response	Caregiver, WDAL
HEW training attendance	Survey Response	HEW
WDAL training attendance	Survey Response	WDAL
Dose Delivered		
The percentage (%) of caregivers who reported their WDAL conducted a transect walk of their compound with them during their first *Andilaye* household counseling visit	Survey Response	Caregivers
The percentage (%) of caregivers who discussed barriers to improvements of practiced behavior with their WDAL during and Andilaye visit	Survey Response	Caregivers
The percentage (%) of households that had the Andilaye goal card	Observation	Enumerator
The percentage (%) of caregivers that reported a HEW came with their WDAL to conduct supportive supervision during an Andilaye household visit	Survey Response	Caregivers, WDALs, HEWs
HEWs conducting supportive supervision visits with WDALs	Survey Response	WDAL, HEWs
HEWs use of supportive supervision checklist	Survey Response	WDAL, HEWs
Dose Received		
The percentage (%) of households that had at least one mark on their goal card (i.e. goal card engagement)	Observation	Enumerator
HEW's ability to recall *Andilaye* intervention motto and key messages	Survey Response	HEW
WDAL's ability to recall *Andilaye* intervention motto and key messages	Survey Response	WDAL

Data was collected electronically on password-protected mobile phones and stored securely using the freely available Open Data Kit (http://opendatakit.org/). The survey platform contained checks and prompts to limit entry errors during data collection. Data from quarterly monitoring visits were stored on password-protected mobile data collection devices, and data was uploaded onto a password- protected server.

Rationale for Criteria

Criteria used to categorize the fidelity of caregiver visits was based on the *Andilaye* household counseling visit protocol. The six criteria (see section "*Fidelity Categorization"*) represent the main components and steps intended for each WDAL to go through at every household counseling visit they conduct. The purpose of an *Andilaye* household counseling visit is to provide personalized counseling to each caregiver. The counseling equips caregivers with the knowledge, skills, and motivation necessary to develop and maintain improved sanitation, personal hygiene, and household environmental sanitation practices. Transect walks provide an opportunity for WDALs to gain a better understanding of the household's current WASH practices and conditions. The WDAL and caregiver can then discuss the household's current WASH practices and the barriers that might be preventing the household from improving that practice. During formative research, actual barriers to improved practices promoted by the *Andilaye* intervention were identified. These barriers and each household's specific barriers should be addressed at this point. Goal setting is facilitated by the WDAL but the caregiver is the one who actually sets or re-commits to a household goals. The caregiver decides the number and type(s) of goal(s) (e.g sanitation, personal hygiene, household environmental sanitation) as well as the path of change (i.e. the circles on the goal card depicting attributes, specific practices, actors within the household that will be the target of the progress over the coming month) she would like to work on during that period. These are goals the household will work toward over the next month, until the WDAL's next counseling visit. The WDALs should make a mark on the goal card to document the goal the caregiver and household are committing to for the next month. By adhering to these criteria, WDALs are equipping households to adopt and maintain improved water, sanitation and hygiene practices.

The median percentage for each indicator was calculated and used as the percentile cutoff for each of the six criteria. *Kebeles* were categorized as high fidelity if five or six of the indicators were above the median cutoff. *Kebeles* were categorized as medium fidelity if three to four of the indicators were above the median cutoff. *Kebeles* were categorized as low fidelity if two or less of the indicators were above the median cutoff.

Fidelity Categorization

The 25 intervention *kebeles* were categorized into low, middle and high fidelity based on the following criteria:

1. The percentage (%) of caregivers who reported their WDAL visited them at least once
2. The percentage (%) of caregivers who reported their WDAL conducted a transect walk of their compound with them during their first Andilaye household counseling visit
3. The percentage (%) of caregivers who discussed barriers to improvements of practiced behaviors with their WDAL during an Andilaye visit
4. The percentage (%) of households that had the Andilaye goal card
5. The percentage (%) of households that had at least one mark on their goal card (i.e. goal card engagement)
6. The percentage (%) of caregivers that reported an HEW can with their WDAL to conduct supportive supervision during an Andilaye household visit

Data Analysis

Data was analyzed using Statistical Analysis Software SAS version 9.4. A score (0-6) was calculated based on how many of the six criteria were met within each *kebele*. Linear

regression was conducted to determine the correlation between score and the indicators collected in the WDAL and HEW surveys.

IRB Statement

Ethical approval for the Andilaye Impact Evaluation was provided by Emory University (IRB00076141), the London School of Hygiene & Tropical Medicine (9595), and locally by the ARHB (HRTT0135909). In addition, the trial is registered on clinicaltrials.gov (NCT03075436). We provided study participants with full details regarding the study as well as their rights as a participant in the study prior to inquiring about consent to participate. This process took place in Amharic. We took appropriate steps to ensure confidentiality for all study participants.

Results

A total of 1,403 households were surveyed during the two rounds of quarterly monitoring (700 households in the first quarter, 703 in the second quarter). According to the categorization used, there was heterogeneity in fidelity of *Andilaye* counseling visits with caregivers across intervention clusters. Fourteen of the twenty-five *kebeles* (56%) were consistent in their fidelity and did not change between quarters. Five *kebeles* (20%) improved in fidelity from the first quarter to the second. Six *kebeles* (24%) did shift into a lower fidelity classification from the first to second quarter (Table 6).

Table 2: Quarterly Monitoring Fidelity Data and Fidelity Score

	QM1 Overall	High Fidelity	Medium Fidelity	Low Fidelity	QM2 Overall	High Fidelity	Medium Fidelity	Low Fidelity
% of Caregivers who reported their WDAL visited them at least once for an *Andilaye* household counseling visit	204/350 58%	43/55 78%	115/169 68%	46/126 37%	199/355 56%	51/71 72%	69/115 60%	79/171 46%
% of Caregivers who reported conducting a transect walk with their WDAL during their first visit *Andilaye* household counseling visit	133/24 66%	33/43 73%	79/115 69%	22/46 48%	135/199 68%	42/51 82%	49/69 71%	44/79 56%
% of caregivers who discussed barriers to improvements of practiced behaviors with their WDAL during a Andilaye visit	27/204 13%	10/43 23%	17/115 15%	0/46 0%	45/199 23%	16/51 31%	16/69 23%	13/79 13%
% of Caregivers who had an *Andilaye* goal card at their household	243/350 69%	50/55 91%	125/169 74%	68/126 54%	239/355 67%	61/71 86%	75/115 (65%)	103/171 60%
% of caregivers who had at least one mark on their *Andilaye* goal card	26/243 11%	14/50 28%	11/125 9%	1/68 1%	31/239 13%	14/61 23%	15/75 (20%)	2/103 2%
% of caregivers who reported an HEW came with their WDAL to their *Andilaye* household counseling visit	44/204 22%	16/43 37%	23/115 20%	5/46 11%	22/199 11%	15/51 29%	6/69 (9%)	1/79 1%
Fidelity Score (0-6) Mean (SD) per *kebele*	2.76 (1.73)	5.25 (0.43)	3.42 (0.49)	0.78 (0.79)	2.64 (1.69)	5.20 (0.4)	3.25 (0.43)	1.17 (0.79)

Legend for Table 2	
	Indicator was above the median cutoff
	Indicator was not above the median cutoff

Table 2 presents the six criteria indicators collected at the household level used to determine the score of each *kebele*. The lowest three indicators in both quarters were caregivers who reported discussing barriers to improvement of practiced behaviors, caregivers who had at least one mark on their *Andilaye* goal card and caregivers who reported a HEW came with their WDAL to their *Andilaye* household counselling visit. The highest percentages were caregivers who reported their WDAL conducted an *Andilaye* household counseling visit, as well as conducting a transect walk during their first visit, and caregivers who had the *Andilaye* goal card at their house.

A score (0-6) was determined for each *kebele* based on six criteria and how many of those criteria were over a calculated cutoff percentage (see *Rationale for Criteria & Fidelity Categorization)*. The average score of all 25 *kebeles,* as well as each fidelity group, is presented in Table 2 for both quarters. The average score for the first quarter was 2.76 and 2.64 for the second. The average score for high and medium fidelity *kebeles* was slightly higher in the first quarter. Additionally, although there were more *kebeles* in the low fidelity category in the second quarter, the average score among low fidelity *kebeles* was higher in the second quarter than the first.

Table 3: Comparing WDAL and HEW indicators to high, medium and low fidelity score								
WDAL Indicators								
	QM1 Overall (n=94)	**High Fidelity (n=15)**	**Medium Fidelity (n=46)**	**Low Fidelity (n=33)**	**QM2 Overall (n=96)**	**High Fidelity (n=19)**	**Medium Fidelity (n=31)**	**Low Fidelity (n=46)**
WDAL training attendance	94 100%	15 100%	46 100%	33 100%	95 99%	19 100%	31 100%	45 98%
WDAL received supportive supervision from HEW	37 39%	4 27%	22 48%	11 33%	38 40%	11 73%	12 39%	15 33%
WDAL ability to recall *Andilaye* intervention motto	20 21%	6 40%	10 22%	4 12%	54 56%	15 79%	17 55%	22 48%
WDAL could identify all three of *Andilaye's* targeted WASH themes	69 73%	13 87%	33 72%	23 70%	79 82%	15 79%	25 81%	39 85%
WDALs able to recall all 6 of the key sanitation messages	10 11%	4 27%	4 9%	2 6%	35 36%	10 53%	8 26%	17 37%
WDALs able to recall all 3 of the key personal hygiene messages	81 86%	15 100%	40 87%	26 79%	67 70%	17 89%	19 61%	31 67%
WDALs able to recall both key household environmental sanitation messages	52 55%	10 67%	22 48%	20 61%	70 73%	15 79%	22 71%	33 72%
HEW Indicators								
	QM1 Overall (n=25)	**High Fidelity (n=4)**	**Medium Fidelity (n=12)**	**Low Fidelity (n=9)**	**QM2 Overall (n=25)**	**High Fidelity (n=5)**	**Medium Fidelity (n=8)**	**Low Fidelity (n=12)**
HEW attendance at the training of trainers (ToT)	25 100%	4 100%	12 100%	9 100%	24 96%	4 80%	8 100%	12 100%
HEW ability to recall the *Andilaye* intervention motto	14 56%	2 50%	7 58%	5 56%	22 88%	5 100%	6 75%	11 92%
HEW could identify all three on *Andilaye's* targeted WASH themes	22 88%	4 100%	10 83%	8 89%	25 100%	5 100%	8 100%	12 100%
HEW able to recall all 6 of the key sanitation messages	6 24%	1 25%	3 25%	2 22%	17 68%	5 100%	4 50%	8 67%
HEW able to recall all 3 key personal hygiene messages	21 84%	3 75%	10 83%	8 89%	25 100%	5 100%	8 100%	12 100%
HEW able to recall both key household environmental sanitation messages	17 68%	3 75%	9 75%	5 56%	25 100%	5 100%	8 100%	12 100%
HEW facilitated a training on how to conduct *Andilaye* household visits with WDALs	18 72%	3 75%	7 58%	8 89%	24 96%	5 100%	8 100%	11 92%
HEW has ever provided a supportive supervision to WDAL during household counseling visit	13 52%	1 25%	8 67%	4 44%	8 32%	2 40%	3 38%	3 25%
HEW has ever used a household counseling supportive supervision checklist	4 16%	0 0%	4 33%	0 0%	2 8%	0 0%	0 0%	2 17%
HEW received supportive supervision from their Health Center Supervisor	2 8%	0 0%	1 8%	1 11%	1 4%	1 20%	0 0%	0 0%

Legend for Table 3	
	Indicator was above the median cutoff
	Indicator was not above the median cutoff

Table 3 details the HEW and WDAL indicators included in quarterly monitoring surveying and associations with high, medium and low fidelity score classifications. The lowest percentages of messaging recall from WDALs were recalling the *Andilaye* motto and being able to recall the six sanitation key messages. There are five recall messaging indicators for WDALs, recall percentages increases in four of the five categories from the first to the second quarter. Supportive supervision of WDALs from HEWs is only occurring 40% of the time.

Results of HEW message recall was higher than WDALs for every indicator and improved from the first to second quarter. Two indicators with extremely low percentages were:

- HEW has ever used a household counseling supportive supervision checklist (less than 20%).
- HEW received supportive supervision from their Health Center Supervisor (less than 10%).

Table 4: Associations between WDAL and HEW indicators and QM1 fidelity score using Linear Regression Model		
	Parameter Estimate	**Pr>t**
WDAL Indicators		
Adjusted R-squared (0.449)		
WDAL received supportive supervision from HEW	0.327	0.20
WDAL ability to recall *Andilaye* intervention motto	0.762	0.13
WDAL could identify all three of *Andilaye's* targeted WASH themes	-0.119	0.82
WDALs able to recall all 6 of the key sanitation messages	0.999	0.17
WDALs able to recall all 3 of the key personal hygiene messages	0.944	0.13
WDALs able to recall both key household environmental sanitation messages	-0.054	0.90
HEW Indicators		
Adjusted R-squared (0.1672)		
HEW ability to recall the *Andilaye* intervention motto	0.097	0.81
HEW could identify all three on *Andilaye's* targeted WASH themes	1.268	0.009
HEW able to recall all 6 of the key sanitation messages	-0.491	0.29
HEW able to recall all 3 key personal hygiene messages	-0.007	0.99
HEW able to recall both key household environmental sanitation messages	1.222	0.007
HEW facilitated a training on how to conduct *Andilaye* household visits with WDALs	-0.487	0.22
HEW has ever provided a supportive supervision to WDAL during household counseling visit	0.455	0.23
HEW received supportive supervision from their Health Center Supervisor	-1.246	0.0001

The coefficient of determination (r^2) of the WDAL indicators is 0.449, indicating that 45% of the variability in the score is accounted for by the WDAL indicators included in table 4. The coefficient of determination (r^2) of the HEW indicators is 0.1672, indicating that 17% of the variability in the score is accounted for by the HEW indicators included in table 4. Specific message recall indicators in the first quarter were associated with a higher score (WDALs ability to recall the *Andilaye* motto, sanitation and personal hygiene messages). The only message recall indicator among HEWs associated with higher outcomes was recall of household environmental sanitation messages. WDALs receiving support through supervision or training was not associated with better outcomes.

Table 5: QM2 Linear Regression Model		
	Parameter Estimate	**Pr>t**
WDAL Indicators		
Adjusted R-squared (0.0836)		
WDAL training attendance	0.889	0.609
WDAL received supportive supervision from HEW	0.481	0.236
WDAL ability to recall *Andilaye* intervention motto	0.836	0.052
WDAL could identify all three of *Andilaye's* targeted WASH themes	-0.861	0.119
WDALs able to recall all 6 of the key sanitation messages	-0.096	0.811
WDALs able to recall all 3 of the key personal hygiene messages	0.699	0.1256
WDALs able to recall both key household environmental sanitation messages	0.15	0.729
HEW Indicators		
Adjusted R-squared (0.1285)		
HEW ability to recall the *Andilaye* intervention motto	-0.215	0.691
HEW able to recall all 6 of the key sanitation messages	1.113	0.004
HEW facilitated a training on how to conduct *Andilaye* household visits with WDALs	0.924	0.268
HEW has ever provided a supportive supervision to WDAL during household counseling visit	-0.096	0.807
HEW received supportive supervision from their Health Center Supervisor	2.172	0.015

The coefficient of determination (r^2) of the WDAL indicators is 0.0836 in the second quarter, indicating that 8% of the variability in the score is accounted for by the WDAL indicators included in table 5. WDAL training attendance and *Andilaye* motto recall was associated with a higher outcome while recall of WASH themes and sanitation messages were not.

The coefficient of determination (r^2) of the HEW indicators is 0.1285, indicating that 13% of the variability in the score is accounted for by the HEW indicators included in table 4. Two indicator parameter estimates were significantly higher values suggesting a greater influence on the score. The first being HEWs ability to recall all six of the key sanitation messages. The main indicator associated with a better outcome (higher score) was HEWs receiving supportive supervision from their Health Center Supervisors.

Discussion

Key Findings

We conducted a process evaluation and compared key indicators among WDALs and HEWs against intervention fidelity at the household level. We found that the main actionable finding associated with a higher fidelity score was HEWs receiving supportive supervision from their Health Center Supervisors. Additionally, specific message recall indicators were also associated with a higher score outcome.

Although there was significant improvement in WDALs ability to recall messages from the first to second quarter, the low percentages of key messaging recall created areas of weakness as WDALs are the ones conducting household counseling visits with caregivers. To effectively conduct *Andilaye* household counseling visits, WDALs knowledge on *Andilaye* and the improved behaviors being promoted is essential. Both the HEW and WDAL structure are based on the belief of creating "model" examples and households in specific public health topics. It was crucial both HEWs and WDALs demonstrate strong understanding of improved WASH practices and behaviors introduced and encouraged through the *Andilaye* intervention. The components prior to the *Andilaye* household counseling were created with the purpose of training HEWs and WDALs, ensuring they understood critical components of *Andilaye* and were comfortable with their roles within the intervention.

The assumptions regarding the components prior to Andilaye household counseling visits were that higher training attendance and recall of messages and *Andilaye* motto would indicate a greater understanding of the purpose and goal of doing each intervention activity. As a result, HEWs and WDALs with higher percentages in the pre-household visit knowledge would then lead to a higher fidelity. This assumption was correct as indicated in the results, the highest recall

of all *Andilaye* disseminated messaging was among WDALs in high fidelity *kebeles* in both quarters.

Transect walks provide an opportunity for WDALs to observe current WASH practices at the household (i.e. household environmental sanitation, latrine type, etc.). A high percentage of caregivers who reported their WDAL conducted a transect walk with them is a strength within the program (66% in the first quarter and 68% in the second quarter). However, a major gap within the program is the low percentage of caregivers who reported their WDAL discussed barriers to improvements in their WASH behaviors. Transect walks should be followed with goal setting and working to eliminate barriers that may exist for caregivers in achieving those goals. Overall, only 13% of caregivers in the first quarter and 23% of caregivers in the second quarter reported discussing barriers to improved behaviors with their WDAL. By not discussing barriers to solutions and goals, WDALs are not equipping caregivers to identify barriers to improved health and how to overcome them. This places limitations on goals to improved health achieved at households. This is consistent with the results of goal card engagement which tracks the number of goals each household is achieving. Existing literature supports the notion that incorporating flipcharts and pictures card techniques aids in education. The results show that the presence of the goal card is high, but engagement is low. This is a pivotal breakdown in *Andilaye* activities.

An additional assumption was supportive supervision from the top down would benefit actors at every level, elevating the heavy burden HEWs have felt in previous health and development programs. Lastly, because there was refresher training conducted prior to the second round of quarterly monitoring, there is an assumption that both fidelity and HEW and WDAL's knowledge surrounding *Andilaye* would be higher. Supervision of WDALs conducted

by HEWs did improve from the first to second quarter especially among high fidelity *kebeles*. However, supervision from Woreda level supervisors remained extremely low.

One of *Andilaye's* goals is to address issues related to over-extension of HEWs. One way this is done is through the utilization of WDALs but also through Health Center Supervisions providing additional guidance. If this fails to happen, HEWs continue to feel over burdened with their responsibilities. The results show HEW supervision of WDALs is extremely low in both quarters. When the issue of supportive supervision from the top down reaches the WDAL level, it effects fidelity. If specific components of the *Andilaye* household counseling visits are being forgotten or conducted incorrectly this is likely to continue due to very little supervision.

Lastly, percentages of HEW's ability to recall both the *Andilaye* motto and key messages surrounding all three themes (sanitation, personal hygiene, and household environmental sanitation) are much higher than WDAL's. As a whole HEWs demonstrate a greater understanding of the *Andilaye* intervention. This further emphasizes the importance of supportive supervision for guidance and to continue increasing the WDALs knowledge on *Andilaye* as they are the ones conducting the counseling visits.

Next Steps for Addressing Gaps

District level

Conducting additional adaptive management workshops would improve intervention outcomes and resource management by learning from monitored program outcomes. Also conducting a skills-based training of the trainers for HEWs, CHC HEWs supervisors and Woreda officials would provide silks-based training on household level intervention activities, supportive

supervision, and on-the-job training so HEWs can, in turn, effectively train WDALs on the implementation of HH level activities and provide supportive supervision.

Community- Level

Conducting additional skills-based review meeting and refresher training for Women's Development Army Leaders would reinforce previously acquired knowledge and skills, address WDAL turnover, and review success and address challenges faced in implementing household counseling visits with caregivers.

Endline Data Collection

In addition to conducting refresher trainings at both the district and community level, with the goal of improving the indicators in table 2, there are specific indicators at the household level that should be included in the endline data collection.

-The percentage of caregivers who discussed barriers to improvements of practiced behaviors with their WDAL during an *Andilaye* visit

-The percentage of caregivers with marks on their goal card (goal card use)

-The percentage of caregivers who reported a HEW came with their WDAL to an *Andilaye* household counseling visit

These indicators had the lowest percentages but are integral components of the *Andilaye* intervention. Discussing barriers to improvements of practiced behaviors and marking on goal cards (achieving *Andilaye* goals) are crucial steps intentionally included in household counseling visits to promote behavior change. An increase in HEW supervising WDALs would ensure WDALs feel supported and are correctly *Andilaye* conducting household visits. With additional refresher trainings, we would expect to see an increase in these three indicators.

Limitations

Limitations with data analysis

Different indicators from table 2 were omitted from the linear regression model for two reasons:

-High number of missing values

The indicator measuring whether a HEW has ever used a household counseling supportive supervision checklist was not included in any model because there were so many missing values. This indicator was conditional on a HEW providing supportive supervision. Because of this we are unable to determine the potential impact this indicator could have on fidelity score.

-No variance in the data (all respondents answered yes or all respondents answered no)

In both quarters, training attendance among WDALs and HEWs was 100%, these parameters were not included in the model due to lack of variance. In the second quarter (table 4), for the same reason, HEWs ability to identify *Andilaye's* three WASH theme, the three key personal hygiene messages and the key household environmental sanitation messages were not included in the model. For both quarters, the parameter identifying the percentage of HEWs who have used a household counseling supportive supervision checklist due to the majority of the values being missing. This indicator on whether HEW ever provided supportive supervision for their WDAL.

Limitation during data collection

A major limitation of second round of quarterly monitoring was the timeline of refresher training in between the two rounds of data collection. After the first round of quarterly monitoring progress and results were summarized and presented to Woreda level Health Center Supervisors. These results were used to inform sessions of refresher trainings for HEWs and WDALs on specific *Andilaye* components that were not being implemented correctly or as

frequently as planned. Goal card usage and supportive supervision were two main points in the training. Refresher training occurred later than originally intended, HEW refresher training took place from November 5-15th and WDAL refresher training took place from November 22nd-December 16th. Data collection for the second round began December 5th and ended January 14th. The training was only one week before or occurring simultaneously as data collection as opposed to having a month in between. Had the refresher training taken place earlier there may have been more impact and improvement on WDAL and HEW's knowledge on implementation of *Andilaye* household counseling visits. The assumption was, by prioritizing certain aspects of the intervention in the additional training, there would have been higher fidelity among *kebeles* between the two quarters.

Manuscript Appendix

Table 6: Fidelity classification between quarters

High Fidelity *Kebeles* (n=4)	**Medium Fidelity *Kebeles* (n=12)**	**Low Fidelity *Kebeles* (n=9)**
First round of Quarterly Monitoring		
Woji Awuramba	Kanat	Worken
Debranta	Mayinet	Tiwa
Azawure	Lata	Dehina Mariam
Arga	Wondatta	Girbi
	Hiruy Aba Aregya	Ayiva Niva
	Fereswoga	Sahirna
	Wogelsa	Gonbat
	Chenta	Kuhur Micheal
	Ayidde	Zeng
	Wewa	
	Anguko	
	Adis Betekristian	

High Fidelity *Kebeles* (n=5)	**Medium Fidelity *Kebeles* (n=8)**	**Low Fidelity *Kebeles* (n=12)**
Second round of Quarterly Monitoring		
Mayinet	Lata	Fereswoga
Debranta	Dehina Mariam	Chenta
Arga	Wogelsa	Gonbat
Woji Awuramba	Wondatta	Kanat
Adis Betekristian	Hiruy Aba Aregya	Azawure
	Ayidde	Zeng
	Kuhur Micheal	Worken
	Tiwa	Ayiva Niva
		Anguko
		Sahirna
		Giribi
		Wewa

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Chapter 3: Conclusion, Recommendations and Future Research

Conclusion

There were three weaknesses in intervention implementation within *kebeles* identified during quarterly monitoring. First, WDALs ability to recall key *Andilaye* messages (i.e. *Andilaye* motto, behavioral themes, and messages within each theme). This raises concern as WDALs are the ones communicating these messages to caregivers during household counseling visits. HEWs consistently demonstrated a stronger understanding for the WASH messages in *Andilaye.* Achieving equal knowledge among the two levels would strengthen the argument that with proper training and supervision WDALs are able to carry out the same activities as HEWs.

Second, discussion of barriers to improvements among WDALs and caregivers is a gap that is impacting other aspects of the intervention. Because the results indicate WDALs are not acknowledging and discussing goals and barriers to achieving them, it is not a surprise goal card engagement (i.e. marking the goal card when goals are achieved) is also low. The goals on the goal card are within the three *Andilaye* behavioral themes (sanitation, personal hygiene, and household environmental sanitation). This leads back to the fact that WDALs are not as familiar with the themes and messages within *Andilaye* as HEWs. Stronger knowledge among WDALs equips them in advising caregivers in goal setting.

Third, the lack of supportive supervision allows for breakdowns and gaps to arise at every level. Without supervision from HEWs, WDALs are not being corrected or reminded on specific *Andilaye* activities and messages. Additionally, without supervision from Woreda level health center supervisors, HEWs continue to feel overburdened and over extended due to the demand programs like HEP continue to place on them.

Key Recommendations

Within the *Andilaye* timeline, there is still one more data collection point (endline) in which longitudinal data will be collected once again to identify areas of behavior change within *kebeles*. Additionally, a recommendation is to include specific process evaluation indicators into endline data collection as well. The following indicators are recommended to be included in endline:

-The percentage of caregivers who discussed barriers to improvements of practiced behaviors with their WDAL during an *Andilaye* visit

-The percentage of caregivers with marks on their goal card (goal card use)

-The percentage of caregivers who reported a HEW came with their WDAL to an *Andilaye* household counseling visit

These indicators were chosen for multiple reasons. First, they are the indicators with the lowest percentages among both the first and second quarter. Identifying and discussing barriers to improvements in behaviors is a sustainable skill *Andilaye* can help caregivers learn and practice. In the future it could assist in behavioral maintenance if caregivers are able to continually identify current barriers that may arise in their future that could potentially impact their behavioral maintenance.

There are examples in the literature surrounding household counseling visits with caregivers as a mechanism for behavior change concluding that the use of flipcharts, picture cards, etc. improved intervention outcomes (Huicho et al, 2005). The *Andilaye* goal card is a visual representation of the key messages and improved WASH behaviors the intervention is disseminating and encouraging. Including the indicator of goal card use in endline would provide

another opportunity to see if goal card use improves if higher behavior change is also present. Lastly, an increase in supportive supervision will only strengthen the results of the *Andilaye* project by ensuring each level of actors within the intervention feel supported and have adequate guidance.

Gaps addressed by this project

The *Andilaye* intervention addresses gaps in sanitation and hygiene practices programs like CLTSH neglect by placing emphasis on the importance of improve WASH behaviors. Additionally, it implements activities and educational messages in positive, community-oriented way as opposed to triggering communities.

Second, unlike government programs such as HEP, *Andilaye* utilizes WDALs for caregiver visits to alleviate the heavy work burden on HEWs. *Andilaye* serves as an example and provides information that can inform future projects in Ethiopia, across all health sectors. *Andilaye* demonstrates the effectiveness of WDALs conducting household visits with caregivers instead of the responsibility falling solely on HEWs.

Lastly, formative research conducted before *Andilaye* was implemented suggested that continuous follow-up and supervision by various stakeholders is needed to prevent community relapse (Berhe et al, 2018). The components of the *Andilaye* intervention focus on skills and tools to aid in behavioral maintenance for caregivers, through repeated household visits, not just behavior change that can potentially result in behavioral slippage.

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Appendix

Appendix A- *Kebele* pairs for Quarterly Monitoring

Quarterly Monitoring Study Households								
Bahir Dar Zuria	**HHs in QM1**	**Pair**	**Fogera**	**HHs in QM1**	**Pair**	**Farta**	**HHs in QM1**	**Pair**
Andasa/ Yigoma	16	6	Adis Betekristian	15	9	Arga	14	22
Chenta	16	8	Alembur Zuria	16	11	Ariengo	15	18
Debranta	16	3	Anguko	14	12	Ata	15	25
Dehina Mariam	16	2	Hagere Selam	14	12	Ayidde	16	20
Fereswoga	15	5	Kuhar Abo	15	13	Ayiva Niva	14	15
Gonbat	16	4	Kuhar Micheal	16	13	Azawure	15	24
Kimbaba	15	7	Makisegnit Ketema	13	10	Buro	14	19
Lata	17	1	Rib Gabrial	14	9	Debretabore Eyesus	17	24
Maqual	16	5	Tiwa	15	14	Gena Mechawocha	15	17
Robit	14	4	Woji Awuramba	15	10	Giribi	15	18
Sebatamit	15	1	Woreta Zuria	15	14	Hiruy Aba Aregay	16	17
Sekelet	17	3	Zeng	15	11	Kanat	16	23
Tentalaguna	14	8				Kolay	15	15
Wogelsa	15	7				Mahidere Mariam	16	16
Wondatta	15	6				Mayinet	14	25
Yigodi	16	2				Megendi	16	20
						Sahirna	13	19
						Selamko	15	23
						Tsegur	15	21
						Wewa	16	21
						Worken	15	16
						Wukro	16	22