Global Communities
Partners for Good

July 31, 2015

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RE: Improved Water, Sanitation & Hygiene (IWASH)

Dear Ms. Ibe,

On behalf of Global Communities, I am pleased to submit our Final Programmatic Report summarizing activities throughout the life of the program from February 2010 to April 2015.

Should you have any questions or comments regarding any aspects of this report, please do not hesitate to contact me.

Sincerely,

Michel Holsten
Senior Vice President

CC: Hillary A. Marshall, Agreement Officer, USAID
Warner Passanisi, Country Director, Liberia, Global Communities

Natural Leaders celebrating open defecation-free communities in Lofa County

Final Report

Program Name/Acronym: Improved Water, Sanitation & Hygiene /IWASH

Country: Liberia

Donor: USAID

Award Number/Symbol: 669-A-00-10-00087-00

Reporting Period: Feb 26, 2010 to April 30, 2015

Submitted To: Ochiawunma Ibe/AOR/USAID

Submitted By: Global Communities/Pia Wanek

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FROM THE AMERICAN PEOPLE

Global Communities
Partners for Good

Name of Project	**Improving Water, Sanitation, and Hygiene (IWASH)**
Country and regions	**Liberia, West Africa**
Donor	**USAID**
Award number/symbol	**669-A-00-10-00087-00**
Start and end date of project	**February 25, 2010 – February 23, 2015**
Total estimated federal funding	**10,000,000 USD**
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Acronyms and Abbreviations

BCC	Behavior Change Communication
CDC	Center for Disease Control and Prevention
CEM	Coarsened Exact Matching
CHT	County Health Team
CLTS	Community-Led Total Sanitation
CSC	County Steering Committee
CWC	Community WASH Committee
DALY	Disability-Adjusted Life Year
DEOH	Division of Environmental and Occupational Health
DQA	Data Quality Assessment
EHT	Environmental Health Technician
GHI	Global Health Initiative
GHWD	Global Hand Washing Day
GoL	Government of Liberia
IPC	Interpersonal Communication
IR	Intended Result
KAP	Knowledge Attitudes and Practices
Libra	Libra Sanitation, Inc.
LISGIS	Liberia Institute for Statistics and Geo-information Services
LMWP	Liberia Municipal Water Project
L-MEP	Liberia Monitoring and Evaluation Program
MDG	Millennium Development Goals
MOHSW	Ministry of Health and Social Welfare
MOE	Ministry of Education
MPW	Ministry of Public Works
MLM&E	Ministry of Lands Mines and Energy

M&E	Monitoring & Evaluation
NCU	National Coordination Unit
NLN	Natural Leader Network
NWSHPC	National Water, Sanitation, and Hygiene Promotion Committee
ODF	Open Defecation-Free
PE	Peer Educator
PMP	Performance Monitoring Plan
POU	Point-of-Use
PRS	Poverty Reduction Strategy
PSI	Population Services International
PTA	Parent Teacher Association
RBHS	Rebuilding Basic Health Services
R&E	Reporters & Editors
SWIP	Small WASH Infrastructure Projects
SOP	Standard Operating Procedures
TRaC	Tracking Results Continuously
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WASH	Water Sanitation and Hygiene
WG	WaterGuard©
WSSC	Water Supply and Sanitation Commission
WTD	World Toilet Day

Executive Summary

Global Communities began implementing the five-year, USAID-funded IWASH program, which facilitates accelerated achievement of the Millennium Development Goals (MDGs) related to water and sanitation, in February 2010. The IWASH program goal is "*to make measurable improvements in water supply, sanitation and hygiene (WASH), as well as in the enabling environment for WASH, in target areas within the three counties of Bong, Lofa and Nimba, and selected communities in greater Monrovia"* to improve health outcomes for community members. This was accomplished through three intended results: 1) increased access to water supply, sanitation, and hygiene products, 2) increased community knowledge and use of potable water supply and storage technologies, sanitary practices, and water hygiene, and 3) improved enabling environment for WASH at the national, county, district, and community level.

In 2011, the IWASH program was re-oriented in response to a USAID request narrow the geographic focus of program activities, and devoted a greater level of effort and resources to improving the enabling environment at multiple levels of government. The realignment reflected an overarching focus on tenets of both the USAID/Forward approach and the Global Health Initiative (GHI) strategy, and allowed for greater program focus and impact. Later, in FY2013, IWASH responded to a midterm evaluation by refocusing the activities of the program into 10 projects which streamlined the activities of the program and focused on sustainable sanitation through Community-Led Total Sanitation (CLTS).

Over nearly five years of addressing community access to critical WASH needs, the IWASH program has been extremely successful in building effective models for expanding sustainable access to safe water, improved sanitation, and hygiene facilities. Models through which these services and assets have been delivered have not only been constructed and established by the program, but have also acted as vehicles for service expansion, allowing Global Communities to exceed program targets. By the end of the program, access to improved sanitation through CLTS, implemented by the innovative Natural Leader Network driven model, exceeded triggering and Open Defecation Free (ODF) community targets by 25% and 41%, respectively. The program also exceeded targets for water access through WASH Entrepreneur activities. The Natural Leader Network, developed to support a cost effective and sustainable sanitation demand generation, has been more effective than anticipated, not only in terms of ODF performance, but also an integral component of education, training, and awareness that was the foundation of many Ebola response and prevention strategies. It appears there are strong linkages between communities that have achieved ODF status and the non-transmission of Ebola. This connection is described in a new report section, Ebola Response, and was the subject of an IWASH supported study included as an Annex to this report. IWASH program success across key indicators is summarized the performance figures in the table below:

Measured Outcome	LOP Target	LOP Actual
Communities Triggered	300	370
Communities ODF	220	310
Number of CLTS Ambassadors	48	147
Beneficiaries with access to improved drinking water	101,608	163,450
Number of water points constructed or rehabilitated	244	388
Number of active WASH Entrepreneurs	21	54

The exceptional performance against key targets for access to water and sanitation represent the highest level of CLTS success in Liberia. The conversion rate for triggered communities becoming verified as ODF is 83.8%, a very high rate for any program in the world. This performance was achieved during a time when the IWASH program took a significant role in Ebola response activities.

Access to improved sanitation has also been increased by construction of five urban latrines implemented with cofounding from Chevron. Three of the latrines were built in Paynesville, completed and inaugurated with participation of USAID Deputy Mission Director and the Mayor of Paynesville in 2015.

WASH Entrepreneurs have contributed enormously to the increase in access to improved water supply through repair of hand pumps. As small business people they have made a sustainable livelihood while providing:

- Hand pump repair (spare parts and repair services)
- Hand washing soap (made by themselves with locally available palm oil)
- CLTS triggering for sanitation development (WASH Entrepreneurs are primarily drawn from NLN members).

A major focus of the IWASH project has been to develop the enabling environment for WASH improvements in Liberia. At the national level, IWASH worked closely with the National Technical Coordinating Unit (NTCU) for CLTS, created county and district level steering committees, and frequently installed Environmental Health Technicians (EHT) into county and district structures where they were not present in order to capacitate local health structures for CLTS implementation. IWASH supported the NTCU to make monthly visits to project sites to critique the implementation and engage in evolving CLTS techniques. IWASH field monitors visited field sites several times each week accompanied by county and district EHT to ensure thorough monitoring was performed.

Water point maintenance was another core component of the IWASH program. The IWASH Entrepreneur Manager held monthly meetings between WASH Entrepreneurs and County WASH Coordinators from the Ministry of Public Works (MPW). These meetings connected the private sector product and service providers with their government counterparts, so that the responsible government agency was aware of private sector activities in the sector. MPW staff also participated in WASH Entrepreneur trainings and graduations.

In March of 2014, IWASH held a program phase-out planning meeting to prepare WASH related ministries to take over the leadership of IWASH initiatives. The meeting was well attended by MOH and MPW, including Assistant Ministers Nyenswah and Yarngo, as well as County Health Officers, WASH Coordinators, and Development Superintendents from all three IWASH target counties. The presence of these Assistant Ministers at a 2 day meeting Gbarnga reflects the importance they placed on the activities and achievements of the IWASH program. Unfortunately, the phase-out activities of the program was quickly overshadowed, when immediately following the meeting in late March, Ebola entered Liberia through Foya. The phase-out activities of the IWASH program were not realized. Assistant Minister Nyenswah became the chair of the Incident Management System (IMS) for Ebola.

IWASH had capacity to respond immediately in Lofa County, delivering personal protective equipment, soap, and disinfectant solutions to clinics and hospitals in the Liberia outbreak epicenter, Foya District. The response broadened to training of clinic staff and environmental health technicians in Lofa, Bong, and Nimba counties, as well as conducting community awareness campaigns for preventing disease transmission. As the outbreak spread, IWASH expanded response activities, conducting education, dialogue and action planning meetings to encourage communities to adopt behaviors to stop the spread of the disease. Promotion of behavior change, primarily hygiene and sanitation practices, included washing hands, avoidance of dead bodies, and notification of county health teams when people become sick, or died. Through additional funding provided by the Office of Foreign Disaster Assistance (OFDA), Global Communities has extended Ebola response programming across Liberia to every county, using IWASH as both a foundation and an example for future successful interventions in new counties and districts. The early Ebola response implemented under IWASH set the framework for Global Communities' larger Ebola response under OFDA, partnering with county health teams to shift community behaviors toward those required to stop disease transmission and engaging the Environmental Health Technicians (EHTs) as front line implementers. EHTs became the leads for safe burial teams that Global

communities supported throughout Liberia as extension of the county health teams. This initiative became one of the most effective elements of the Ebola response.

In this final reporting period, IWASH engaged an independent study team to investigate the relationship between ODF communities and the non-transmission of Ebola. With transmission continuing more than a year after first entering Liberia, this relationship may be an important step in understanding how to create sustainable Ebola risk reduction in rural Liberia. The study is discussed in section 12 of this report and the study documents are provided as an annex to this report.

The innovative and successful modalities for WASH implementation developed under the IWASH program are continuing under the USAID funded Partners Advancing Community Services (PACS) program implemented by International Rescue Committee (IRC), Global Communities, and Population Services International (PSI). Through this new project, Global Communities will be able to strengthen the capacity of the MOH and MPW structures at national, county and district levels to ensure sustainable WASH behaviors and further entrench the private sector actors providing WASH products and services.

Introduction

After decades of economic mismanagement and fourteen years of civil war, Liberia continues to make strides in rebuilding its economy, government, infrastructure and social capital, efforts that were starkly challenged by the onset of the devastating outbreak of Ebola in 2014. Although the Government of Liberia (GoL) has embraced an overarching strategy of decentralization over the last decade, the ensuing onus of data collection, policy implementation, and service delivery placed on counties in the face of limited resources and poor management and coordination mechanisms remain constraints to mainstreaming national standards and guidelines for Water, Sanitation, and Health. At the community level, local government and community leaders continue to face obstacles in building trust and achieving sustainable change, as well as struggling to retain a sense of responsibility and ownership that was significantly undermined during the protracted civil war, and also by the impact of Ebola across the region. At the time of IWASH design and launch, limited and superficial efforts to support local capacity and autonomy had culminated in a high level of dependence on NGOs and external actors to provide for water, sanitation and hygiene (WASH) services.

In March of 2014, the first cases of Ebola were reported in West Africa, resulting in an eventual outbreak that has spread throughout the region. In late July 2014, the World Health Organization (WHO) declared the current Ebola Virus Disease (EVD) outbreak in West Africa a Grade 3 Emergency. The impact of Ebola on this operating environment was catastrophic and rapidly exposed weaknesses in the ability of the GoL to mobilize a systematic response plan and effectively manage severe deficits in technical capacity, institutional coordination, social cohesion and the provision of medical treatment across the country. Simultaneously, distrust of government, social discord and resistance to external messaging among affected communities further tested the ability of institutional leadership and the international community to stem the burgeoning health crisis through coordinated and sustainable water and sanitation initiatives, especially hygiene promotion. As a result, although most of the program budget had already been used for implementation, for much of the second half of FY 2014 and all of FY 2015, IWASH activities and resources were re-oriented to prevention and mitigation of the Ebola outbreak on program communities. Subsequently, the focus of IWASH in FY2015 included: 1) education, dialogue and action planning meetings, 2) hygiene kit distribution, hygiene promotion trainings and some selected CLTS implementation, 3) water source repair at health clinics and effected communities, and 4) a study to investigate why no IWASH communities that have achieved ODF status have been affected by Ebola. Results of the study point to a linkage between achieving ODF status and Ebola free status, which may be important to consider as a critical mitigation and risk-reduction strategy as well as a protective factor in preventing the rapid spread of Ebola outbreaks across national and international borders.

Country Context at Program Startup

Global Communities' longstanding presence in Liberia since 2004 was an asset to IWASH program startup activities, which were initiated in a protracted post-conflict recovery context. Years of implementing humanitarian and development-oriented programs in Lofa County allowed for a keen understanding of local contextual factors, and established trust with many communities that ultimately shaped the operating environment. Aside from logistical constraints presented by poor road infrastructure, inconsistent communications and poorly functioning networks, and extreme climate conditions presented by protracted wet season, the IWASH program was introduced in a fragmented social and political context as rural and urban communities and governing institutions continued to recover from years of devastating internal conflict, displacement, and destruction of key economic and social assets. Initial program activities and implementation efforts navigated several factors that shaped the program strategy in the long-term:

Extremely poor health outcomes: At the time of IWASH program startup, national health outcomes were among the lowest in the world. Only 65% of Liberian households had access to an improved water sources according to the classification of improved and unimproved water sources by the WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation, while 19.8% of children under age five had diarrhea in the two weeks preceding the survey, with higher rates among children aged six to eleven months (29%) and 12-23 months (26.3%). 16% of households reported treating their drinking water with bleach or chlorine and 80% of household report doing nothing to treat their drinking water.

Complexities of Community Ownership and Capacities: In the years leading up to the implementation of IWASH, infrastructure needs were largely identified by external parties, without coordination through government structures and without sufficient attention to development of capacity for long-term operations and maintenance. Infrastructure development was delivered with the establishment and training of community-level WASH committees and pump mechanics to maintain hardware, but materials, inputs, and repair parts were not easily accessible in local markets. The continuing response by myriad NGOs and donors to repair existing infrastructure or install new infrastructure contributed to the failure of communities to develop a culture of responsibility for WASH infrastructure.

Lack of Technical Skills and Infrastructure to Deliver WASH Services: During the IWASH startup phase, target counties were struggling to develop and maintain both the physical and human resource capacity necessary to improve the WASH sector. Counties had limited and often uncoordinated community outreach, resulting in an incomplete understanding of the WASH infrastructure or hygiene activities undertaken to date. Most community-level activities such as water quality testing and WASH training were conducted in an ad hoc manner, insufficient to meet needs and to detect contamination or danger. Limited county capacity to monitor interventions has led, for example, to a lack of standard implementation, including installation of a wide variety of pump models, rendering it difficult to source parts, train engineers and for communities to manage installed infrastructure.

Poor Government Coordination: At the national level, the Ministry of Lands, Mines and Energy (MLME) was charged with water and sanitation policy development to govern the work of the service ministries (primarily the Ministry of Public Works (MPW), the Ministry of Health and Social Welfare (MHSW)). The MLME was simultaneously responsible for donor coordination while the MPW is responsible for service coordination. Key areas of weakness included quality, quantity and frequency of communications and information flow, including collection and dissemination of data to create conditions for evidence-based decision making. Local government also lacked the necessary tools, resources, and capacity, in some cases, to manage local affairs relating to water and sanitation.

Approach

Global Communities implemented a programmatic approach that emphasized several core values and strategies to address institutional weakness, infrastructure constraints, and social resistance to change in a largely rural and dispersed population. The most important IWASH program values and strategies included:

Participatory, community driven engagement: Believing that success relies on people and their ownership of concepts, processes, and results, IWASH's strategy was people-centered, promoting personal and community understanding, ownership, and action through Community-Led Total Sanitation (CLTS) and associated behavior change activities. The core of the project goal of mainstreaming hygiene promotion through a participatory community mobilization and priority setting process. This strategic approach successfully motivated communities to adopt healthy hygiene and sanitation practices through self-governed systems that have achieved Open Defecation Free status and maintained it in the year following program close. The further

development of human capital through Natural Leader Networks has allowed communities to advocate for their own health needs and maintain a healthier living environment as part of community-based priority setting.

Empowerment of local actors: All aspects of IWASH promoted participation and capacity building to maximize sustainability of community ownership of its health and environment, county government coordination and services, and local innovations and technologies. Global Communities' strategy for IWASH originated in a strong emphasis on meaningful collaboration with all stakeholders in order to achieve measurable improvements in water supply, sanitation, hygiene and to create an enabling environment for sustainable WASH improvements. Practical implementation of this strategy prioritized the engagement of key stakeholders at various institutional levels; for example, county WASH teams and community WASH committees. Recognizing the significant role that government plays in providing the policy framework, monitoring its implementation, and allocating resources in the water, sanitation, and health sectors, IWASH invested heavily with local government agencies to improve coordination and strengthen systems for information collection, analysis and dissemination between the national-level ministries (specifically, MHSW, MPW, LISGIS, LWSC, MLME, MOE) through the counties, down to the community level. This intensive collaboration proved critical during the Ebola emergency response, where Global Communities and the IWASH program were able to leverage trusted and productive relationships at all levels of Liberian Government, a distinct advantage in mainstreaming response and prevention measures throughout the country.

CLTS is an innovative methodology for mobilizing communities to completely eliminate open defecation. Communities are facilitated to conduct their own appraisal and analysis of open defecation and take their own action to become open-defecation free (ODF). CLTS focuses on the behavioral change needed to ensure real and sustainable improvements – investing in community mobilization instead of hardware. CLTS triggers the community's desire for change, propels them into action and encourages innovation, mutual support and appropriate local solutions, thus leading to greater ownership and sustainability.

As a participatory approach, CLTS involves communities at all stages of implementation. At the heart of CLTS lies the recognition that merely providing latrines does not guarantee use nor result in improved sanitation and hygiene.

Sustainable Behavior Change: IWASH mainstreamed sustainable behavior change through behavior change communications (BCC) and community mobilization via community led total sanitation (CLTS)—a participatory methodology that mobilizes communities to completely eliminate open defecation, the IWASH program addressed multiple aspects of personal and communal water and hygiene practices and management. CLTS focuses on the behavioral change needed to ensure real and sustainable improvements, emphasizing investments in community mobilization over the delivery of hardware. CLTS triggers the community's desire for change, propels them into action and encourages innovation, mutual support and appropriate local solutions, thus leading to greater ownership and sustainability.

Implementation Activities by Program Objective and Expected Results

The IWASH program goal is "*to make measurable improvements in water supply, sanitation and hygiene (WASH), as well as in the enabling environment for WASH, in target areas within the three counties of Bong, Lofa and Nimba, and selected communities in greater Monrovia"* to improve health outcomes for community members. This is to be accomplished through three intended results: 1) increased access to water supply, sanitation, and hygiene products, 2) increased community knowledge and use of potable water supply and storage technologies, sanitary practices, and water hygiene, and 3) improved enabling environment for WASH at the national, county, district, and community level.

For each of these intended results, the IWASH program implemented several projects designed to improve water and sanitation standards in the selected target counties and communities. CLTS activities completed over the

life of project in Bong, Nimba, and Lofa are mapped in Annex I, II, and III. Specific projects for each intended result (IR) are listed below.

IR 1: Increased Access to Water Supply, Sanitation, Hygiene, and household level products

- WaterGuard Sales and Distribution
- Small WASH Infrastructure Projects (SWIP)
- Private Public Partnership (PPP) Urban Latrine Construction
- Training and Establishment of WASH Products and Services Entrepreneurs

Increasing access to WASH products using a market-oriented approach has a demonstrated effect in supporting the supply side of WASH activities, allowing for easier access to inputs that increase household and community health and hygiene. The IWASH program's four projects support increased access to supply of WASH products through: 1) "point of use" (POU) water treatment through WaterGuard sales and distribution, 2) SWIP, water supply and latrine construction for schools and health clinics, 3) urban latrines constructed in the Greater Monrovia/Paynesville area, and 4) establishing WASH Entrepreneurs who can implement CLTS, fix water sources, and supply products such as WaterGuard and soap. IWASH program results indicate that increased access to basic WASH products and services has increased utilization of these products, as stronger community awareness and behavior change (strengthened through behavior change methodologies described in IR2) drives demand.

IR 2: Increased community knowledge and use of potable water supply and storage technologies, sanitary practices, and water hygiene

- Community-led Total Sanitation (CLTS)
- Development of WASH Products and Services Guide
- Social Marketing of ODF CLTS

Increasing community knowledge and use of safe water, sanitation, and hygiene (IR2) proved to be the core of the IWASH program, with the realization that the sustainability of water supply and sanitation infrastructure is not possible without communities valuing those resources. In post-war Liberia, many NGOs constructed latrines and water supply points that were never maintained once programming ended. An overall lack of ownership by the community, who did not embrace responsibility for maintenance, combined with a general lack of institutional resources that prevented the government from overseeing and managing WASH infrastructure at the county level resulted in most latrines and water points falling into disrepair or going entirely unused. IWASH incorporated an empowerment approach to target communities, enabling communities to create, manage, and maintain their own key WASH facilities by developing popular awareness of and demand for safe water, sanitation, and hygiene, and an appreciation for the value of ownership of these resources. The IR2 was successfully supported by the following activities:1) Community-led Total Sanitation and related messaging to achieve open defecation-free status, 2) development of a WASH products and services guide to assist communities in assuming ownership of WASH resources, and 3) social marketing of CLTS and WASH products (including WaterGuard) to expand awareness of and desire for the benefits prior to engagement.

IR 3: Improved enabling environment for WASH at the national, county, district, and community level

- Institutionalization of CLTS within Government
- WASH Policy Development, Improvement, and Dissemination
- Water Point Functionality and Water Quality Data Management

The third intended result (IR3) encompasses the creation of an enabling environment for improved WASH in Liberia through two key initiatives:1) creating and developing the capacity of GoL institutional structures for CLTS

implementation at national, county, district, and community levels, and 2) developing the policies and technical guidelines for WASH in Liberia and disseminating those documents to county and district level officials so that they may be implemented.

The specific projects elaborated under IR3 include: 1) institutionalization of CLTS within Government and ensuring that key staff are hired and trained to perform CLTS in target areas, 2) WASH policy development, improvement, and dissemination, and 3) water point functionality and water quality data management. The third element of IR3 addresses two water supply related activities. One of these activities, the water point functionality system, was determined to be redundant due to a similar project being implemented in Liberia. Therefore, this activity was replaced with the development of the National Hygiene Promotion Guideline. IWASH also supported the Ministry of Health's Department of Environmental and Occupational Health (DEOH) in the finalization of National Drinking Water Quality Guidelines, as well as a database to manage drinking water quality test data.

Impact of Ebola on IWASH Intended Results

In addition to the projects outlined above, the IWASH program was supplemented heavily in 2014 and 2015 to effectively respond to the Ebola outbreak in Liberia. In coordination with USAID, IWASH activities were rapidly adapted to address urgently needed prevention and mitigation against the impact of the outbreak, working with communities to provide needed education and materials to combat the Ebola Virus Disease (EVD). A detailed narrative of these activities is provided in Section 11. The IWASH program also adjusted the anticipated end line survey to an Ebola-specific study that investigates and analyzes apparent mitigation of Ebola transmission risk in ODF communities (see Section 12).

Implementation Indicators

The indicators developed for the IWASH performance management plan (PMP) are presented in the table below, arranged by IR. FY 2011 - FY 2014 Cumulative Results, 2015 Results and Life of Project (LOP) are presented. Some of the behavior change indicators that were anticipated to be measured at the end of the program were not measured since the environment was dramatically shift during the Ebola crisis. Hygiene awareness indicators such as knowledge about hand washing are a prime example. These indicator have been marked as NA/Required Survey in the LOP Results column. For these indicators IWASH performed some informal rapid survey to assess the penetration and adoption of messaging. The results of these surveys indicate the awareness level of target community members with regard to the importance of safe water (treated with WaterGuard) and personal hygiene.

Many of the performance indicators are informed by more than one of the 10 IWASH projects. The PMP table presents related projects for each indicator in the right-hand column. In the next section of the report, each of the projects is described in detail and both performance and implementation details that occurred over the life of the program are reviewed. The end line survey intended to capture some IWASH program performance indicators was amended due to the Ebola crisis, to a study of the reduced transmission of Ebola in ODF communities. As a result, some indicators once found in the PMP have been abandoned and a supplementary end line study has been provided for review and reference.

GOAL/IR Results Statements	Indicators	Baseline Value	FY 2011 - FY 2014 Cumulative Results	2015 Results	LOP Target	LOP Results	IWASH Project Effecting Performance
GOAL: Improved water supply, sanitation, and hygiene	Percentage (%) of children under 60 months of age with diarrhea in the last 2 weeks	Reduced levels of diarrhea between target and non-target community areas	To be measured through the Endline CEM survey	Reduced levels of diarrhea between target and non-target community areas			All Projects
IR 1: Increased access to water supply, sanitation, hygiene, and household level products as a result of USG assistance	1-1Percentage (%) of population using improved drinking water source	62% from the Project Proposal	84.1% cumulative (22.1% increase; 158,500 persons reached / population of 717,592)	84.7% cumulative (0.6% increase; 4,950 persons reached / population of 717,592)	76% cumulative (14.2% increase; 101608 persons reached / population of 717,592)	84.7% cumulative (22.7% increase; 163,450 persons reached / population of 717,592)	2. SWIP 6. WASH Entrepreneurs
	1-2 Percentage (%) of population using an improved sanitation facility	12.7% from TRaC	27.5% cumulative (14.8% increase; 106,564 persons reached / population of 717,592)	28.5% cumulative (1% increase; 7485 persons reached / population of 717592)	26% cumulative (13.3% increase; 95,768 persons reached / population of 717,592)	28.5% cumulative (15.8% increase; 114049 persons reached / population of 717,592)	2. SWIP 3. PPP Urban Latrines 5. CLTS
	1-3 Percentage (%) of IWASH target communities that report that they know a place within their district to buy hand pump spare parts if their hand pump spoils	0	70%	Required survey not done.	65%	70%	4. WASH Entrepreneurs 6. WASH Products & Services Guide
	1-4 Percentage (%) broken IWASH water facilities that were	N/A	100%	N/A	75%	100%	4. WASH Entrepreneurs 5. CLTS

	repaired by community within one year of handed over						
	1-5 Percentage (%) of IWASH school latrines properly managed after 1 year of hand over	0%	83%	N/A	70%	83%	2. SWIP 5. CLTS
IR 1.1 Increased access to Non-Household level IWASH products	1.1-1 Number of people gaining access to an improved water source (first time access)	0	6,137	4,700	0	10,837	2. SWIP
	1.1-2 Number of water points constructed or rehabilitated in target communities.	0	376 (43 new, 333 rehabilitated)	12 (5 new, 7 rehabilitated)	244	388 (48 new, 340 rehabilitated)	2. SWIP 4. WASH Entrepreneur
	1.1-3 Number of "girl friendly" latrines constructed at schools	0	17	0	17	17	2. SWIP
IR 1.2 Increased access to Household level IWASH products	1.2-1 Number of IWASH wholesale and retail outlets regularly stocking POU water treatment products.	0	63	0	51	63	1.WaterGuard Distribution Established in FY2103 and continuing to operate
	1.2-2 Number of Water Guard bottles sold or distributed	**107,140**	**626,316**	**60,120**	**366,694**	686,436 836,436*	1.WaterGuard Distribution
	1.2-3 Number of IWASH-trained WASH products and services entrepreneurs actively selling WASH product and services in IWASH communities	0	54	N/A	21	54	4. WASH Entrepreneur
IR 2: Increased community use of	2-1 Liters of drinking water disinfected with USG-support point-of-	**92,086,830**	**538,318,602**	**No update from PSI**	315,173,493	538,318,602	1.WaterGuard Distribution 4. WASH Entrepreneur 5. CLTS

potable water supply and storage technologies, sanitary practices and water hygiene	use water treatment products						
	2-2 Percentage (%) of care givers in IWASH-targeted communities who cite different critical times when they wash their hands with soap	N/A	Survey	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2-3 Percentage (%) of caregivers in IWASH communities that can show a container of treated drinking water with POU water treatment product WaterGuard	6% TRaC	Survey	N/A Required Survey	10% above baseline	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2-4 Percentages(%) of beneficiaries able to show the latrine they are using to defecate	N/A	Survey	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2-5 Percentage (%) of primary caregivers that are able to show a safe place they dispose of child feces	N/A	Survey	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2-6 Percentage (%) of triggered communities that achieved ODF status	0	82.5% (283 ODF communities / 343 triggered communities)	100% (27 ODF communities / 27 triggered communities)	75% (220 ODF communities / 300 triggered communities)	83.8% (310 ODF communities / 370 triggered communities)	5. CLTS FY2014: first % is all ODF, second % is only NLN triggered
	2-7 Percentage (%) of ODF communities that maintained their status after one year of being “verified ODF”	100%	81.5%	N/A	90%	81.5%	5. CLTS
IR 2.1: Increased community knowledge of potable water supply and storage	2.1-1 Percentage (%) of target group that knows that clear water is not always safe for drinking	N/A	End line survey not conducted	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.

technologies, sanitary practices and water hygiene	2.1-2Percentage (%) of target group that can cite two ways of fecal-oral transmission	N/A	End line survey not conducted	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2.1-3 Percentage (%) of the target group that knows washing hands with soap removes germs	N/A	End line survey not conducted	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2.1-4 Percentage (%) of target group who knows that treated drinking water can be contaminated if the water is not stored properly	N/A	End line survey not conducted	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
IR 2.2: Increased social norms for potable water supply and storage technologies, sanitary practices and water hygiene	2.2-1 Percentage (%) of target group who reports that their neighbors understand the importance of treating their drinking water	N/A	End line survey not conducted	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2.2-2 Percentage (%) of target group who reports that their neighbors take some actions to store their drinking water properly	N/A	End line survey not conducted	N/A Required Survey	N/A Required Survey	N/A Required Survey	This activity has been removed from IWASH implementation plans.
	2.2-3 Percentage (%) of target group that believe that their neighbors consider washing hands with soap as a good cleanliness practice	N/A	End line survey not conducted	N/A Required Survey	N/A Required Survey	N/A Required Survey	5. CLTS
IR 2.3: Increased Community demand for ODF Status	2.3-1 Number of communities verified "Open Defecation Free"	0	283	27	220	310	5. CLTS

	2.3-2 Number of communities that express interest in CLTS by returning completed CLTS request forms	0	180	30	75	210	5. CLTS 7. Social Marketing ODF Status
	2.3-3: Number of natural leaders that emerge as CLTS ambassadors	0	147	0	48	147	5. CLTS 7. Social Marketing ODF Status
IR3:Improved enabling environment for WASH at national, county, district and community level	3-1 Percentage (%) of IWASH communities using their own funds (cash box) to operate and maintain their drinking water source (1)	N/A	85%	N/A	85%	86%	4. WASH Entrepreneurs 5. CLTS Interim results from USAID field trip
	3-2 Percentage (%) level to which County Steering committee (CSC) follow their TOR in applying CLTS[1]	0	64%	N/A	75%	56%	5. CLTS 8. CLTS in GoL
	3-3 Percentage (%) of project community's water infrastructure reports are captured in the county database on a quarterly basis	0	Abandoned	Abandoned	70%	Abandoned	This activity has been removed from IWASH implementation plans.
IR 3.1 A functional CLTS structure and system institutionalized at national, county,	3.1-1 # of monitoring visits made by GOL CLTS governing structures per IWASH ODF community. (NTCU,CSC,DSC)	0	3 visits per ODF community	3 visits per ODF community	3 visits per ODF community	3 visits per ODF community	8. CLTS in GoL

[1] The performance of CSC with respect to their TORs was graded by IWASH County Advisors during the third quarter of FY2014.

district and community levels	3.1-2 Number of functional district Natural Leaders Networks established by IWASH	0	6	0	12	6	8. CLTS in GoL
	3.1-3 A National CLTS Guideline developed and published with IWASH input	0	1	0	1	1	9. WASH Policy Dev & Dissemination
IR 3.2 The GoL rural water infrastructure monitoring and reporting system strengthened	3.2-1 Number of community water points on which water point reports are received regularly	0	Abandoned	Abandoned	Abandoned	Abandoned	This activity has been removed from IWASH implementation plans.
	3.2-2 A national water quality electronic database developed and capturing data from counties	0	Abandoned	Abandoned	1	0	This activity has been removed from IWASH implementation plans.
IR 3.3 GoL WASH policy documents developed and disseminated at county and district	3.3-1 Number of GoL WASH policy documents that IWASH fully participated in developing	0	7	0	7	7	9. WASH Policy Dev & Dissemination National Drinking Water Quality Guideline
	3.3.2 Number of policy dissemination workshops conducted by IWASH at county and district levels	0	4	0	4	4	9. WASH Policy Dev & Dissemination
IR 3.4 National Hygiene Promotion Guidelines developed	3.3-1 A National Hygiene Promotion Guideline developed	1	1	1	1		9. WASH Policy Dev & Dissemination Hygiene Promotion Guidelines Complete, awaiting signature by Assistant Minister Nyenswah

Progress Report: IR1 – Increased Access to WASH

1 WaterGuard Distribution

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
1.2-1 Number of IWASH wholesale and retail outlets regularly stocking POU water treatment products.	51	63	63
1.2-2 Number of Water Guard bottles sold or distributed*	366,694	626,316	686,436 **836,436***
2-1 Liters of drinking water disinfected with USG-support point-of-use water treatment products.	315,173,493	538,318,602	538,318,602
2-3 Percentage (%) of caregivers in IWASH communities that can show a container of treated drinking water with POU water treatment product WaterGuard	10% above baseline	Survey	N/A Required Survey

***150,000 bottles distributed through UNICEF for hygiene kits in Ebola effected communities

Procurement and Social Marketing of WaterGuard

PSI was responsible for the activities under the Procurement and Social Marketing of WaterGuard project. However, in August of 2014 when the Ebola crisis moved the IWASH program towards more emergency response focused activities, the activities under this project also shifted. Due to these factors and the evacuation of PSI staff, the PSI's involvement in the IWASH program ended. Data was provided by PSI for WaterGuard through the project end date FY2015.

Sales of WaterGuard actually increased as the Ebola outbreak expanded in April, likely due to perceived heightened concerns for disease transmission through water consumption. Although Ebola is not a water borne disease, the public perception was that safe water would reduce the potential for disease transmission. Sales through the final period of IWASH remained strong, exceeding original targets by a wide margin (686,436 actual vs 366,694 target). In addition to PSI social marketing sales of WaterGuard, UNICEF included WaterGuard as a component in hygiene

promotion kits distributed in communities vulnerable to or at heightened risk of Ebola infections. The IWASH program also participated in distributing these kits and conducting hygiene promotion activities in Bong, Nimba, and Lofa Counties. The distribution of WaterGuard during the emergency phase of the Ebola outbreak is further discussed in the report section 12, Ebola Response. Through UNICEF kits, and additional 150,000 bottles of WaterGuard were distributed.

Sales and Marketing Activities

The project far exceeded LOP goals through good and timely marketing, bolstered by the overall environment created by the health crisis and the ensuing common perception that safe water reduces risk of Ebola disease transmission. While IWASH did not promote the perception that Ebola is water-borne, marketing activities for water treatment overlapped with public concern. PSI adjusted the WaterGuard marketing campaign to lead with a well-received tag line "Pour, Relax, Drink" that increased visibility in the market place and emphasized the emotional benefit of the product.

In June 2014, IWASH launched a hygiene promotion activity that emphasized hand washing and the use of WaterGuard for safe water consumption. Natural Leaders from the CLTS activity led the activities in CLTS communities. Natural Leaders were also encouraged to manage their own distribution of WaterGuard. The intention was to overcome rural consumer's barrier to access, the Natural Leaders brought WaterGuard directly to the target audience. In addition, clinic health talks, market day events, promotional tours were arranged for WaterGuard distribution. Awareness in the counties was also increased through better branding materials such as billboards and point of sale materials, and media campaigns such as radio jingles and print advertisements.

This increased awareness and availability of the product, coupled with demand driven through health concerns led to significantly improved sales of WaterGuard through the final period of IWASH in FY2015.

Progress Report: IR1 – Increased Access to WASH

2 Small WASH Infrastructure Projects

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
1-1Percentage of population using improved drinking water source.	76% 101,608	84.1% 158,500	84.7% 163,450
1-2 Percentage of population using an improved sanitation facility.	26% 95,768	27.5% 106,564	28.5% 114,049

1-5 Percentages of IWASH school latrines properly managed after 1 year of handing over to school authorities.	70%	83%	83%
1.1-1 Number of people gaining access to an improved water source (first time access)	0	6,137	10,837
1.1-2 Number of water points constructed or rehabilitated in target communities.	244	376	388
1.1-3 Number of "girl friendly" latrines constructed at schools	17	17	17

Small WASH Infrastructure Project (SWIP) activities include the resurrection and establishment of institutional latrines at schools and water points at schools and health facilities implemented in the early phase of IWASH. SWIP activities were completed in FY2014. The indicators relevant to SWIP are also related to several other projects within IWASH, specifically CLTS, WASH Entrepreneurs, and PPP Latrines. All activity targets categorized as SWIP were met or exceeded for the life of project (LOP). Overall, during the life of project, access to improved drinking water was increased through the WASH Entrepreneur project and access to sanitation was increased through both CLTS and PPP latrine projects.

Progress Report: IR1 – Increased Access to WASH

3 Public Private Partnership Urban Latrines

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
1-2 Percentage of population using an improved sanitation facility.	26% 95,768	27.5% 106,564	28.5% 114,049

The Public Private Partnership urban latrine project was jointly funded by USAID and Chevron Liberia, to increase access to sanitation and hygiene facilities in urban Montserrado County. In the first grant provided by Chevron, in 2012, the company allocated funds for the construction of two improved urban latrines, which were completed in fiscal years 2012 and 2013 in Logan Town and New Georgia communities of Greater Monrovia.

With the successful completion of the initial two constructed latrines and positive community reaction, Chevron continued its partnership with the IWASH program for the construction of three additional latrines. These facilities, though referred to as latrines provide improved sanitation and hygiene. Hand washing and bathing are available for improved community health.

The three final latrines were constructed after a long process of working with municipalities and a range local government actors to identifying available land for construction, sites were selected in Paynesville (Greater Monrovia). The sites were specifically located in the communities of: Red Light, Samuel K Doe (SKD), and Paynesville City Corporation (PCC). Although the majority of the construction was completed in FY 2014, construction delays due to the Ebola emergency resulted in a final facility inauguration in April of 2015, in the presence of the Mayor of Paynesville, the Deputy Mission Director, and the Country Director for Global Communities. Photos of the construction and inauguration are provided in Annex IV.

Progress Report: IR1 – Increased Access to WASH

4 WASH Products & Services Entrepreneurs

Implementation indicators and outcome indicator

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
1-1Percentage of population using improved drinking water source	76%	84.1%	84.7%
1-3 Percentage of IWASH target communities that report that they know a place within their district to buy hand pump spare parts if their hand pump spoils	65%	70%	70%
1-4 Percentage of IWASH provided water facilities that broke and were fixed by community within one year of being handed over to community	75%	100%	100%
1.1-2 Number of water points constructed or rehabilitated in target communities	244	376	388
1.2-3 Number of IWASH-trained WASH products and services entrepreneurs actively selling WASH product and services in IWASH communities	21	54	54
2-1 Liters of drinking water disinfected with USG-support point-of-use water treatment products	315,173,493	538,318,602	538,318,602
2-3 Percentage (%) of caregivers in IWASH communities that can show a container of treated drinking water with POU water treatment product WaterGuard	10% above baseline	Survey	N/A Required Survey
3-1 Percentage of IWASH communities that have a drinking water source and are using their own funds (Cash box) to operate and maintain it	85%	85%	86%

* UNICEF distributed free WaterGuard in 150,000 hygiene promotion kits

The WASH Entrepreneur project was designed with the goal of providing sustainable WASH products and service through a private sector, market-oriented model. The initial concept was to train candidates to repair community hand pumps, which they could continue to do in their own communities while charging a competitive fee. Entrepreneurs were trained in small business management and basic accounting and finances (job costing) as well as technical skills for hand pump repair. This concept was married with the CLTS, and Natural Leaders who were Community Champions (having brought not only their own, but neighboring communities to ODF status) we prioritized for training as entrepreneurs. Soap making was added to the training curriculum to expand the range of WASH products available for entrepreneurs to produce and market. In the last year of the project, 12 entrepreneurs were trained to install new hand pumps to further their WASH capacity.

In FY2015, 5 new hand pumps were installed and 7 hand pumps were rehabilitated. IWASH subsidized the maintenance of hand pumps in Ebola effected locations as a means of reducing displacement due to lack of water in infected communities. Additionally, this activity provided health facilities with clean water for use in medical treatment and for drinking water that served medical staff and community clients.

Key achievements

The WASH Entrepreneurs have established an income generating activity for themselves through providing WASH products and services in rural communities in Bong, Nimba, and Lofa Counties. Although it was difficult to track the progress of the WASH Entrepreneurs during the Ebola crisis, in the period preceding the outbreak, financial data collected indicates that entrepreneurs were successful in marketing products and repairing water points. From June 2013 to September 2014, 16 Entrepreneurs from Bong County, 20 from Nimba and 21 from Lofa earned approximately $14,450 through 140 hand pump repairs paid by the community and work on 121 independent contracts.

The table below provides a breakdown of WASH Entrepreneur income generation, by county and activity, for the prior reporting period.

	WASH Entrepreneur Performance June 2013 to September 2014									
COUNTY	**CLTS/ODF Bonus**		**Hand Pump (HP) Repair IWASH**		**HP Repair Independent**		**New Well Installation**		**Soap**	
	#	**$ USD**	**#**	**$ USD**	**#**	**$ USD**	**#**	**USD**	**#**	**$ LD**
Bong	13	845	60	3,108	66	2,374	1	400	5882	58,820
Lofa	50	3,250	51	3,165	46	533	0	0	17553	175,780
Nimba	50	3,250	29	1,760	9	69	0	0	11317	113,170
Total	**113**	**7,345**	**140**	**$11,738**	**121**	**$2,976**	1	**400**	**34,752**	**347,770** (4,347USD)

Progress Report: IR2 – Increased Knowledge and Use of Improved WASH

5 Community-Led Total Sanitation (CLTS)

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
1-2 Percentage of population using an improved sanitation facility.	26%	27%	28.5%
1-4 Percentage of IWASH provided water facilities that broke and were fixed by community within one year of being handed over to community	75%	100%	100%
1-5 Percentage of IWASH school latrines properly managed after 1 year of handing over to school authorities.	70%	83%	83%
2-1 Liters of drinking water disinfected with USG-support point-of-use water treatment products.	315,173,493	538,318,602	538,318,602
2-2 Percentage (%) of care givers in IWASH-targeted communities who cite different critical times when they wash their hands with soap.	N/A Required Survey	N/A Required Survey	N/A Required Survey
2-3 Percentage (%) of caregivers in IWASH communities that can show a container of treated drinking water with POU water treatment product WaterGuard	10% Above Baseline	Abandoned N/A Required Survey	N/A Required Survey
2-4 Percentages of men and women able to show the latrine	N/A Required Survey	N/A Required Survey	N/A Required Survey

they are using to defecate.			
2-5 Percentage of primary caregivers that are able to show a safe place they dispose children feces.	N/A Required Survey	N/A Required Survey	N/A Required Survey
2-6 Percentage of triggered communities that achieved ODF status	75%	82.5%	83.8% 310 ODF of 370 triggered
2-7 Percentage of ODF communities that maintained their status after one year of being "verified ODF"	90%	81.5%	81.5%
2.1-1 Percentage of target group that knows that clear water is not always safe for drinking	N/A Required Survey	End line survey not conducted	N/A Required Survey
2.1-2Percentage of target group that can cite two ways of fecal-oral transmission.	N/A Required Survey	End line survey not conducted	N/A Required Survey
2.1-3 Percentage of the target group that knows washing hand with soap removes germs	N/A Required Survey	End line survey not conducted	N/A Required Survey
2.1-4 Percentage of target group who knows that treated drinking water can be contaminated if the water is not stored properly	N/A Required Survey	End line survey not conducted	N/A Required Survey
2.2-1 Percentage (%) of target group who reports that their neighbors understand the importance of treating their drinking water	N/A Required Survey	End line survey not conducted	N/A Required Survey
2.2-2 Percentage (%) of target group who reports that their neighbors take some actions to store their drinking water properly.	N/A Required Survey	End line survey not conducted	N/A Required Survey
2.2-3 Percentage (%) of target group that	N/A Required Survey	End line survey not conducted	N/A Required Survey

believe their neighbors consider washing hands with soap as a good practice of cleanliness			
2.3-1 Number of communities verified "Open Defecation Free"	220	283	310
2.3-2 Number of communities that express interest in CLTS by returning filled in CLTS request forms.	75	180	210
2.3-3: Number of natural leaders that emerge as CLTS ambassadors.	48	147	147
3-1 Percentage of IWASH communities using their own funds (cash box) to operate and maintenance maintain their drinking water source.	85%	85%	86%
3-2 % level to which County Steering committee (CSC) follow their TOR in applying CLTS[2]	75%	64%	56%

Community Led Total Sanitation

CLTS was the core activity of the redesigned IWASH program, with the primary goal of developing sustainable and steady demand for sanitation in rural areas. By the end of program implementation, the demand for appropriate and functioning sanitation infrastructure is stronger than at any other point in the program. Overall, CLTS conversion from triggering to ODF status was above 83%, exceptionally high when compared to other countries in sub-Saharan Africa (Uganda has rates between 40% and 60%), and during the Ebola crisis rates climbed to over 100%. The escalation in conversion rates, especially in Bong County, was bolstered by the self-triggering of communities adjacent to IWASH communities that had already been triggered with the support of IWASH staff. In Bong County, 25 Ebola-affected communities were triggered as part of a follow-on activity to hygiene kit distribution and hygiene promotion, and all of those communities were verified as open defecation free within 2 months of triggering. Two neighboring communities were not triggered, but had been progressing toward ODF on their own initiative with support from the neighboring Natural Leader. When GoL verification was performed in the 25

[2] The performance of CSC with respect to their TORs was graded by IWASH County Advisors during the third quarter of FY2014.

communities, the verification team visited the self-triggered communities and they were verified as well. This gives the reporting period a conversion rate of 108%.

In total, through the IWASH program, 310 communities were verified as open defecation free, exceeding the target of 220 by nearly half (141% of target). Notably, these communities achieved ODF status as IWASH was diverting staff and resources for Ebola response activities.

The success of CLTS, as implemented by the IWASH program, is explained by 4 critical factors: 1) adoption by triggered communities was high (83.8%); 2) it was sustainable (81.5% of communities remained ODF for more than one year); 3) CLTS incorporated local human resources (Natural Leaders) for cost effectiveness; and 4) Reputation- more than 180 communities completed letters of interest requesting to be triggered, ostensibly due to witnessing and/or hearing of success of this technique in other areas

CLTS has become an aspirational activity in the health districts where IWASH has been implemented. Several factors have created and sustained demand for CLTS at the community level, including: 1) positive 'word of mouth' reporting from ODF community members, 2) inherent community benefits that accompany the activities of the Natural Leader Network who are promoting CLTS, and 3) social marketing (described in the following section). IWASH received 180 requests for triggering in FY2014, more than the program could meet. Community members have observed positive and healthy change occurring in neighboring ODF villages and desire the same benefit for their own community and household. A number of "self-triggered" communities emerged during the course of program implementation, where members do not wait to be triggered, enlist the assistance of their neighbors to take the first steps. Peer influence and self-determination create a very favorable environment for future expansion of health and sanitation programming in these communities.

The innovative integration of Natural Leader Networks (NLN) leading a local CLTS approach has proved to be effective for successful implementation of IWASH. Natural Leaders who successfully supported their own communities to become ODF were organized into networks and encouraged to trigger neighboring communities. If the communities triggered by the NLN members become ODF, then the network members received a cash incentive. The network members work alongside nearby communities within walking distance of their homes no additional costs are incurred for lodging or transport. The success rate of CLTS proved to be much higher when local peer leaders frontline CLTS messaging and can draw on local power structures, such as traditional chiefs, for support. NLN members were also effective health messengers during Ebola response, enthusiastically engaging in appropriate messaging campaigns, and demonstrated high-value added in hygiene promotion while supporting UNICEF kit distribution and follow up.

The use of GIS as a CLTS management tool has proven to be an innovative application of technology in health programming, particularly in the rural jungle environmental context of Liberia. GIS maps were used to track progress, status, and performance of CLTS activities in target communities, using color-coding to track triggering dates, and relationships between communities and NLNs. The result of GIS mapping exercise is a comprehensive map that clearly describes the progress, effectiveness, coverage, and interconnectivity of communities who participated in CLTS initiatives. Final maps for each of the target counties is provided in Annexes I, II, and III.

Program Innovation

In addition to successful innovations in the conducting of CLTS implementation through a natural leader driven approach, several other innovations made noteworthy contributions to the physical

design of sanitation and hygiene facilities. These include the “Slab-less VIP Latrine” and the “Bamboo Hand Washing Device”. The Slab-less VIP Latrine is a latrine made almost entirely out of locally sourced, or “found,” materials that provides the benefits of a VIP Latrine. The latrine is pour flush, using a toilet bowl made from hand-made mud bricks connected to a pit that is located behind the superstructure by a bamboo drain pipe. The pit behind the superstructure is vented by another bamboo pipe (sectional separators in the bamboo are knocked out so that the bamboo functions as a normal pipe). A small amount of cement and sand mortar is used to glaze the surface of the bowl so that it does not erode when feces are washed out into the drain pipe and the pit (see Annex IV for pictures of the Slab-less VIP Latrine). This design was created by villagers in a community in Bong County and has been shared with CLTS implementers across Liberia through a World Toilet Day event hosted by IWASH in Bong County in 2013.

A no cost hand washing innovation was also created in Bong County. This hand washing device can be made out of materials readily available in the forest surrounding most Liberian communities and is simple and easy to construct. The design utilizes a section of bamboo set in the ground with section wall removed in the upper sections to create a water receptacle and a hole dug into the receptacle need its bottom. The hole is blocked with a removable plug. A picture of this device is shown in use by Chris Holmes (USAID Global Water Coordinator) during a field visit (see Annex VI).

Progress Report: IR2 - Increased Knowledge and Use of Improved WASH

6 WASH Products & Services Guide

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
A simplified WASH products and services Guidelines developed	1	1	1

WASH PRODUCTS AND SERVICES GUIDE

The WASH Products and Services Guide was provided as an attachment to the FY2014 Semi Annual Report. The guide is intended to be a resource to communities and Natural Leaders; a self-help guide to WASH improvements. The guide uses pictures and simple language to explain the construction of WASH related products that are essential to becoming open defecation free. It also has a directory for contacting key WASH implementers in the counties: WASH Coordinator working for the Ministry of Public Works and Environmental Health Technicians working for the Ministry of Health. There is also a director for Natural Leader Networks in each county. Because it is an important product of the IWASH program, it is being resubmitted with the report as Annex VII.

Progress Report: IR2 - Increased Knowledge and Use of Improved WASH

7 Social Marketing of Community-led Total Sanitation

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
2.3-3: Number of natural leaders that emerge as CLTS ambassadors.	48	147	147
2.3-2 Number of communities that express interest in CLTS by returning filled in CLTS request forms.	75	180	210

7.1 Social Marketing of Community Led Total Sanitation

In late-2012, the IWASH Project, aiming to build on CLTS success, decided to use social marketing in an effort to expand the reach and improve the success rate of CLTS in the IWASH counties and, potentially, beyond. This approach had not been implemented elsewhere in the CLTS world. The key to achieving the desired results was to develop a differentiated marketing approach to build the interest of pre-triggered communities in becoming "pupu free", ODF, and to develop specific interventions to support natural leaders from ODF communities to become advocates for ODF in non-ODF neighboring communities.

7.2 CLTS Marketing Activities

Brand Identity: The Open Defecation Free sign board, "Improved Sanitation, Path to Development," was extended to all ODF communities in Bong, Nimba, and Lofa counties and has become the recognized symbol ODF communities. This logo was approved by the GoL's National Technical Coordinating Unit for CLTS and will be adopted in the national CLTS guidelines in their revision anticipated in late 2015 as the logo that should be used by all CLTS implementers to identify ODF communities.

Radio Dramas: The CLTS radio dramas aired through December of 2013 on five radio stations in the three IWASH counties. IWASH received feedback from communities that they learned about CLTS based on listening to the story of Mulbah, the Natural Leader, and Mumusu, the clean community. Listeners expressed strong interest in getting their communities open defecation free.

Street Theatre: To supplement radio dramas as a form of social marketing, IWASH developed a live street theatre performance based on the narrative in the radio drama. The street theatre

version was performed in 15 markets (five per IWASH Target County). The street theatre was used as a medium to create local interest and dialogue about CLTS in the communities, and to get more communities interested in becoming “pupu free”. The IWASH team participated in street theatre events by providing more information about what CLTS is and answering questions. Natural Leaders also participated to engage with communities that they might later trigger.

Billboards: Billboards depicting a Liberian making the choice between an obviously clean and organized community, and a messy dirty community, with the caption “Take the Path to Improved Sanitation”, were placed in key locations in IWASH target counties. An additional three billboards were placed in a market location in each county.

Branding of Champions: By the end of the program, 160 Community Champions were provided with a specially designed champion uniform, which consists of a collared shirt with green accents and the CLTS logo. The uniform not only sets Champions apart from the other members of the Natural Leader Network, but also increases recognition of CLTS, making them more identifiable when they visit communities, markets, and other locations where spreading the promise of CLTS will increase receptivity of and desire for triggering and the benefits ODF can bring to communities.

Progress Report: IR3 – Improved Enabling Environment for WASH

8 Institutionalization of CLTS within the Government of Liberia

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
3-2 % level to which County Steering committee (CSC) follow their TOR in applying CLTS[3]	75%	64% Average	56%
3.1-1 # of monitoring visits done by GOL CLTS governing structures per IWASH ODF community. (NTCU,CSC,DSC)	3 visits per ODF community	3 visits per ODF community	3 visits per ODF community

The IWASH program created and supported all required governmental CLTS structures including support to County and District Level Steering Committees in all project districts, and creating the Natural Leader Networks which extends the connection from District EHTs to community level implementers (Natural Leaders). A diagram of the support mechanisms engaged at various levels (national, county, district, clan, and community) is presented in Annex VIII.

The sustainability of CLTS as a national sanitation methodology and ODF as a sustained behavior and status is dependent on effective and ongoing governmental structures at all levels. In March 2014, IWASH conducted a program review meeting attended by all relevant government agencies, led by Assistant Minster Nyenswah (MOH) and Assistant Minister Yarngo (MPW), with representatives of the Superintendents and CHOs in Bong, Nimba, and Lofa. In the meeting the GOL ministries expressed appreciation for the accomplishments of the program as well as the structures built to sustain CLTS. Both Minister Nyenswah and Assistant Minister Yarngo pledged to continue their support of the structures, through payroll inclusion of EHTs and encouraged participation in County-level CLTS Steering Committees (CSCs).

The CSCs have been helpful in CLTS implementation, but have not consistently supported field activities at the level anticipated in the CLTS Guidelines. This is an area for focus in the continuing PACS program.

[3] The performance of CSC with respect to their TORs was graded by IWASH County Advisors during the third quarter of FY2014.

Progress Report: IR3 – Improved Enabling Environment for WASH

9 WASH Policy Development, Improvement, and Dissemination

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
3.1-3 A National CLTS Guideline developed and published with IWASH input.	1	1	1
3.3.2 Number of policy dissemination workshop conducted by IWASH at county and district levels	4	4	4

The IWASH program pro-actively supported policy development and improvement, as well as led dissemination efforts throughout program implementation period. IWASH staff contributed significantly to the development of the National CLTS Guidelines and led the development of National Hygiene Promotion Guidelines. IWASH staff were cowriters on the CLTS guidelines and the project funded publication of the document. IWASH staff recruited and funded the consultant who wrote the hygiene guidelines. IWASH has contributed to the Joint WASH Sector Review annually, financially, organizationally, and with relevant case studies and success stories to share lessons learned with the WASH sector stakeholders. IWASH has also participated in task force activities to bring about the National Water Resources and Sanitation Board and the Water Supply and Sanitation Commission. IWASH staff were invited to represent Liberia as part of WASH sector delegations along with the National Water, Sanitation, and Hygiene Promotion Committee presenting in Ivory Coast in 2013.

Improvements to the National CLTS Guidelines are anticipated based on the effective CLTS innovations developed in partnership with the National Coordinating Technical Unit for CLTS. These policy enhancements will be carried out through follow-on WASH programming being implemented by Global Communities with funding from USAID.

WASH sector policy dissemination workshops were held at both the county level and district level for each of the target counties and associated districts (Bong, Nimba, and Lofa) in FY2013. These workshop brought together local government leaders and officers to educate them on policies they were responsible for, but had often never heard about. Representatives from the Ministries of Health, Public Works, Internal Affairs, Lands, Mines, and Energy, and Education all participated in presenting components of the policy workshop related to their specific ministries. The before and after workshop response documents indicated not only a high level of interest, but also that meaningful and useful information was conveyed that could initiate positive change in the decentralized WASH sector.

IWASH staff also led efforts to disseminate lessons learned through program implementation in Liberia to the regional WASH sector and global WASH actors. The IWASH Chief of Party

presented experience and lessons learned through program implementation at a CLTS conference for West Africa held in Benin and at the Sanitation Working Group meeting in Washington DC, USA in FY2014.

Progress Report: IR3 – Improved Enabling Environment for WASH

10 Water Point Functionality and Water Quality Data Management

Implementation indicators and outcome indicators

Indicator	LOP Target	FY 2011 - FY 2014 Cumulative Results	Final Performance
3.2-1 Number of community water points on which water point reports are received regularly at the county level per quarter.	Abandoned	Abandoned	Abandoned
3.2-2 A national water quality electronic data base developed and capturing data from counties.	1	Abandoned	0

During the reporting period, IWASH launched a project designed to shift the responsibility to report on water point development from NGOs to the County WASH Coordinators. The program works to place the MPW WASH Coordinator at the center of water supply development and maintenance for the counties and utilizes the AKVO-FLOW system to update water supply information in real-time. Although AKVO-FLOW was initially created as an MPW project, County WASH Coordinators were not trained on the system. To remedy this, IWASH conducted a two-day workshop for county staff as well as key IWASH personnel on AKVO-FLOW technology for water point mapping. The workshop specifically targeted MPW WASH County Coordinators, CLTS County Focal Points and the Senior M&E Officer of IWASH.

The three month pilot program, initiated by the training in June 2014, intended to put the county level ministry staff in control of water resource data to help develop and manage data at the county and district level for dissemination to the national level. This route for information would help to better inform planning for gaps, interventions and water point improvement. IWASH also intended to provide supplies to the trained teams and incentive payments to encourage data collection.

However, the second wave of the EVD outbreak in the counties halted the work as communities began to violently react to anyone approaching water points due to a rumor that people were poisoning water points with Ebola. These were not resumed before the end of the program.

11 Ebola Response

IWASH staff and resources were integrated into Ebola response efforts in March 2014, when the first reports of EVD emerged from Foya. The initial Ebola outbreak crossed into Liberia in the Foya District of Lofa County in late March 2014. IWASH responded immediately by supporting health centers in areas bordering Guinea, the epi-center of the outbreak. In coordination with USAID and USAID/OFDA, IWASH program activities expanded to support the provision of basic protective equipment and hygiene/disinfection supplies, localized in Lofa County, to Ebola related

education and health messaging, hygiene promotion and safe water provision in the three target counties.

An initial distribution of key health supplies was initiated by IWASH staff in several community clinics and health centers in Lofa County. Following the distribution of materials to the clinics, IWASH commenced community awareness campaigns, expanding into Nimba and Bong counties. These activities engaged gCHVs and Natural Leaders in community education and sensitization regarding the importance of basic hygiene and safe behaviors to stop the transmission of the disease. The safe behavior messaging included core themes and guidelines, such as: avoiding handshakes and contact with dead bodies, safe burial practices, reporting symptoms, and avoiding bush meat consumption. In addition to focused community meetings and dialogue sessions, IWASH also aired radio spots in the counties to raise awareness and engaged with wider community on market days to spread correct information on EVD and prevention.

In July 2014, as cases continued to increase in Lofa, IWASH teamed up with the Director of Community Health Services Tamba Boima, to launch a series of community education, dialogue, and action planning meetings. These meetings were conducted at the county level and the at each health catchment area to educate community leadership before engaging them in dialogue about the crisis and action planning for their communities. The meetings, particularly in Voinjama Health District, were effective in counteracting the denial of Ebola and resistance in community to engaging with the County Health Team (CHT).

The table below provides an overview of the number of meetings held and communities reached during the second wave of Ebola response activities. The more focused dialogue sessions included distribution of items successfully used to promote safe hygiene practices under the IWASH program including wrist bands reminding the wearer to wash their hands five times a day and posters.

Bong, Lofa and Nimba Overview:

County	Number of Meetings Held	Number of Communities Attending (total)	Number of People Attending (total)	Number of Wrist Bands Distributed (total)	Ebola Posters Distributed
Bong	13	275	883	109	785
Lofa	14	173	800	298	790
Nimba	7	83	445	77	253
Total for all Counties	**34**	**531**	**2128**	**484**	**1828**

In FY2015, IWASH focused in two key areas of Ebola response related to WASH: 1) hygiene promotion, including distribution of UNICEF supplied hygiene kits and 2) facilitated water access to households in Ebola effected communities and health clinics. In Bong County, 25 communities

that received hygiene kits and support for hygiene promotion were later triggered through CLTS, and along with two additional neighboring communities, achieved ODF status. The table below lists communities where hygiene kits were distributed and hygiene promotion activities were carried out post distribution in FY2015.

County	# Communities	# Kits to distribute	# Distributed	% Kits reported in use
Bong	23	4097	4097	96.82
Lofa	93	9935	9935	97.3
Nimba	1	265	265	100
TOTAL	**117**	**15369**	**15369**	**98.04**

12. Ebola Study

The IWASH program initially planned for a final end line survey to measure a series of specific indicators relating to behavior change, knowledge aptitudes and practices (KAP), and to determine the success of CLTS methodologies in fostering sustainable adoption of risk-reducing WASH systems at the community level. The advent of the Ebola outbreak in March 2014 significantly disrupted and changed the operating environment across all of Liberia, and particularly, in the flashpoint counties where IWASH was implemented. In Lofa County, arguably the epicenter of Ebola in Liberia, and one of the core IWASH program counties, accelerating EVD transmission patterns and case fatality rates culminated in urgently needed emergency response and prevention measures.

As the rate of Ebola transmissions began to decline, and as communities regained some stability, informal word-of-mouth observations and reports from IWASH communities and by Global Communities' staff consistently pointed to an absence of Ebola infections in communities where IWASH had implemented Community Led Total Sanitation programming, and specifically, in 98 communities in Lofa County that had achieved Open Defecation Free (ODF) status(of the total 284 ODF communities across all three program counties). In order to confirm unofficial reports, and to identify any critical links between CLTS and ODF status and reduced Ebola transmission, Global Communities commissioned a research study in January 2015 in two of the six health districts in Lofa County where IWASH was implemented (Voinjama and Kolahun). An estimated combined total population of 21,587 households reside in 435 communities across these two districts; the IWASH project implemented CLTS in 115 of these communities, impacting a total population of 34,235 individuals (or 6,865 households). The complete study can be reviewed as Annex IX.

Purpose of the Study

The CLTS/ODF Ebola study conducted in Lofa County was developed to: 1) validate informal claims that IWASH communities with verified ODF status had not experienced any Ebola cases, 2) determine if CLTS-specific interventions can explain any variance in fatality and infection rates in EVD and non-EVD communities, and 3) control for other plausible explanations (other than CLTS) that may explain variance in the incident rate of EVD in similar communities. The study also aimed to identify, if possible, which community-based EVD-specific activities were most

effective in disseminating EVD information and promoting disease prevention and response behaviors.

Methods and Analysis

The study incorporated several quantitative and qualitative methods: an initial desk review of secondary data, including the Liberia Demographic and Health Survey (2013), John's Hopkins' KAP study (2014), IWASH project reporting and documentation, as well as and GoL information and data resources. The research team conducted a quantitative survey of 551 households residing in 551 households residing in 18 CLTS communities (10 of those were ODF-verified), and 25 comparable non-CLTS communities. Purposive, proportionate and stratified random sampling techniques informed the final selection of communities. Finally, qualitative methods were incorporated into the research methodology, including Focus Group Discussions with both men and women's groups across all categories of communities, specifically (1) Project beneficiaries who had reached ODF status (ODF); 2) project beneficiaries no longer progressing towards ODF (non-ODF); 3) non-project communities affected by EVD; and 4) project communities that were affected by EVD. From the household survey data, one CLTS (project beneficiary) but non-ODF community with EVD was identified and a fifth comparison group (36 households), and twenty focus group discussions were carried out with 14 Natural Leaders in both project districts. Researchers also conducted Key Informant Interviews with Global Communities and GoL WASH focal persons.

Summary findings

A more in-depth analysis and presentation of key findings can be reviewed in the full report. A breakdown of summary findings and observations produced by the research team are presented below:

Link between CLTS and Community Health Status (Ebola Resistance)

- <u>All verified ODF status communities remained Ebola-free during the Ebola outbreak, and had maintained Ebola-free status at the time of the study</u>**.** Survey results confirmed that there were no cases of EVD in any of the 104 households residing in verified ODF communities. Overall, households in CLTS communities were 17 times less likely to have any cases of Ebola than households in non-CLTS communities.[4]

- <u>Communities that did not participate in any CLTS activities had higher rates of Ebola and more confirmed case fatalities</u>. Survey results confirmed that 236 households (76%) across 23 of the 25 surveyed communities that did not participate in CLTS programs reported confirmed Ebola cases.

- <u>Research evidence points to a strong correlation between CLTS engagement and ODF status and reduced risk of Ebola</u>. In addition to the lack of Ebola infections, transmission, and death in verified ODF communities, survey results suggest lower levels of Ebola infection in communities that were actively engaged in CLTS but did not achieve full ODF status. Only one out of 8 CLTS communities that did not attain verified ODF status (36 households) were affected by Ebola; qualitative analysis revealed that this community had also experienced protracted internal conflict. Survey data therefore suggest that the process of achieving ODF status, which includes significant change in various hygiene behaviors and sanitation

[4] Statistical analysis resulted in an odds ratio of 0.06 for incidence of Ebola in CLTS households versus non-CLTS households, indicating a strong negative association between involvement in CLTS and incidence of Ebola (see Annex B of the full report).

practices provide an enabling environment, and can be interpreted as building protective factors in the community.

- Natural Leaders may have a key role in reducing Ebola risk at the community level. Training by a NL is one specific element that is exclusively connected with IWASH CLTS communities in the two surveyed health districts. Regression analysis of multiple factors in the household survey showed that "Training by a Natural Leader" (a proxy for CLTS) emerged as an important difference between communities where Ebola was present and communities with no Ebola cases. The vast majority (91.5%) of households in communities directly affected by Ebola had not benefited from training by a Natural Leader. CLTS communities expressed a higher level of trust for NLs and even external sources (CHTs, GoL, and NGOs) than communities that had not participated in CLTS activities.

- Further research is required to determine which behaviors, practices, and relationships specifically influence Ebola and disease resistance in general. Survey data indicate that the process of achieving ODF status, which includes significant change in various hygiene behaviors and sanitation practices, provides an enabling environment and builds protective factors in the community. Given that communities also commit to specific and measurable actions to achieve verified ODF status, behavioral indicators are likely to be higher in CLTS/ODF communities than in communities where these actions are not taken. The study was unable to identify which *specific behaviors or processes* might have been more important than others; further analysis is required to fully understand the importance and contribution of each measure to ensuring community health and reducing Ebola risk.

Community Perspectives Regarding Ebola Response and Resistance

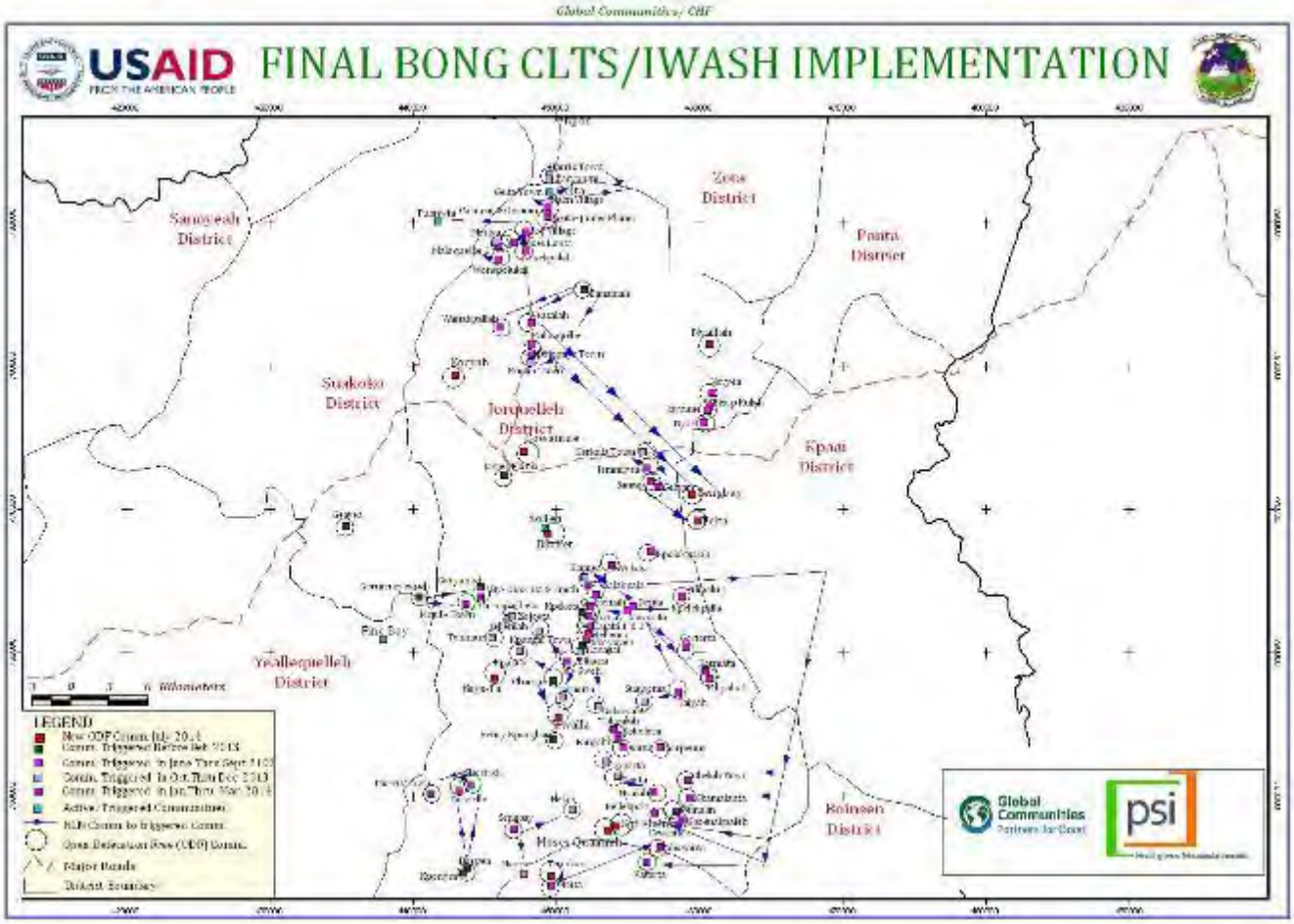
- CLTS communities credit behavior change and good hygiene practices as reasons for the lack of Ebola in their community. ODF communities reported that they were "already doing the preventive hygiene behaviors *before* EVD" because of the training they received in CLTS. In comparison, EVD-affected communities expressed that denial regarding the actual nature of the disease was a most influential reason for delayed adoption of improved hygiene behaviors.

- Trust is an important feature of IWASH programming, and strengthened protective factors in the community. CHT and DHT officials reported that initial responses to radio messaging varied widely between communities, and that non-CLTS communities attempts made by the CHT to reach the sick as part of the overall response effort. According to the CHT, IWASH communities were more receptive to and complied more readily with information regarding EVD prevention than non-IWASH communities.

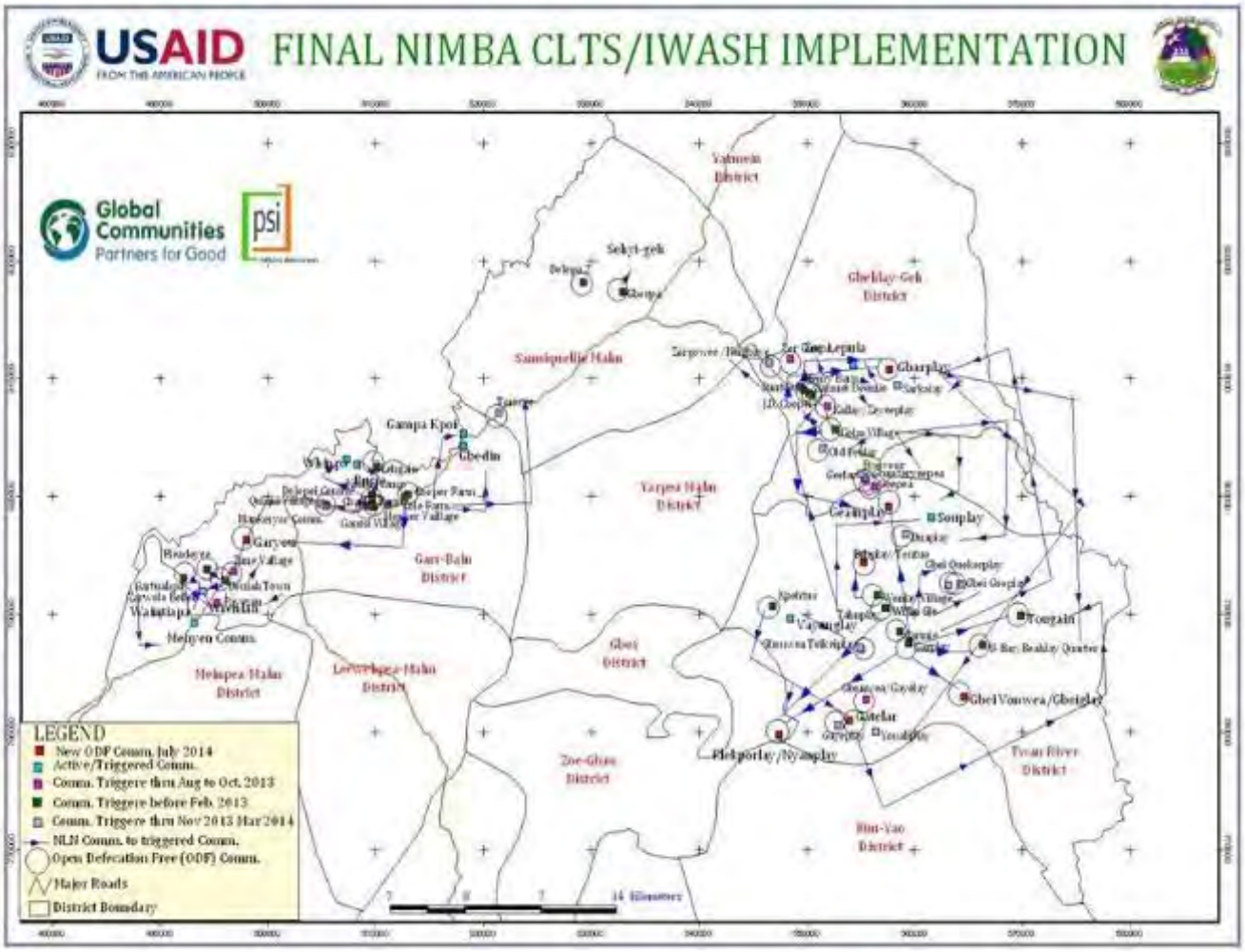
- In the context of Ebola response, the level of trust in the information source may directly influence community acceptance and adoption of guidelines and directives. All communities in the survey, regardless of CLTS or EVD status, identified radio broadcasting as their first source of EVD information, followed by health workers, NGOs and family and peers. Both CLTS and no-CLTS communities cited health workers as the most trusted source of information. Retrospective responses revealed a change and evolving reliance on various information sources among communities with EVD, who changed the sources of information

they responded to over the course of the epidemic. During the survey, over four months after the last case of Ebola in Lofa County, both CLTS/ODF and EVD communities listed (in this order) “health workers”, “radio” and “NGO”s as the most trusted sources of information.

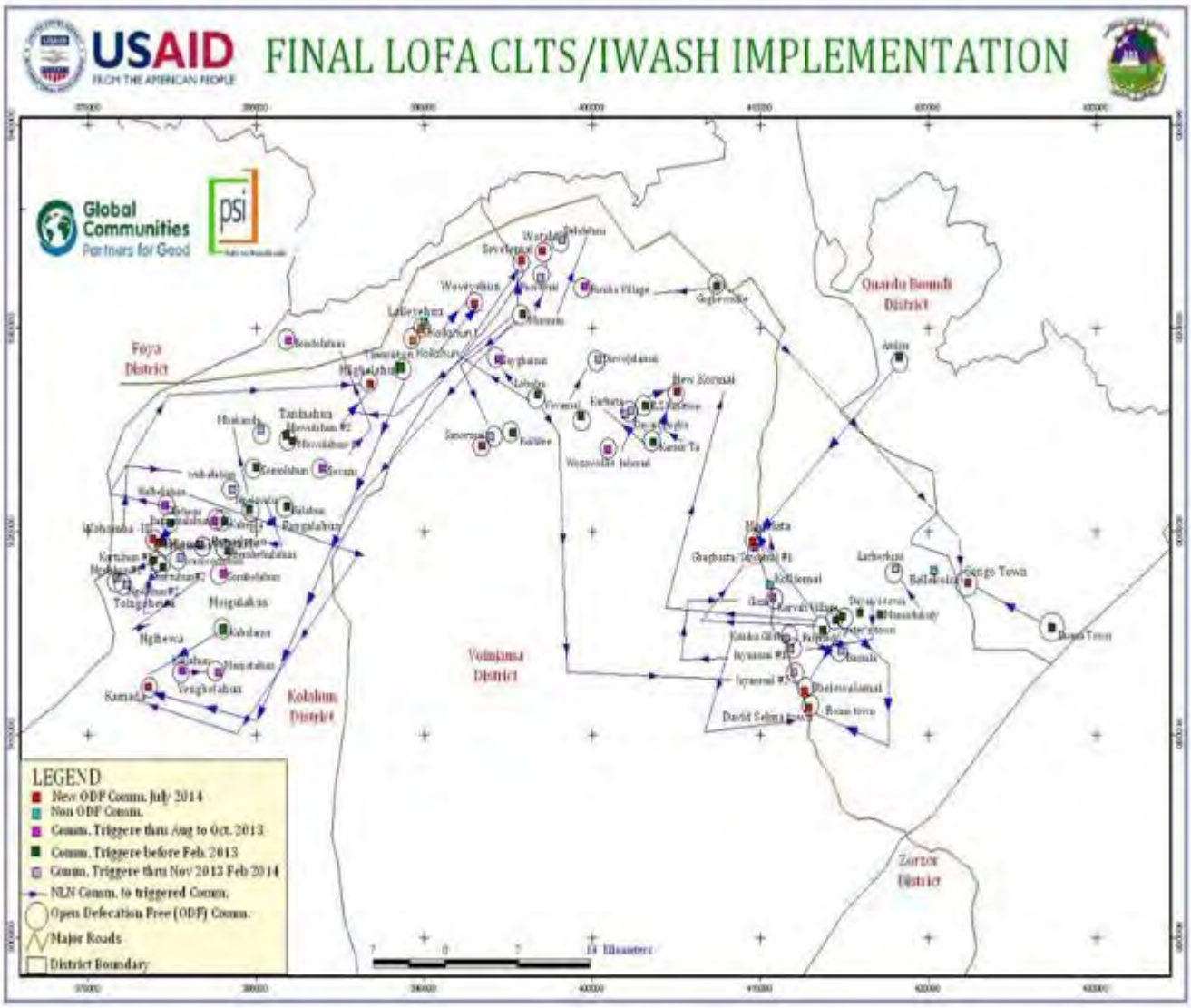
Annex I: Bong County CLTS Map



Annex II: Nimba County CLTS Map



Annex III: Lofa County CLTS Map

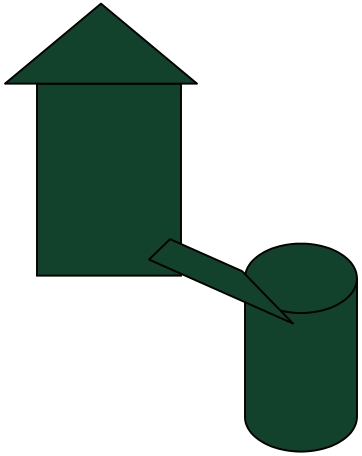


Annex IV: Paynesville Urban Latrine Inauguration

Global Communities Country Director, Warner Passanisi hands keys to Deputy Mission Director, Barbara Dickerson at the Panyesville Urban Latrine Inauguration while Mayor of Paynesville, Cyvette M. Gibson, looks on.

Innovation – Slabless VIP Latrine

A pour flush latrine with all local materials



- Benefits of VIP latrine
- No slab required
- Minimal cost

Annex VI: Bamboo Hand Washing Facility

Chris Holmes, USAID Global Water Coordinator, using a bamboo hand washing facility in Bong County

Annex VII: WASH Products and Services Guide

WASH PRODUCTS AND SERVICES GUIDE

Improved Water, Sanitation and Hygiene Promotion (IWASH) Program in Liberia

USAID Cooperative Agreement No. 669-A-00-10-00087-00

In collaboration with:

THE MINISTRY OF PUBLIC WORKS

THE MINISTRY OF HEALTH AND SOCIAL WELFARE

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About this Manual

This WASH Products and Services Manual is a step towards presenting communities, especially Open Defecation Free (ODF) communities, with options of products and services to be used in improving their access to safe water, sanitation and hygiene.

The target audience is community mobilizers (Natural Leaders, Community Health Volunteers, and others) who are assisting their communities in the CLTS process and are active in moving their communities towards improved standard of living.

It is an easy to read presentation with simple graphic designs and easy to follow instructions on how people can access and use low cost (or no cost) local materials to put together simple devices that can be used to wash hands, treat water, dispose of garbage, and many other safe health and hygiene activities.

It has been put together from the experiences and lessons learnt by the USAID-funded IWASH project following feedback from communities in field locations with the aim of sharing these experiences with a wider audience.

It is hoped that all who use this manual will share it with community members to use as a tool for improving their health and hygiene.

Improved Water, Sanitation, and Hygiene in Liberia

Community led Total Sanitation (CLTS) is the national method used to improve sanitation in rural Liberia and the doorway for improved Water, Sanitation, and Hygiene (WASH) in rural communities. In addition to construction and use of household latrines, CLTS includes construction and use of hand washing facilities, dish racks and clothes lines.

Through the experiences of the USAID-funded IWASH program, local innovations from communities in Bong, Nimba, and Lofa counties have been encouraged and distributed. Local designs for each of the "products" mentioned above: 1) **latrines**, 2) **hand washing facilities**, 3) **dish racks**, and 4) **clothes lines**, are presented in this document. For communities that do not already have a hand pump, a **rock/sand filter** design is provided so that very dirty water can be improved. However, this water is not safe after filtering alone! **WaterGuard** should be used to treat filtered water and water from hand pumps. Instructions for WaterGuard use are provided in this guide.

WASH Services assist communities interested in CLTS, hand pump repair, or access to WaterGuard and soap, through the Natural Leader Networks in Bong Nimba, and Lofa counties. All Natural Leader Network members can provide CLTS support and some members (known as WASH Entrepreneurs) can also repair hand pumps, as well as supply WaterGuard and soap. A WASH Services Directory of Natural Leader Network contacts is provided in the back of this guide.

The Government of Liberia (GOL) at county level has professionals assisting the Natural Leader Networks to provide WASH products and services. Contact information for the GOL WASH professionals is also provided in the back of this guide. The roles of the GOL WASH professionals are presented below.

County CLTS Focal People: Government of Liberia implementer with responsibility for all CLTS activity within their county.

District Environmental Health Technician (EHT): Government of Liberia implementer that monitors CLTS implementation on a daily basis, participates in feedback meetings, and reports to the District Steering CLTS Committee as well as County Focal Person. The District EHT is responsible for coordination with NLN members within their district.

Natural Leaders (NLs): NLs are community members who emerge during the early stages of CLTS by showing enthusiasm about the process. They show leadership and are chosen as volunteer community mobilizers and become the point person in the community for encouraging others to take action.

WASH Entrepreneurs: WASH Entrepreneurs are successful NLs who are trained in soap making, hand pump repair and sale of WaterGuard. In doing so, they promote improved hygiene and sanitation while earning some income.

PRODUCTS

VIP Latrines

Ventilated Improved Latrines (VIP) with no slab

What is a ventilated improved (VIP) pit latrine?
A VIP pit latrine is the best type of pit latrine! The ventilation keeps the odors and flies away from the person using the latrines. The usual design requires several bags of cement and some steel, but the new design from Bong County does not. Only a small amount of cement is used in construction, but the user does have to use water to "rinse" the latrine bowl. Another great benefit - there is no danger of falling through a rotten pit cover while using the latrine.

Benefit:

- No odors or flies
- No risk of falling through the floor while using the latrine
- Without the cost of building a large concrete slab floor

Materials:

1. Bricks or wood and mud for building walls
2. Reed for connecting the "bowl" to the pit
3. Bricks for the "bowl"
4. Wood, and palm leaves or zinc for the roof
5. Steel rods

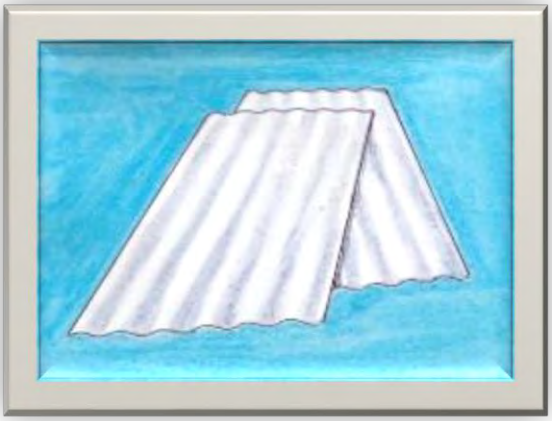
How to construct:

Building a latrine is like building a very small house, connected with a reed pipe to a hand dug hole. It's simple to do and can be done with local materials.

Woven Branches, Ropes and Sticks for wall structure, to be mudded later.

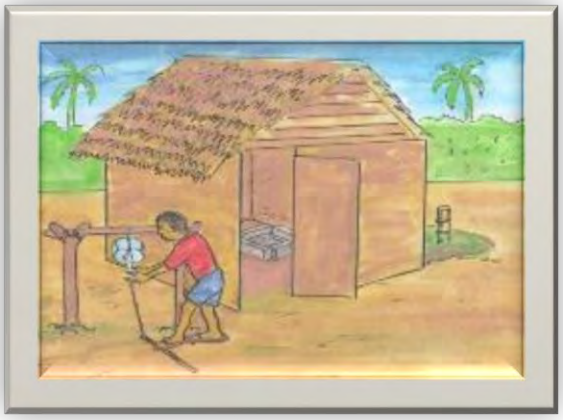
Mud Bricks or Concrete Bricks can be used to make walls too. They last a long time.

VIP Latrines (Continued)



Zinc makes a long lasting roof.

Bamboo leaves make a good roof too.



The latrine has a room with a "bowl" inside connected with reed to a pit.

Here is how it looks when someone is sitting on the "bowl" in a completed latrine.

Hand Washing Facilities

Hand washing is the most effective personal hygiene activity for preventing disease transmission. It requires water and soap (or ash). To be convenient, the water is stored in some kind of container that can release a stream sufficient for wetting the hands before using soap and rinsing them after. There are two methods described in this guide that use local materials and can be made at little or no cost.

- **Hand Washing Reed**
- **Tippy-tap**

What is a Hand Washing Reed?

A hand washing reed is a piece of reed that is set into the ground and filled with water; a small hole plugged with a stick, can release water for hand washing.

Benefit

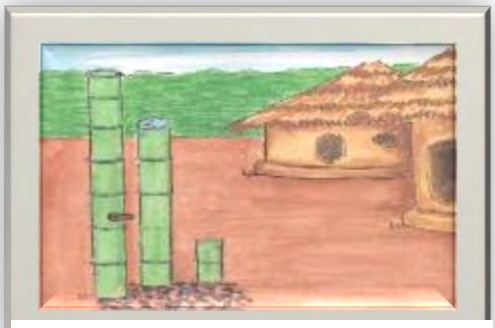
The hand washing reed is both free (as long as you have reed available) and easy to construct.

Materials

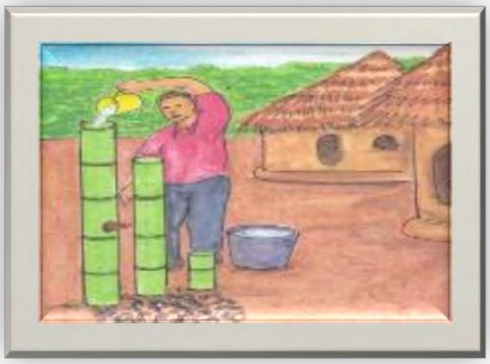
1. A piece of reed about 5 foot long
2. 6 inches of string

How to Construct:

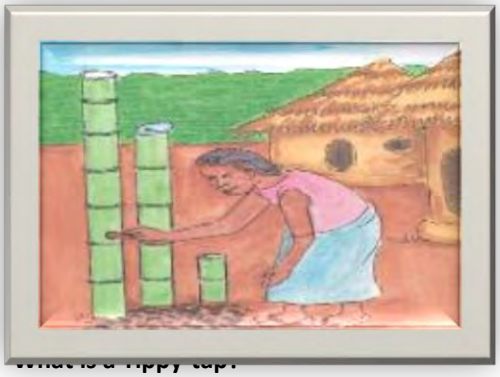
Cut the Reed and stick it into the ground. On the other end, use a knife and sharpened stick to punch through the reed separations between sections, so water can be poured into it from the top and fill it to about 3 feet down. Just above the bottom of where the water can reach, when poured in from the top, cut a small hole from the outside of the reed into the water stage area. Sharpen a stick so that it can be pushed into this hole to plug it.



The Semi-hollow reed already in the ground



Water being poured into the reed to wash hands with the hole plugged by the sharpened stick



Removing the sharpened stick to wash hands

Water flowing out of the reed to wash hands with another reed nearby to hold your soap

Ti

vice made from e

r no cost.

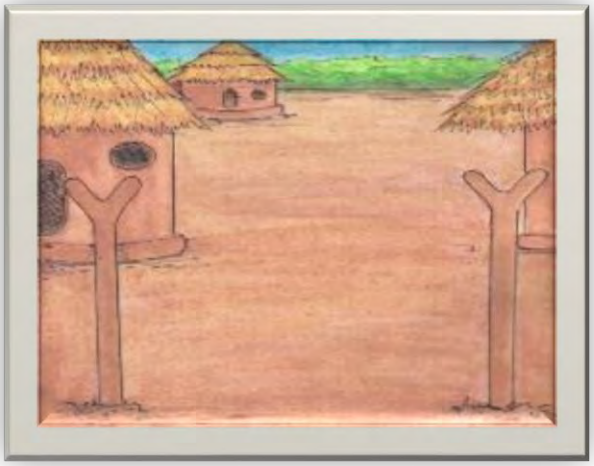
Benefit:

The tippy-tap costs very little to make and helps to keep your hands clean after using the latrine thereby protecting you and your family members from diseases due to contamination from feces.

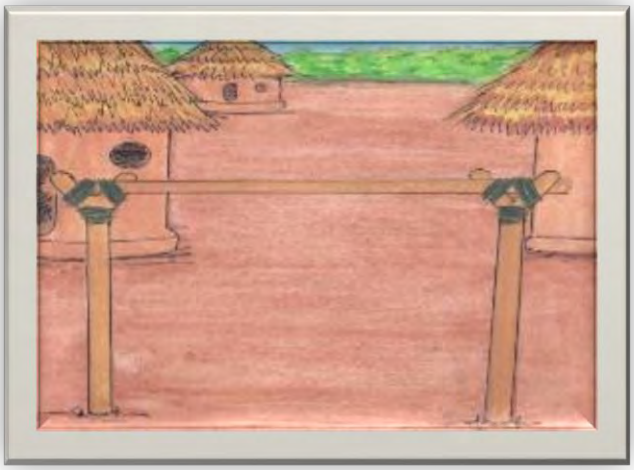
Materials:

1. Old jerry can; Country calabash; any container
2. Bush rope; Nylon twine
3. Forks (2) cut out of bush sticks
4. Soap

How to Construct:

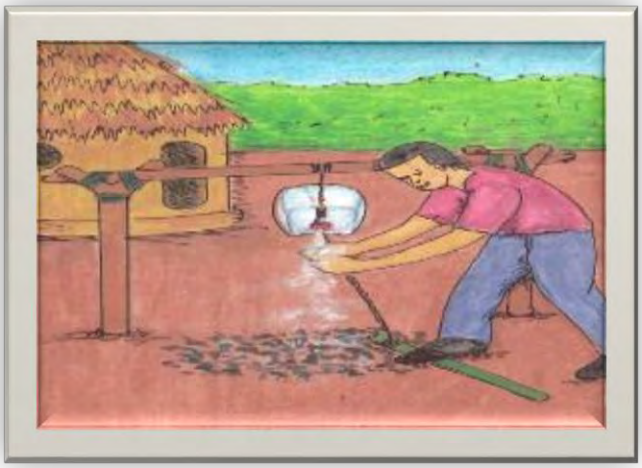


Cut two forks at least two feet in length and bury at least one foot apart



Cut another stick and lay across both forks and properly tie at both ends

- **Get an old jerry can, country calabash, or any other container and tie to the stick attached to the forks**
- **Tie a piece of bush rope or twine to the "mouth" of the container and tie to a piece of stick leaving the part of the stick tied to the container slightly elevated**
- **Fill the container with water almost to the brim**



Get a cake of soap and grind to powder and add to the water in the container or keep the soap close to the device or where there is no soap, get the ashes from your regular cooking and keep near the device

How to Use:

After using the latrine, go to your Tippy-tap, gently press on the stick tied to the container with your foot and the container will tip thereby releasing the water for you to wash your hands using the soap or ashes nearby.

Maintenance:

1. Replace the stick form when you notice that they are getting weak or rotten or falling apart
2. Replace the container when you notice wear and tear
3. Replace the ropes when you notice breakage and slackness

Dish-rack

What is a Dish-rack?

A dish-rack is a locally made kitchen device used to keep kitchen utensils, plates, spoons, cups and pots away from the ground and animals

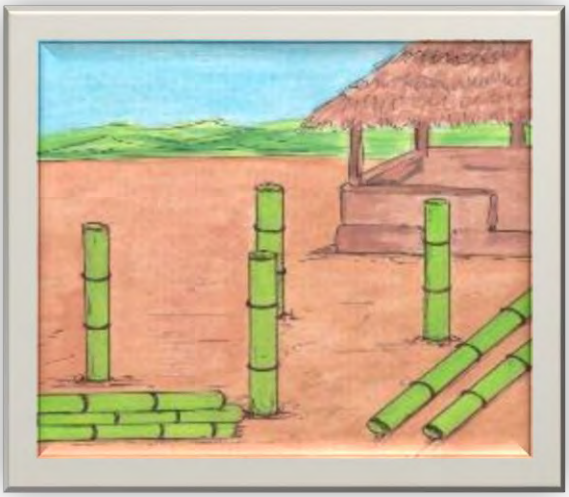
Benefit:

The dish-rack protects your kitchen utensils, spoons, plates, cups, pots etc. from coming into direct contact with dirt, and animals especially after the utensils have been washed to be used

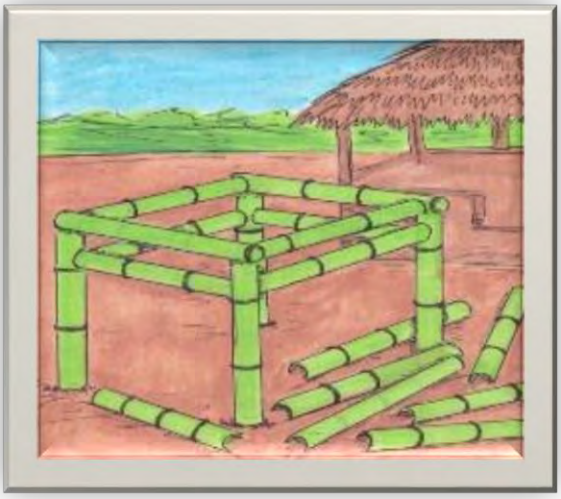
Materials:

1. Reeds/sticks
2. Ropes/nylon twine

How to construct:



Cut four medium size sticks/reeds
Cut smaller size sticks/reeds



Get some ropes or nails or nylon twine
Bury the bigger sticks/reed into the ground close to your kitchen

Use the smaller sticks to connect the bigger sticks to make them firm
Spread smaller sticks on top of the structure closely apart to hold the dishes and other utensils

Spread your kitchen wares including dishes, pots, spoons, etc on the dish rack to keep them away from domesticated animals and dirt

Maintenance:

1. Replace sticks, ropes or nails when you notice slackness, rot or when the dish rack begins to break apart.

Sand-Rock Filter

What is a Rock-sand Filter?

A rock/sand filter is a simple easy to make filter made from local materials used for filtering water to remove dirt. This filter is not reliable for removing bacteria or viruses, so water should be treated with WaterGuard after filtering.

Benefit:

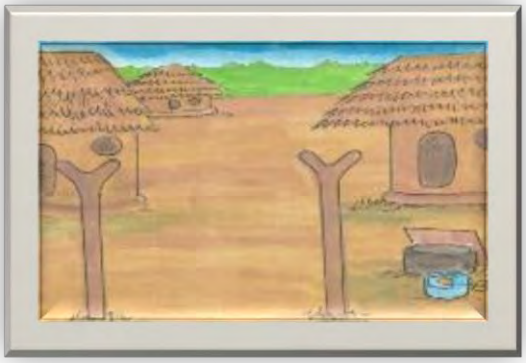
The rock/sand filter is useful in communities that depend on creeks and other surface bodies of water as it greatly reduces dirt, color, and odor from the water. The filter also may remove some of the bacteria but it does not make the water safe. If water is to be consumed, it should be treated with WaterGuard or boiled.

Materials:

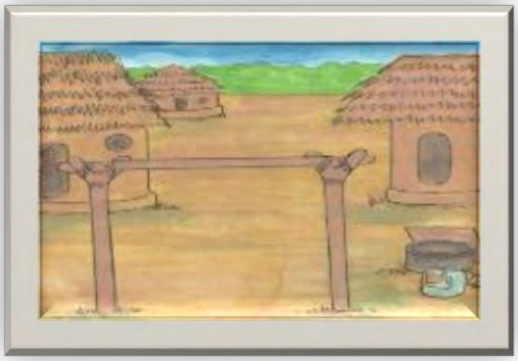
1. Empty rice bag
2. River sand
3. Crushed rocks
4. Forked sticks (2 or 3)
5. Bush rope or twine

How to construct:

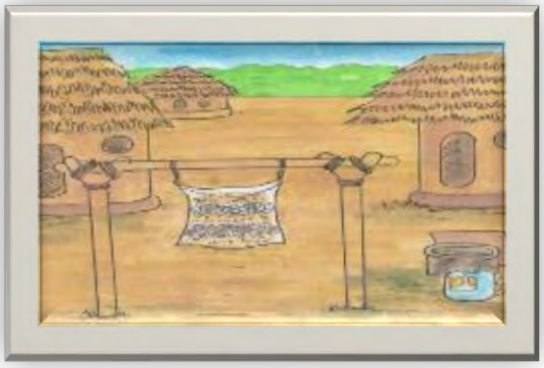
Get all the materials listed above



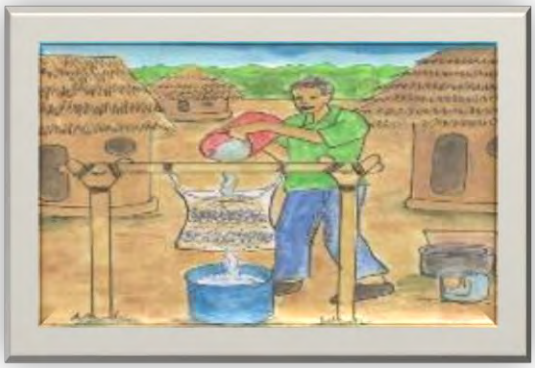
Cut the forks and bury at least 2 feet.



Cut another stick and lay it across the two forks and tie properly to the forks



Get an empty rice bag, fill up to one third of the bag with clean river sand, add crushed rocks (small pebbles) to half of quantity of sand, and add another one third of sand. Tie the bag to the crossed stick on the forks. Place a clean container under the bag to collect water from the bag



Collect water from your usual water collection point and pour into the bag. Water poured into the bag will collect in the clean container placed under the bag

Maintenance:

1. Change the sand in the bag every month or when you notice that the water coming through is no longer clean as it used to be
2. When changing the sand, wash the rocks and reuse
3. Change the stick form used to hold the bag when you observe weakness and tearing

Drawback:

The filter makes the water clean and sometimes odorless but not necessarily safe, so it is advised to treat the water with WaterGuard or other available water treatment product after filtering and before drinking.

WaterGuard

What is WaterGuard?

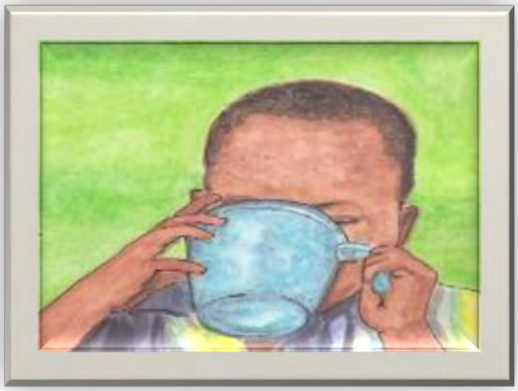
WaterGuard is a point of use water treatment product

Benefits:

Prevents waterborne diseases such as diarrhea, and cholera

How do you use WaterGuard?

- **Pour out one capful of WaterGuard**
- **Pour into a 5 gallon container of water**
- **Cover the gallon and shake well until WaterGuard is completely mixed with the water**
- **Wait at least thirty minutes for WaterGuard to work**



Your water is now safe to drink

How to get WaterGuard:

1. WaterGuard can be bought from WASH Entrepreneurs, shops, pharmacies, markets and other petty-traders
2. Recommended retail price is LD40.00 at least for one blue bottle
3. WaterGuard can also be gotten free of charge form government and humanitarian organizations during emergency period/outbreaks

Soap

What is Soap?
Soap is a product used to clean objects and wash hands

Materials:

1. Oil Container
2. Caustic soda
3. 1liter cup
4. Rubber Hand gloves (elbow length)
5. Rubber bowl
6. Mixing stick
7. Water
8. Woolen socks
9. Cutting Table
10. Empty Bags/Mat
11. Drum
12. Rubber Bucket
13. Mixing Vessel

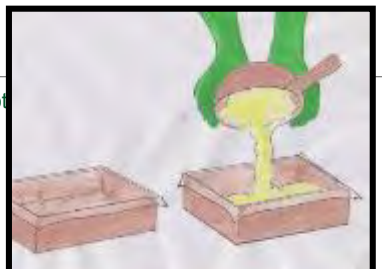
How to prepare soap:

Pour caustic into the 1liter cup until it is filled

Pour the 1liter cup filled with caustic into the rubber bowl

- **Pour the 1liter of caustic into the mixing container and add 2liters of water**
- **Mix the caustic and water until it b**

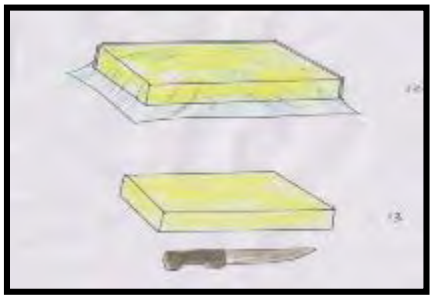
How to prepare soap (continued)



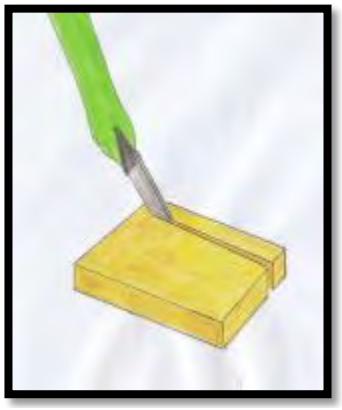
- **Heat 2liters of red palm oil until it gets very light**
- **Pour the palm oil into the water and caustic solution and mix turning in one direction only, until you feel the thickness in your arm**

Pour the thick mixture into a wooden box lined with plastic sheet, spread the mixture evenly and allow to cool

Remove the soap from the wooden box onto the cutting table



Remove the plastic sheet from soap to prepare for cutting



Cut to preferred size using a sharp cutting knife

How to use:
Soap is used to wash objects such as clothes, household utensils, the body, etc. It is advisable to always use soap and water to wash hands whenever one uses the toilet.

Benefit:
Soap leaves the body especially the hands clean after coming in contact with feces which most times cause illnesses.

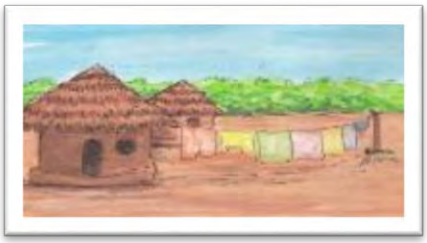
Clothes Line

What is a clothes line?
A clothes line is a piece of bush rope, reeds, or nylon twine used to hang clothes after they have been washed.

Benefit:
Hanging clothes on clothes lines instead of spreading them on the ground keeps away crawling insects and other animals from getting on to the clothes either making them dirty or leaving harmful parasites that can affect the body when the clothes are worn or used on bedding, etc.

Materials:
1. Sticks
2. Bush rope/Nylon twine

How to construct:



Cut two sticks/forks and tie bush rope or nylon twine across to hang your clothes after washing

Garbage Pit

What is a Garbage pit?

A Garbage pit is a hole dug in the ground at the edge of the community to dispose of garbage

Benefits:

Garbage pits makes the community clean and free of dirt when used properly and always

Materials:

1. Shovels
2. Sticks
3. Digger
4. Ropes/nails

How to Construct and Use:

Dig a pit at the edge of the community and build a fence around it using sticks and bush ropes/nails

Collect all garbage from the community and ensure that the fence is always closed

Open the gate to the fence and dispose of your garbage making sure all goes into the pit

After disposing of your garbage, ensure that you close the fence to prevent animals from scattering the garbage or bringing it back to the community. Cover the pit with dirt after pit is full and dig another pit at another spot

WASH Services Directory: Natural Leader Network Contacts

Lofa County

Kolahun District leadership

Chairman	Moses N. Sevelee	0555225391
Tahamba Clan		
Chairman	Joseph Hena	0886269180

Voinjama District Leadership

Upper Walker Clan		
Co-Chairman	James K. Kullie	0777623196
Lower Walker Clan		
Chairman	Thomas Salloh	0886602678
Bondi Clan		
Chairman	Mohammed Kanneh	0777700600

Bong County

(Jorquelleh #2 Leadership Structure)

Chairman	Julliette Togbah	0886981213
Mowaita Clan		
Chairman	Quita Kerkula	0886227781
Gbanshay Clan		
Chairman	Luke Gbanyan	0777281469
Jorquelleh # 1		
Jorpolu Clan		
Chairman	Moses Ketteh	0880667811
Bequelleh Clan		
Chairman	Murphy Davies	0886518840

Nimba County

(Gbelleh-geh District Leadership)

Chairman	Daniel McGill	077954934
Zor Clan		
Chairman	Peter Nuahn	0776950873

Sanniquellie-mah District

Gar Clan		
Chairman	Prince Domah	0886118796
Bain Clan		
Chairman	Mark Gartuah	0880526766

WASH Services Directory: County Government Contacts

Sanitation and Hygiene Contacts

Bong County CLTS Focal Person	Young Paygar	0886755934
Nimba County CLTS Focal Person	T. Pleyelekay Gbaintor	0880652531
Lofa County CLTS Focal Person	Blima Sirleaf	0886525825

Water Supply Contacts

Bong County WASH Coordinator -	T. Maxwell Ricks	0886544975
Nimba County WASH Coordinator -	Dilsworth Nupolu	0886815139
Lofa County WASH Coordinator -	Joseph Leewar	0886423541

Hand Pump and Pump Spare Parts Vendors

Lofa County

1. Easy Boy Shop (***Hand Pump Spare parts***)
   Kolba City, Kolahun District, Lofa County
   Cell #: 05224597; 0886630513

Bong County

2. RIZK and Son Trading Center (***Hand Pump Spare parts; Well construction materials***)
   Gbarnga-Ganta Highway, Gbarnga City, Bong County
   Cell #: 0886425707; 0886456999

3. **Bong Shopping Center** (***Hand Pump Spare parts; Well construction materials***)
   Gbarnga-Ganta Highway, Gbarnga City, Bong County
   Cell #: 0886594999; 0886434888

4. **Johnson Cole** (***Latrine slabs and culverts***)
   Monrovia-Gbarnga Highway, Gbarnga City, Bong County
   Cell # 0886423431

Nimba County

5. **Jungle Water #2 (*Hand Pump Spare parts; Well construction materials)***
   Sanniquellie Broad Street, Sanniquellie City, Nimba County
   Cell #: 0886587673

6. **River Sand Inc. (*Hand Pump Spare parts*; *Well construction materials*)**
   Sanniquellie Broad Street, Sanniquellie City, Nimba County
   Cell #: 0880530799

7. **RUWASSCON Inc (*Culverts; Latrine slabs*)**
   Saclepea Highway, Ganta City, Nimba County
   Cell #: 0886473578

8. **Sethi Bros. (*Hand Pump Spare parts; Well construction materials*)**
   Ganta Broad Street, Ganta City, Nimba County
   Cell #: 0886634734

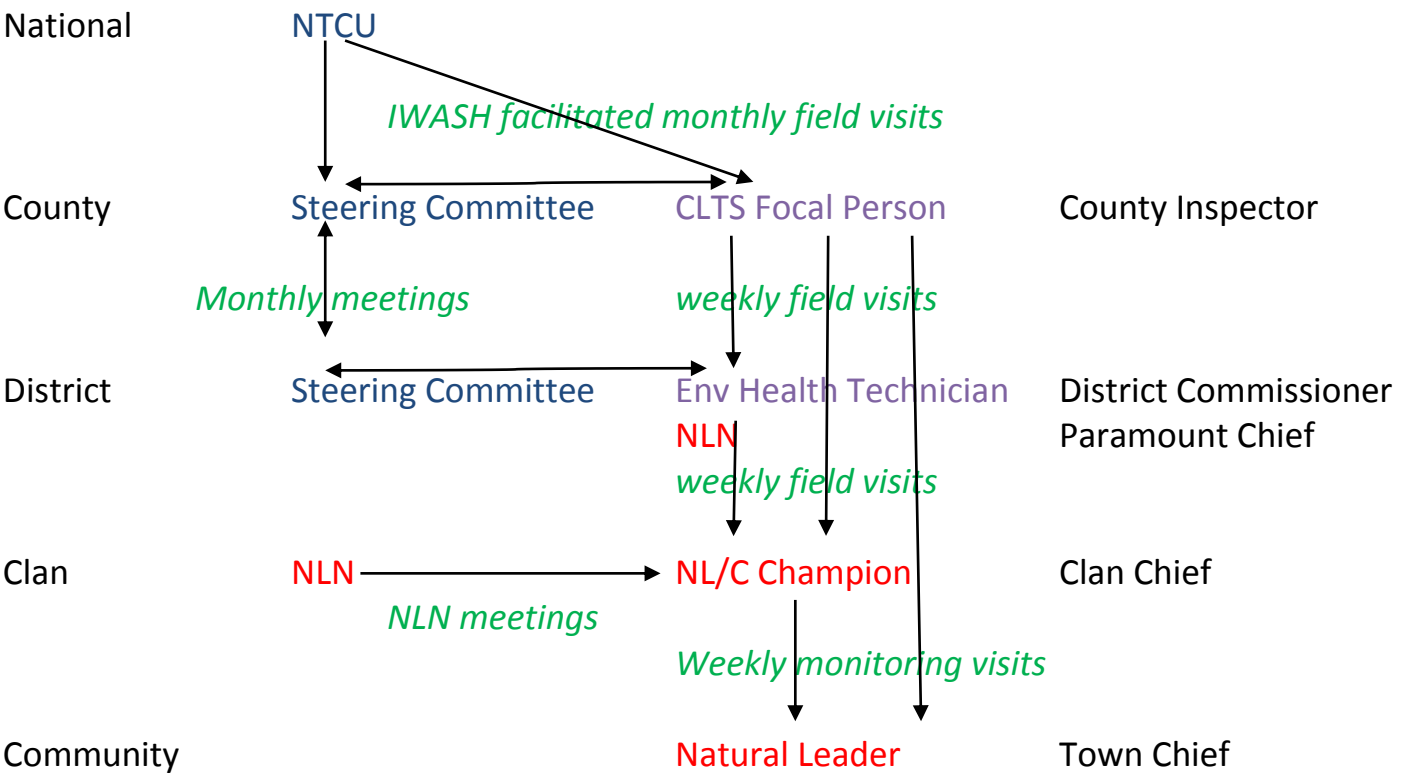
WASH Entrepreneurs Contact Details

No.	Names	Community	District	County	Contact No.
BONG COUNTY					
1	Jefferson P. Togbah	Kowai	Panta-kpai	**Bong**	**0888391024**
2	Esther Moye	Maluquille	Jorquelleh# 1	**Bong**	**0886659041**
3	Richard M. Farkai	Wainsue	Jorquelleh# 1	**Bong**	**0886671279**
4	Flomo Gbatawee	Gbeyanyea	Jorquelleh# 1	**Bong**	**0886309873**
5	Esther Moye	Maluquille	Jorquelleh# 1	**Bong**	**0886659041**
6	Tokpa M. Dolo	Blomey/Gbarnga	Jorquelleh# 1	**Bong**	**0886895594**
7	Moses Mango	Iron Gate/Gbarnga	Jorquelleh# 1	**Bong**	**0886917941**
8	Flomo J. Kollie	Galima	Jorquelleh# 1	**Bong**	**0886422630**
9	Jerry Nulupah	Gbarnga	Jorquelleh # 1	**Bong**	**0886979804**
10	James Gwehkporlusohn	Kponyea	Jorquelleh# 2	**Bong**	**0880741376**
11	Dickson Plator	Kpeketa	Jorquelleh# 2	**Bong**	**0886853849**
12	Bill Mulbah Kollie	Stamata	Jorquelleh# 2	**Bong**	**0886647347**
13	Emmanuel Y. Mulbah	Gbolorkpala	Tukpahblee	**Bong**	**0880517295**
14	Sam K. Dahn	Rock Crusher	Kokoyah	**Bong**	**0880762891**
15	Titus Bondo	Gbechon	Kokoyah	**Bong**	**0886978854**
14	Monday Flomo	Pelelie	Zota	**Bong**	**0886422630**
16	Flomo Barck	Geayea	Suakoko	**Bong**	**0886903740**
LOFA COUNTY					
1	Anthony S. Dovelee	Sombolahun	Kolahun	**Lofa**	**0880347965**
2	Anthony H. Harlay	Mowolahun	Kolahun	**Lofa**	**0888945954**
3	Stephen N. Selay	Koilahun #2	Kolahun	**Lofa**	**0886960115**
4	Moses N. Sevelee	Kortohun #2	Kolahun	**Lofa**	**0555225391**
5	Benjamin M. Kpehe	Kortohun #1	Kolahun	**Lofa**	**0888572378**
6	Wendor Sayndee	Wohomba	Kolahun	**Lofa**	**0888107519**

7	Jassah Hassay	Kimbalahun	Kolahun	**Lofa**	**0888434794**
8	Augustine K. Sayndee	Ngolavolu	Kolahun	**Lofa**	**0886960115**
9	Cynthia Jallah	Moluwarhun	Kolahun	**Lofa**	**0888823838**
10	Hena Joseph	Kabalama	Kolahun	**Lofa**	**0886269180**
11	James K. Kullie	Vavamai	Voinjama	**Lofa**	**0777623196**
12	Korpo Woiwor	Gbolowollie	Voinjama	**Lofa**	**0776238412**
13	Philip Morlu	Koiyanmai	Voinjama	**Lofa**	**0886351681**
14	Mulbah G. Kessellie	B.Z. Junction	Voinjama	**Lofa**	**0777790202**
15	Sedeke F. Kamara	Fafenedu	Voinjama	**Lofa**	**0776410440**
16	Peter Warbo	Peter's Town	Voinjama	**Lofa**	**0770259196**
17	Thomas S. Salloh	Mumusu	Voinjama	**Lofa**	**0886602678**
18	Richard Kota	Jayanmai #1	Voinjama	**Lofa**	**0770259196**
19	Kabadah Mulbah	Kolubah Gelleh	Voinjama	**Lofa**	**0770259196**
20	Gayflor Yarkpawolo	Karmodu	Voinjama	**Lofa**	**0775564456**
NIMBA COUNTY					
1	Prince M. Domah	Mengain	Sanniquellie-mah	**Nimba**	**0886118796**
2	Markan S. Zeekeh	Cooper Farm	Sanniquellie-mah	**Nimba**	**0888615706**
3	Teizu Wolobah	Cooper Farm	Sanniquellie-mah	**Nimba**	**0886349457**
4	Larry Gogoi	Pleadehyee	Sanniquellie-mah	**Nimba**	**0880603373**
5	Peter Gartuah	Gartuahpia	Sanniquellie-mah	**Nimba**	**0880526766**
6	Alex Dolopei	Dolopei	Sanniquellie-mah	**Nimba**	**0880526758**
7	Love Dolopei	Dolopa	Sanniquellie-mah	**Nimba**	**0886325910**
8	Allen W. Zorh	Dolopa	Sanniquellie-mah	**Nimba**	**0886290085**
9	Sabastine Tokpah	Dolopa	Sanniquellie	**Nimba**	**0888355400**
10	Williamson S. Walee	Frog Island	Sanniquellie-mah	**Nimba**	**0886638325**

11	Advertus Dolo	Landin	Sanniquellie-mah	**Nimba**	**0886142787**
12	Alfred Smith	Gehmun-to	Sanniquellie-mah	**Nimba**	**0880717732**
13	Alvin S. Gbozuah	Sanniquellie-mah	Sanniquellie-mah	**Nimba**	**0886952392**
14	Allison S. Dolo	Dolopa	Sanniquellie-mah	**Nimba**	**0886215313**
15	Daniel Mcgill	Nanpea	Gbelleh-geh	**Nimba**	**077954934**
16	Alocious Sobie	Henry Bah	Gbelleh-geh	**Nimba**	**0886322323**
17	Edward T. Gohn	Nanpea	Gbelleh-geh	**Nimba**	**077954934**
18	Titus Than	Tahnplay	Gbelleh-geh	**Nimba**	**0888164776**
19	J. Constance Peter	Kpehtuo	Gbelleh-geh	**Nimba**	**0880990430**
20	Abel Dolo	Willie Gio	Gbelleh-geh	**Nimba**	**0888164776**

Annex VIII: CLTS Actors at National, County, District, Clan & Community Levels



Annex IX: Ebola Study

USAID IWASH PROJECT:
Community-Led Total Sanitation Component

Open Defecation Status, Community-Led Total Sanitation and Ebola Virus Disease (EVD) in Voinjama and Kolahun Health Districts, Lofa County, Liberia (2014)

June 2015

Jean Meyer Capps
Haron Njiru

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Acknowledgements

The study team would like to express its appreciation to the Lofa County Heath Team (CHT) for its assistance with this study, particularly its assistance with identifying Ebola communities, providing EVD data and facilitating entry into communities to conduct the household survey and Focus Group Discussions (FGDs). Special thanks go to Global Communities' field staff in Kolahun health district for their invaluable assistance in finding several local enumerators for the household survey.

We would also like to thank the respondents in CLTS and non-CLTS communities that had cases of Ebola who opened their homes and their communities to answer our questions, and in many cases, share with us their heartbreaking experiences and their struggles to regain a normal life.

Acronyms and Abbreviations

BCC	Behavior Change Communication
CDC	Centers for Disease Control and Prevention
CEG	CLTS and Ebola Grouping
CGV	Care Group Volunteers
CHT	County Health Team
CI	Confidence Interval
CLTS	Community-Led Total Sanitation
DHT	District Health Team
EHT	Environmental Health Technician
ETU	Ebola Treatment Unit
EVD	Ebola Virus Disease
FGD	Focus Group Discussions
gCHV	General Community Health Volunteers
GHI	Global Health Initiative
GoL	Government of Liberia
HH	Household
IWASH	Improved Water, Sanitation, and Hygiene
KII	Key Informant Interviews
LDHS	Liberia Demographic and Health Survey
LIGIS	Liberia Institute for Statistics and Geo-Information Services
LOE	Level of Effort
M&E	Monitoring and Evaluation
MNCH	Maternal Newborn and Child Health
MoHSW	Ministry of Health and Social Welfare
MPW	Ministry of Public Works

NGO	Nongovernmental Organization
NL/NLN	Natural Leader/Natural Leader Network
NTCU	National Technical Coordinating Unit
ODF	Open Defecation Free
OFDA	Office of Foreign Disaster Assistance (USAID)
ORS	Oral Rehydration Solutions
POU	Point of Use (Water Treatment)
PSI	Population Services International
RBHS	Rebuilding Basic Health Services
SBCC/BCC	Social & Behavior Change Communication/Behavior Change Communication
SPSS	Statistical Package for Social Sciences
TTM	Trained Traditional Midwife
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization

Executive Summary

Context

Global Communities, formerly CHF International, implemented the five-year USAID-funded Improved Water, Sanitation and Hygiene (IWASH) program in three counties in Liberia from February 2010 to April 2015. Global Communities concentrated WASH program activities in portions of Liberia's most densely populated, non-urban counties, specifically Lofa, Bong and Nimba counties. In addition to supporting households and communities with improved access to suitable water and sanitation services, IWASH engaged heavily in capacity building with multiple Government of Liberia entities, focusing on strengthening County Health Teams (CHTs) to improve the enabling environment for WASH, while enlisting substantive participation from relevant ministries, including the Ministry of Health and Social Welfare (MoHSW) and the Ministry of Public Works (MPW).

In collaboration with the Liberian Ministry of Health and Social Welfare (MoHSW) at both national and county levels, IWASH implemented Community-Led Total Sanitation (CLTS), an internationally-recognized approach to improving sustainable access to sanitation and safe hygiene practices. CLTS "triggers" community disgust toward open defecation practices and subsequently raises community awareness about how feces in the environment can impact health and livelihoods. CLTS identifies Natural Leaders (NLs), community members who encourage their communities to achieve Open Defecation Free (ODF) status, as verified by the Liberian government. Once triggering was initiated, communities were actively monitored by IWASH staff. At the onset of the Ebola Virus Disease (EVD) outbreak in Liberia (March 2014), 284 of 350 triggered communities (81%) had been verified as ODF. During the Ebola crisis, Global Communities continued to trigger more communities. At the close of IWASH Global Communities had triggered 370 communities, 310 of which were verified ODF.

EVD first entered Lofa County from Guinea through Foya district in March 2014 and spread quickly across the county into other IWASH program areas. The Lofa County Health Team reported a total of 928 reported EVD cases – of which 422 were confirmed cases (206 male/216 female) – and 648 deaths in Lofa County alone.[5] As the rate of Ebola transmissions began to decline, and as communities regained some stability, informal word-of-mouth observations and reports from IWASH communities, County Health Team officials and Global Communities' staff consistently pointed to an absence of Ebola infections in communities where IWASH had implemented CLTS programming, and specifically, in communities that had achieved Open Defecation Free (ODF) status.

In order to confirm unofficial reports, and to identify any critical links between CLTS and the ODF process and reduced Ebola transmission, Global Communities commissioned a research study in January 2015 in two of the six health districts in Lofa County where IWASH was implemented (Voinjama and Kolahun) and where 98 out of 115 IWASH communities had achieved ODF status. The research also examined the broad impact of Ebola on IWASH communities in Lofa County and whether any correlation could be demonstrated between IWASH interventions and EVD preparedness or prevention.

Purpose of the Study

The CLTS/ODF Ebola study conducted in Lofa County was developed to: 1) validate informal claims that IWASH communities with verified ODF status had not experienced any Ebola cases, 2) determine if CLTS-specific interventions can explain any variance in fatality and infection rates in EVD and non-EVD communities, and 3) control for other plausible explanations (other than CLTS) that may explain variance in the incident rate of EVD in similar communities. The study also aimed to identify, if possible, which community-based EVD-specific activities were most effective in disseminating EVD information and promoting disease prevention and response behaviors.

[5] Lofa County Health Team data. February 2015

Methods and Analysis

The study incorporated several quantitative and qualitative methods: an initial desk review of secondary data, including the Liberia Demographic and Health Survey (2013), John's Hopkins' KAP study (2014), IWASH project reporting and documentation, as well as and GoL information and data resources. The research team conducted a quantitative survey of 551 households residing in both ODF-verified communities and comparable communities with confirmed Ebola caseloads and fatalities. Purposive, proportionate and stratified random sampling techniques informed the final selection of communities. Finally, qualitative methods were incorporated into the research methodology, including Focus Group Discussions with both men and women's groups across all categories of communities, and with Natural Leaders in each of the selected districts. Researchers also conducted Key Informant Interviews with Global Communities and GoL WASH focal persons.

Summary Findings Specific to ODF/CLTS and Ebola Rates

A more in-depth analysis and presentation of key findings can be reviewed in the full report below. It is important to note that while results below suggest a strong correlation between communities' achievement of ODF status and EVD-free results, the scope of this study does not prove causality. Additional limitations are outlined in Chapter Three.

Link between CLTS and Community Health Status (Ebola Resistance)

100% of ODF status study communities remained Ebola-free during the Ebola outbreak, and had maintained Ebola-free status at the time of the study. Survey results confirmed that there were no cases of EVD in any of the 104 households residing in verified ODF communities. Overall, households in CLTS communities were **17 times less likely** to have any cases of Ebola than households in non-CLTS communities.

Communities that did not participate in any CLTS activities had higher rates of Ebola and more confirmed case fatalities. Survey results confirmed that 236 households (76%) that did not participate in CLTS programs reported confirmed Ebola cases. Of the 239 total CLTS households involved in the survey, 36 reported cases of Ebola (15%).

Research evidence points to a strong correlation between CLTS engagement/ODF status and reduced risk of Ebola. In addition to the lack of Ebola infections, transmission, and death in verified ODF communities, survey results suggest lower levels of Ebola infection in communities that were actively engaged in CLTS but did not achieve full ODF status. Only one out of eight CLTS communities that did not attain verified ODF status (36 households) were affected by Ebola; qualitative analysis revealed that this community had also experienced protracted internal conflict. Survey data therefore suggest that the process of achieving ODF status, which includes significant change in various hygiene behaviors and sanitation practices can provide an enabling environment, and can be interpreted as building protective factors in the community. More research is needed to investigate possible causality

Natural Leaders may have a key role in reducing Ebola risk at the community level. Training by a NL is a specific element that is exclusively connected with IWASH CLTS communities in the surveyed districts. Statistical analysis of multiple factors in the household survey showed that "Training by a Natural Leader" emerged ahead of other factors as an important and unique difference between communities where Ebola was present and non-Ebola communities, and implies increased community adoption of standard hygiene practices. The vast majority (91.5%) of households in communities directly affected by Ebola had not benefited from training by a Natural Leader.

Further research is required to determine which behaviors, practices and relationships specifically influence Ebola and disease resistance in general. As noted above, survey data indicate that the process of achieving ODF status may strengthen protective factors in the community. Given that communities also commit to specific and measurable actions to achieve verified ODF status, behavioral indicators are likely to be higher in CLTS/ODF communities than in communities where these actions are not taken. The study was unable to identify which specific behaviors or processes

might have been more important than others; further analysis is required to fully understand the importance and contribution of each measure to ensuring community health and reducing Ebola risk.

Community Perspectives Regarding Ebola Response and Resistance

CLTS communities credit behavior change and good hygiene practices as reasons for the lack of Ebola in their community. ODF communities reported that they were "already doing the preventive hygiene behaviors before EVD" because of the training they received through CLTS. In comparison, EVD-affected communities expressed that denial regarding the actual nature of the disease was a most influential reason for delayed adoption of improved hygiene behaviors.

Trust is an important feature of IWASH programming and strengthened protective factors in the community. CHT and DHT officials reported that initial responses to radio messaging varied widely between communities, and heavy resistance persisted in some areas, specifically towards attempts made by the CHT to reach the sick as part of the overall response effort. According to the CHT, IWASH communities were more receptive to and complied more readily with information regarding EVD prevention than non-IWASH communities.

In the context of Ebola response, the level of trust in the information source may directly influence community acceptance and adoption of guidelines and directives. All communities in the survey, regardless of CLTS or EVD status, identified radio broadcasting as their first source of EVD information, followed by health workers, NGOs and family and peers. Both CLTS and non-CLTS communities cited health workers as the most trusted source of information. Retrospective responses revealed a change and evolving reliance on various information sources among communities with EVD, who changed the sources of information they responded to over the course of the epidemic. During the survey, more than four months after the last case of Ebola in Lofa County, both CLTS/ODF and EVD communities listed (in this order) "health workers," "radio" and "NGO"s as the most trusted sources of information.[6]

[6] This technical summary was compiled by Global Communities so that readers can access the most salient points of the study. More substantive context, explanation and analysis is available in the following chapters.

Background on the IWASH project, CLTS and Ebola in Lofa County

The five-year USAID-funded IWASH program was implemented by Global Communities, formerly CHF International, from 2010 to April 2015. The purpose of IWASH was to support accelerated achievement of the Millennium Development Goals (MDGs) related to water, sanitation, and hygiene in Liberia. After the first year of the project, USAID requested that Global Communities reduce the geographic scope of the project and focus on portions of Bong, Nimba, and Lofa counties - Liberia's most densely populated non-urban counties. Global Communities was also asked to adjust their program focus on building the capacity of the GoL at multiple levels, including the CHT to improve the enabling environment for WASH. In response to USAID requestes, Global Communities expanded stakeholder engagement to include additional relevant ministries in addition to the Ministry of Health and Social Welfare (MoHSW) including the Ministry of Public Works (MPW). Realignment of the project supported the tenets of both USAID/Forward and the Global Health Initiative (GHI) that are the basis of USAID's development strategy in Liberia.

An external midterm evaluation in FY2013 recommended further streamlining of project activities to focus on sustainable sanitation by using the internationally-recognized Community Led Total Sanitation approach.[7] CLTS is a community social mobilization methodology that taps into the community's own assets, including existing community human resources called Natural Leaders (NL). Prior to the EVD outbreak, Global Communities triggered CLTS in 350 communities in the three counties. Following triggering, communities were actively monitored and encouraged to reach Open Defecation Free (ODF) status. Global Communities added an innovative approach by organizing the NLs into Natural Leader Networks (NLN) that were still in place after IWASH field activities were completed. In addition to promoting CLTS, some Natural Leaders were trained to be "WASH Entrepreneurs," with skills in soap making and hand pump repair to provide some to some NLs and/or NLNs and also promote communities' ability to sustain hygiene behaviors they had learned. IWASH followed the CLTS methodology and supported the GoL to adapt CLTS to the Liberian context that became Liberian national policy. Guidelines and protocols developed with GoL are currently used by other members of the Liberia WASH Consortium as their primary approach to improved sanitation.

IWASH invested a significant Level of Effort (LOE) in developing the enabling environment for the Liberian WASH sector. Capacity-building provided by Global Communities to the CLTS National Technical Coordinating Unit (NTCU) has enabled the development and management of a CLTS national database and implementation map. This additional capacity has enabled the GoL to adopt CLTS as national policy, and subsequently allowed the GoL to commit their own resources to assess progress of CLTS by all implementing partners. This process also developed methods to formally verify when communities have completed all CLTS steps and attain ODF status. By the time of the Ebola outbreak in early 2014, 284 of those communities had successfully become ODF. During the Ebola crisis, Global Communities continued to trigger more communities. At the close of IWASH Global Communities had triggered 370 communities, 310 of which were verified ODF.

Lofa County, one of the three IWASH focus counties, is one of the 15 counties of Liberia has an area of 9,982 km^2 with a total population of 270,114. It is the fourth most populated political subdivision and the second largest county in the country by area.[8] Global Communities implemented CLTS in Kolahun and Voinjama health districts, two of the six health districts[9] in Lofa County.

The first case of Ebola in Liberia originated in Guinea, entered Liberia through adjoining Foya District in February 2014 and quickly spread to other districts in the county. The last confirmed EVD case in Lofa County was in November 2014. As of March 2015, there had been a total of 928 reported Ebola cases, 422 confirmed cases (206 male/216 female) and 648 deaths in Lofa County.10 As of March 2015, no new cases had been identified in Lofa County for several months and

[7] Kar, K and Chambers, R. "Handbook on Community Led Total Sanitation", Plan International 2008

[8] Government of Liberia (2014): Overview of Lofa County. URL: http://tiny.cc/qfsbux Updated: 24 February 2014

[9] Quandu Gboni, an additional administrative district in Lofa County is part of Voinjama Health District

[10] Lofa County Health Team data, February 2015

only a few new cases remained hospitalized in Monrovia. The Ebola Treatment Unit (ETU) outside of Voinjama City was empty. The borders between Liberia, Guinea, and Sierra Leone were reopened in February 2015, while intensive anti-Ebola sanitation and hygiene promotion campaigns were ongoing in both former IWASH and non-IWASH communities. Schools were reopened and the MoHSW had resumed immunization campaigns to catch up to make up for reduced routine immunization coverage that resulted from disruptions in health services during the EVD epidemic.

Purpose of the study

IWASH participant communities, Global Communities' monitoring and the County Health Team officials in Lofa County had all reported that none of the 98 CLTS ODF communities had any cases of EVD[11] during the outbreak, even when comparable nearby communities that had not participated in CLTS had confirmed EVD cases. In fact, Global Communities received reports from health workers that there had been no cases of EVD in any of the 284 IWASH communities that had achieved ODF status. The question arose as to whether CLTS that led to ODF status had somehow acted as a protective factor against infection and transmission of Ebola.

The CLTS/ODF Ebola study carried out in Lofa County was developed to: 1) validate claims that there had been no EVD cases in CLTS ODF communities in the sample area, 2) determine if CLTS-specific interventions were likely to explain differences between EVD and non-EVD communities and 3) control for other plausible explanations (other than CLTS) for the differences between EVD-incidence in similar communities. The study was also intended to identify, if possible, which community-based EVD-specific activities were most effective in disseminating EVD information and promoting disease prevention and response behaviors. Specific interventions that were considered include hand washing with soap or chlorine, safe burial practices, isolating sick people and rapid care seeking for anyone exhibiting symptoms.

The WHO has determined that one important lesson learned from the EVD epidemic was that "community engagement is the one factor that underlies the success of all other control measures. It is the linchpin for successful control. Contact tracing, early reporting of symptoms, adherence to recommended protective measures, and safe burials are critically dependent on a cooperative community."[12] CLTS depends on complete community engagement. CLTS ODF communities were already experienced in partnering with CLTS implementers to achieve common objectives (ODF status).

Poor access to clean water and sanitation are significant factors that influence most humanitarian emergencies. Findings from study should contribute to developing the evidence-base of WASH-related factors that contributed to the spread (and prevention) of EVD, and will hopefully be used to understand the relationship between strong WASH programs and improving health status, even in the absence of EVD. Lessons learned from the study should be used to inform future programs in developing community resilience for routine disease prevention as well as strengthen community capacity to respond to emergencies where water and sanitation conditions are factors.

Study Population

The study was carried out in Lofa County, one of the three counties covered by IWASH programs. In Lofa County, IWASH was implemented by Global Communities in two of the six health districts, Voinjama and Kolahun. The two districts combined have a total of 435 communities with an estimated 21,587 households, of these IWASH project implemented CLTS in 115 communities with a population of 34,235 in 6,865 households. By February 2014, 98 of IWASH CLTS communities had been verified by the GoL as having met the criteria to be verified ODF.

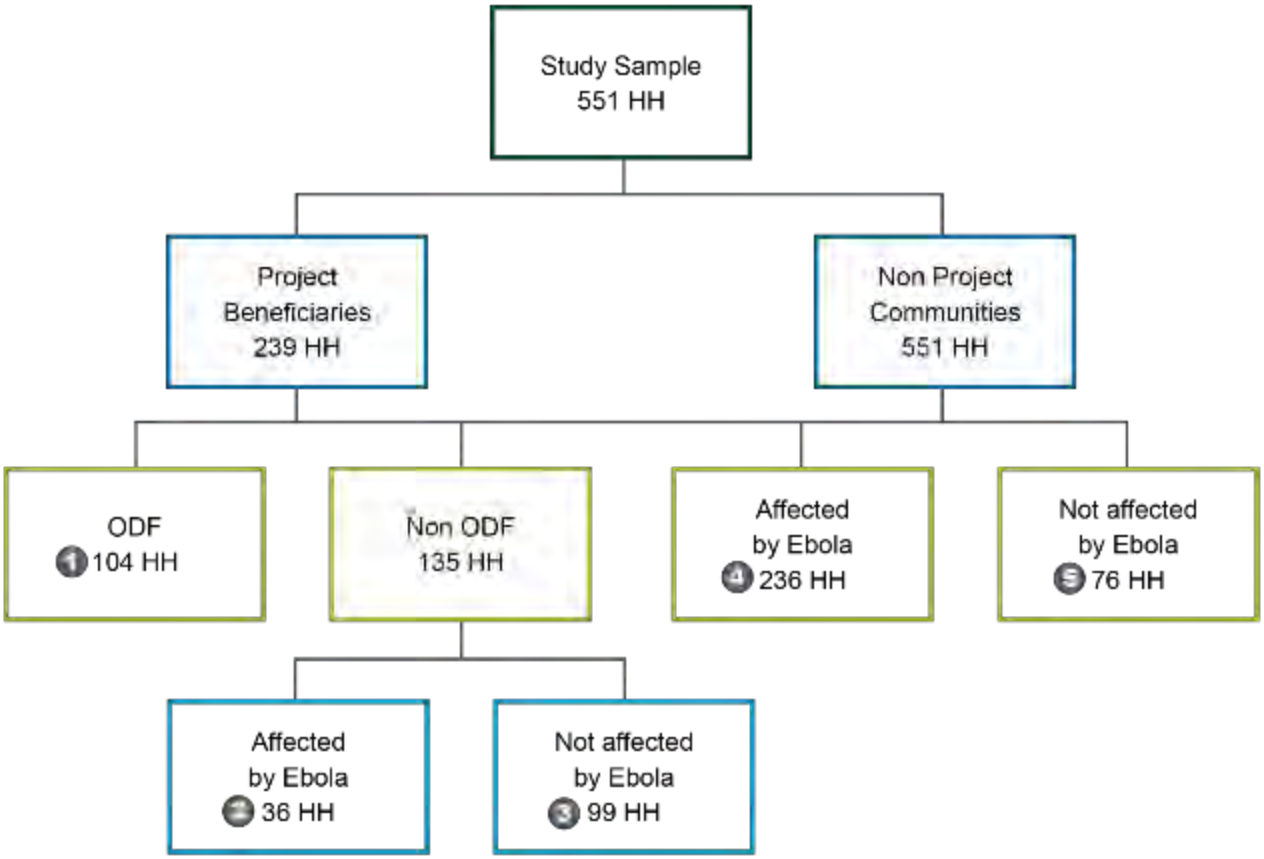
[11] Ebola Virus Disease (EVD) and Ebola are used interchangeably in this report

[12] *What needs to happen in 2015,* World Health Organization, January 2015

Study Design and Methodology

The study incorporated a variety of quantitative and qualitative methods that included: Review of available data and key relevant documents such as the Liberia Demographic and Health Survey (2013), John's Hopkins' KAP study (2014), project documents and GoL documents. A quantitative survey of 551 households was conducted in ODF communities and EVD communities. Qualitative methods included FGDs with men and women's groups in 14 ODF and EVD communities and non-EVD communities and one group of NLs in each district. KIIs were conducted by Global Communities and GoL WASH focal persons. Data were also collected and FGDs conducted in CLTS communities that did not reach ODF as well and also in non-CLTS communities to be used in analyzing the findings for confounding factors.

Figure 1. Distribution of Survey Sample (according to CLTS, ODF, EVD status)



Quantitative Methods

Sampling techniques

Purposive, proportionate and stratified random sampling techniques were used to select the respondents for household survey. Both districts were equally represented in the study. CLTS communities were matched with non-CLTS communities according to geographical location and proximity to each other, population size and tribe. From among the CLTS communities, those that had been verified as ODF were identified. To control for possible confounding factors and ensure matched communities were comparable, households in non-CLTS and non-EVD communities were also represented in the sample for an original total of four different categories: 1) Project beneficiaries (CLTS communities) who had reached ODF status (ODF); 2) project beneficiaries (CLTS communities) no longer progressing towards ODF (non-ODF); 3) non-project communities affected by EVD; and 4) non-project communities that were not affected by EVD.

From the household survey data one CLTS but non-ODF community with EVD was identified and a fifth comparison group (36 households) was added for the purpose of analysis. The full breakdown in household terms can be seen in the chart above. In all, the study included 10 ODF communities (no cases of EVD); eight CLTS but non-ODF communities (including one EVD-affected community); and 25 non-CLTS communities, of which 23 were EVD-affected. A list of all study communities according to district, CLTS and ODF status is available upon request.

Sample size and sampling method

Using William Cochran's formula for cross sectional surveys,[13] a minimum sample size of 534 households was required. This estimation was based on a 95% confidence interval, a tolerance of 5% margin of error, with the assumption that 50% of the households were exposed to EVD, and 20% of household questionnaires would be invalid for some reason.[14] Because a random sampling of communities may not have yielded sufficient ODF communities, additional ODF communities were added to make the final sample size 551 households (see Figure 1).

Since Global Communities' CLTS intervention measured community's collective behavior rather than individual behavior, the study applied population level matching. Data was collected from a sample of households within a community, but analyzed at the community level. A multiple-stage sampling technique was used to identify the households to participate in the survey. First, two health districts (Voinjama and Kolahun) in Voinjama County were purposely selected because the IWASH program was implemented in these locations. Communities were then stratified into two groups: Those who had benefited from the Global Communities project and those who had not; communities were then compared to a list provided by LGIS for the sampling frame. From the CLTS strata, both CLTS and CLTS/ODF communities were randomly selected for the study and matched with similar communities from the non CLTS strata based on geographical location, proximity to one other, ethnic group and population size.

Global Communities and CHT CLTS focal persons and CHT health data focal persons provided a list of communities with confirmed EVD cases. Once both control and project communities had been identified, the number of households per community was proportionately determined (i.e. larger communities contributed larger samples and vice versa). Finally, individual households for the survey were identified through systematic random sampling (Reference is available upon request.)

In the community, the survey team engaged the community elder or area chief to show them the center of the village, where the survey team randomly selected a direction by spinning a pen on the ground and following the direction of the pen to the first household. Subsequent households were identified through systematic random sampling where a skip pattern was determined based on the number of households in the community versus the sample size expected from the particular community.

Data sources

Both primary and secondary data sources were used for this survey. Primary data was collected using a questionnaire administered to the head of household by a locally-hired enumerator in the local language. The tool was based on the major CLTS activities and collected information regarding household demographic characteristics, standard WASH survey indicators such as household knowledge and practices in relation to water, sanitation and hygiene. The survey also included specific Ebola-related questions such as knowledge on Ebola signs and symptoms, transmission and prevention. Secondary data sources included project reports and databases as well as CHT-provided records and included a list of communities where CLTS has been implemented and also lists of communities that had experienced a case of Ebola infection.

[13] Cochran, W. G. (1963). Sampling Techniques (2nd Ed.). New York: John Wiley and Sons, Inc.

[14] Assumptions had to be built in. The percentage of households that were exposed to EVD is unknown. Experience with field surveys has shown that some households selected for the survey may decline to participate or there may be errors in data collection.

Data Quality Control

Data collection tool: The household questionnaire was pre-tested by enumerators in non-study communities before use to check for any inconsistencies, ambiguity or incomprehension. Any challenges identified while piloting the tool were addressed before the survey began.

Training of enumerators: Two days of training was provided to locally-hired, experienced enumerators to familiarize them with the survey methodology and the data collection tool. Training topics included an overview of the survey and study ethics, as well as a detailed question-by-question review of the household survey questionnaire that had been translated into local languages. Training was meant to ensure that questions were asked and recorded correctly and uniformly to minimize the likelihood of errors and interviewer bias. To reduce potential bias, survey enumerators were not made aware of specific community categories or EVD/ODF status.

Supervision of enumerators: A team of 14 enumerators was deployed to assist in administering the household questionnaire. The enumerators worked in pairs. For each two pairs, there was a team-leader who worked closely with the enumerators for quality assurance.

Reviewing data collection tools: Enumerators were instructed to review each questionnaire before leaving a household to ensure that all questions had been asked and appropriately recorded on the questionnaire. Team leaders reviewed all questionnaires from their teams before sending them to Global Communities Office for computer data entry.

Internal audit: At the office, random checks were conducted on completed questionnaires and any data recording anomalies were communicated to the team leaders and enumerators to prevent the same mistakes the next day. Data was cleaned before it was analyzed.

Informed consent: Enumerators received verbal informed consent prior to any data collection to ensure that the survey was conducted in an ethical manner without violation of the rights of study subjects, and also to assure the respondents that the information they were providing for the survey would be kept confidential.

Data processing and analysis

Data was collected on demographic and socio-economic factors, as well as multiple standard indicators used in WASH surveys to ensure that communities were comparable and to control for multiple possible confounding factors outside of CLTS that may have been the actual reasons for variances between EVD and non-EVD communities.

Analyzing Quantitative Data

The “Null Hypothesis,” a common statistical approach, was used to confirm that any differences between CLTS/ODF and EVD communities were not merely due to chance.[15] Data were entered into a computer and cleaned using Predictive Analysis Statistical Software (PASW™). Simple frequency and cross tabs were run to detect inconsistencies. Any errors identified at the cleaning stage were corrected by comparing the data in the questionnaires with those in the PASW™ dataset.

Both univariate descriptive and inferential statistics were used to analyze the data using the following procedures: 1) Univariate descriptive analysis: frequencies, proportions, percentages and means of variables were computed. 2) Bivariate analysis: Pearson’s Chi Square test was conducted to test the association between the dependent variable (presence of Ebola case in community) and possible explanatory variables that were identified during the literature review. 3) Multivariate analysis: Logistic regression was performed to identify predictors of Ebola. Only variables that were found

[15] Stockburger, DW, “Hypothesis and Hypothesis Testing”, Encyclopedia of Measurement and Statistics, Sage Publications, 2007

to be significantly associated with Ebola during bivariate analysis stage were included in the regression model.[16] For more information on the model, please see Household Survey Report[17]. Adjusted odd ratios were calculated, with 95% confidence intervals with levels of statistical significance set at $p<0.05$.

Qualitative Methods

Key project and government documents as well as WASH and health references and available relevant data were reviewed.[18] FGDs based on the study research questions were conducted in both EVD and non-EVD communities in both health districts. FGDs within communities were separated by gender and consisted of 5-10 members per group. KIIs were conducted with Global Communities staff, current and former MoHSW and CHT informants and the Paramount Chief of Quandu Gbone (part of Voinjama health district). Respondents included county and district CLTS focal persons and members of the WASH Task Force for Lofa County. The Paramount Chief of Quandu Gbone represented the perspective of several local traditional leaders. Results of the qualitative findings were analyzed to identify common responses across groups and also used to triangulate or explain findings from other sources, including the household survey.

Whenever findings did not correspond, additional information was sought through additional interviews or sources of information.

Demographic Characteristics of the Population

A total of 551 households from 43 communities participated in the household survey. Of the total households, 239 (43%) resided in communities where IWASH implemented CLTS activities. Altogether, 18 of the 43 communities selected for the survey were beneficiaries of IWASH CLTS project while 25 were not. Of the CLTS population, 19% (104 survey households in ten communities) were verified by the GoL specific criteria as ODF. Slightly more households (53%) were in Kolahun health district compared to Voinjama health district. Ten different clans were represented in the survey with a third of the households were from Tahamba clan. Lorma and Gbandi tribes were among the majority of survey respondents, with Mandingo and Kissi also represented. Respondents included 273 females and 278 males with a mean age of 40 years (median 38, SD 14.78). Most respondents (80%) were married (10% widowed, 7% single, 3% separated / divorced). Christians constituted 63% of the respondents and Muslims 32%. Average household size was 9 members (median 8, SD 4.98). Half of the respondents had no formal education and a total of 67% had not completed the lowest level of formal education. The main source of income was farming (86%).

To match communities and to account for income disparities, the study used a method similar to that used in the 2013 LDHS based on type of floor and roof for the main house as proxies for income status. “Higher” income groups in communities in the study coincide with the middle quintile of the LDHS, “middle” income the second lowest quintile and “lower” with the lowest income quintile. Figures 2 and 3 illustrate how this determination was made and that the majority of households (75%) were in the middle income group, or corresponding with the next lowest quintile in the 2013 LDHS.

[16] Detailed information on the regression model can be found in the Household Survey Report
[17] Available upon request
[18] A list of references can be reviewed upon request

Figure 2. Breakdown of population by estimated household income status based on type of roof and floor in the house

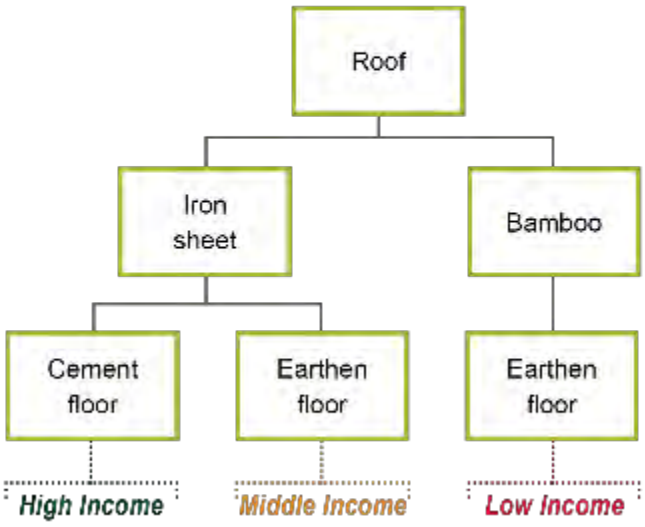
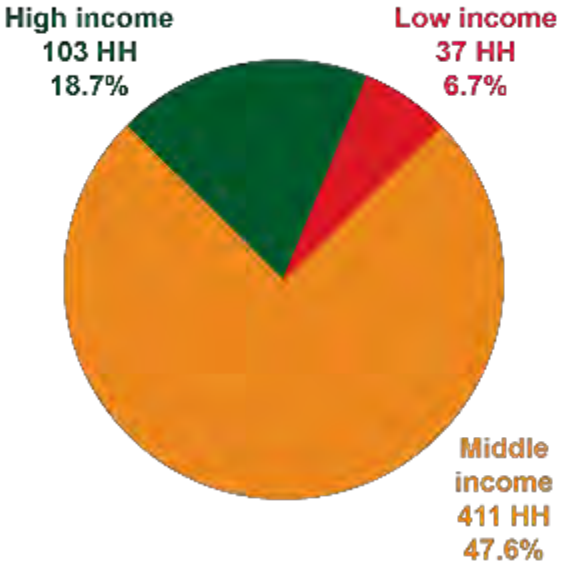


Figure 3. Household income status of the study population



Limitations of the Study

Data collection in the study was conducted at the household level, then grouped and analyzed at the community level. This study does not provide insights on specific factors associated with person to person transmission or individual behavior within households. Additional epidemiologic research will be needed to understand why some members in households contracted Ebola while others did not, and also why some households within the community became infected and others did not. Rather, the study examines the relationship between instance of EVD in the community (regardless of percentage of households affected) and community-level factors (such as behaviors or characteristics) thought to correlate with instance of EVD.

Several limitations associated with the research method must be considered when reviewing findings and conclusions. In this type of study, limitations of the research method impact what the study can and cannot reveal regarding what effect CLTS interventions (that lead to ODF) might have had on the spread of EVD through households and communities. The findings must also be considered in light of the fact that the study is retrospective of a development program that was not originally designed to accommodate or serve as a research study. With some exceptions, a direct observation for most components examined in the study were not possible, and self-reporting was the only source of information. Certain types of bias are inherent in any study that relies on self-reporting:[19]

1) *Selection bias* is a potential limitation, due to several factors. CLTS communities, whether or not they became ODF, were not completely comparable with all other communities in the two districts because: a) The methodology deliberately calls for selecting small communities, b) CLTS communities already demonstrate initiative and motivation, as the CLTS process requires community initiation of the triggering process and declaration of intent by submitting a letter of interest and agreeing to organize initial triggering events. Therefore, CLTS communities are motivated by other underlying factors, and c) Large communities that were due to start CLTS were not started due to the epidemic, meaning all CLTS communities were small.

[19] Much of the DHS relies on self-reporting

2) *Recall Bias* has to do with individuals' ability to accurately recall and report events in the past. In this particular study, individuals with a disease could be more concerned about remembering potential causes of an infection, such as hygiene behaviors, and consequently might have overestimated the association between failure to implement certain behaviors and actually contracting Ebola. To control for this potential bias, the sample included communities that had received ODF verification prior to February 2014 to demonstrate that specific behaviors were in place prior to the epidemic and mass media and social campaigns.

3) *Halo bias* is the tendency among respondents to under-report socially undesirable answers (or over-report desirable answers) and alter their responses to approximate what they perceive the social norm to be (or what they perceive the "interviewer wants to hear"). The study used a variety of sources and methods to collect information and triangulated responses between methods and/or objectively observable information (such as presence of hand washing stations and latrines). ODF verification checklists provided objective documentation that some behaviors were practiced in ODF communities prior to the outbreak.

In addition, data quality presents potential limitations, as all official EVD data was collected after the outbreak had already started and CHT officials acknowledge that data for early presumed cases was probably not completely accurate.

Further, the study was conducted shortly after the epidemic ended in Lofa County and during a response effort when massive external inputs for hygiene promotion were flooding into Lofa County. This could have influenced communities to under-report on some issues (such as availability of soap or buckets) with the hope it would attract donor support to their communities. Challenges with the quality of available health data, especially early EVD data have been well-documented.[20] During community selection for the study, the team found that a few communities had been misclassified.

A final limiting factor is that Ebola is a new disease to the study area and to all of Liberia, as EVD prevalence at the debut of IWASH was zero. Previous Ebola health research was largely undertaken at health facilities in remote locations in other countries and focused on clinical care; very little is known about community and household factors. The Ebola ODF study was retrospective and not a case-control experimental study (with clearly defined outcomes to compare between intervention and non-intervention communities). The global health community still faces a significant learning curve regarding the interruption of disease transmission at the community level, and correlations identified in the study may be useful in orienting future efforts and "where to look" for useful interventions. A statement from WHO in early 2015 points out that much needs to be learned from the success stories like the Lofa County experience as precise causal factors driving the successful decline of Ebola there are not clear. Operational research such as this evaluation starts with identifying correlations between different factors to identify which ones should be selected for comparison studies.

> *"Operational research is needed to understand why some areas have stopped or dramatically reduced transmission while others, including some in the same vicinity and with similar population profiles, remain hotspots of intense transmission. Did the striking and robust declines in Lofa County, Liberia, and Kailahun and Kenema districts in Sierra Leone occur because devastated populations learned first-hand which behaviors carried a high risk and changed them? Or can the declines be attributed to simultaneous and seamless implementation of the full package of control measures, as happened in Lofa country? Answers to these questions will help refine control strategies.[1]"*
>
> *– World Health Organization*

Correlation and Causation

Most scientific evidence is based upon a correlation of variables that are observed as occurring together. Scientists are careful to point out that correlation does not necessarily mean causation. At the same time, as Holland point out, "much important scientific evidence would be discarded if correlations were discarded. Correlational evidence from several

[20] KII with Global Communities Liberia staff and Lofa County CHT, February 2015

different angles may be the strongest causal evidence available and has been used as a source of scientific evidence in medicine, psychology, and sociology." Correlations must first be confirmed as real, and "then every possible causative relationship must be systematically explored. In the end correlation can be used as powerful evidence for a cause-and-effect relationship between a treatment and benefit, a risk factor and a disease, or a social or economic factor and various outcomes. But it is also tempting to come to premature conclusions based upon the preliminary appearance of a correlation."[21] Any potential correlations identified by comparing matched communities in the study may provide the basis for those types of studies, but would need to be followed up by observational or experimental studies to confirm that the relationships were real.[22]

Validity

To ensure validity, results of the survey were triangulated during data analysis with qualitative findings from the KII and FGDs and other available data (such as the LDHS, IWASH, the HC3 KAP study[23] and CHT monitoring data). Any differences were followed up and reconciled with additional data analysis, interviews at the community and CHT level and visits to specific communities. Some CLTS community survey respondents reported that a household members were infected, but when this information was triangulated, enumerators determined that these household members resided in Monrovia and not in Lofa County. Only one community that started CLTS but did not reach ODF certification reported EVD cases, and no communities that reached ODF certification were affected by EVD. Follow-up investigation regarding the affected community discovered it had experienced internal conflict that was unrelated to WASH activities. This led to breakdown of the social cohesion necessary for CLTS and other community-based interventions to be successful. (See Recommendations section.)

Findings by Research Question

Question 1: How did communities respond to Ebola, particularly focusing on practices related to hygiene, sanitation, disease prevention, exposure to infected people, and treatment and burials of the dead, etc.?

At the time of the survey, Ebola prevention knowledge and behaviors were relatively high in Lofa County and there were no statistical differences in responses from both EVD and non-EVD communities regarding level of knowledge or adoption of preventative hygiene practices. A likely factor in this similarity is that intensive Ebola prevention promotion had already been in place for several months as part of the larger emergency Ebola response effort supported by both GoL entities, NGOs, and donors. Core activities during that period included the distribution of hygiene kits and instructions about avoiding personal contact, identifying and referring infected people and notifying the CHT of deaths.[24]

All Ebola-specific interventions took place in the study area after IWASH CLTS activities had already ended. During key informant interviews, CHT and DHT officials reported that initial responses to radio messaging varied widely between communities, and that in non-CLTS communities, heavy resistance persisted in some areas, specifically towards attempts made by the CHT to reach the sick as part of the overall response effort. In Kolahun District, the District Hospital ambulance was attacked and heavily damaged. In addition, health facilities were not equipped for timely or effective response to the Ebola outbreak; most had no electricity or water and lack of roads made it difficult to reach many EVD communities. The CHT reported that communities already engaged with the IWASH project were more receptive and tended to comply with radio and government messaging to mainstream the identification of EVD symptoms, hygiene and sanitation messages, and to encourage avoidance of personal contact and traditional burial practices. Eventually all communities in the study responded to health messaging about improved hygiene and sanitation due to Ebola response

[21] Pearl, Judea (2000). *Causality: Models, Reasoning, and Inference*. Cambridge University Press

[22] Novella, S, "Evidence in Medicine: Correlation and Causation" *Science and Medicine*. Science-Based Medicine, November 2009

[23] Johns Hopkins Center for Communication Programs, *Community Perspectives About Ebola in Bong, Lofa and Montserrado Counties in Liberia: Results of a Qualitative Study, January 2015*

[24] Comparative data on these behaviors can be found in the Household Survey Report, available upon request

and adjusted behaviors accordingly. At the time of the study, standard hygiene and sanitation practices, including safe burial, had evolved according to guidelines across all different categories of communities involved in the research efforts.

Survey data and community FGDs found that both CLTS/ODF and EVD communities reported making significant changes in their water, sanitation and hygiene behaviors, specifically hand washing with soap and/or chlorine. However, differences emerged when participants were asked *when some hand washing behaviors were first adopted*. FGD respondents in ODF communities confirmed the survey findings by responding that they were *already practicing* preventive hygiene behaviors *before* EVD emerged in Lofa County and believe that these behaviors played a key role in resisting infection in their community. Focus groups conducted in verified ODF communities asserted a belief that they were able to practice preventive behaviors before the Ebola epidemic because it was part of the training they received in the IWASH/CLTS program. Researchers triangulated this feedback by observing hand washing dispensers for chlorine water and the enforcement of hand washing before entering a community, business or attending a gathering even within the community.

Because CLTS training (which IWASH would have provided) promotes specific hand washing behaviors, including construction of hand washing stations using local materials and using soap, the study can assert that these are factors to consider in the overall consideration of reduced Ebola risk.

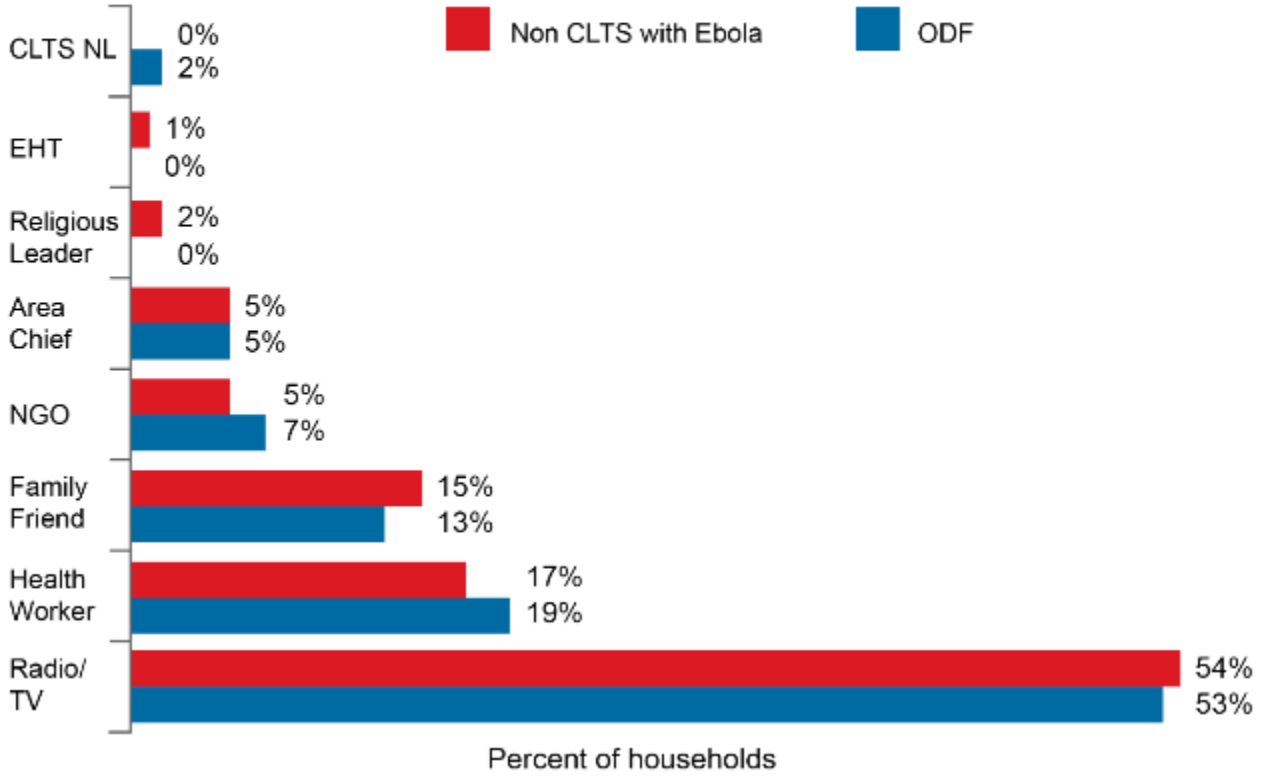
Question 2: Where did communities get information and guidance on Ebola prevention? What was their willingness to follow it?

All communities in the survey, regardless of CLTS or EVD status, identified radio broadcasting as their first source of EVD information, followed by interactions with health workers, family and friends and NGOs (see Figure 4). No statistically significant variation was observed when comparing community Ebola transmissions and where or how community members first learned about Ebola and how to prevent it. Focus group feedback in communities where Ebola was present suggested that family and friends, including those living overseas not only provided them Ebola with information but also sent money to purchase medicine. Feedback from communities where EVD was contracted indicated an initial level of distrust of all information disseminated through radio and by the government.

Community access to radios was varied, and information on household access to radios, specifically in Voinjama and Kolahun health districts prior to the epidemic, was limited or unreliable although radio distribution was a key component of Ebola response programming. At the time of the survey, households in CLTS communities had more access to radios for information than those living in EVD communities.

Figure 4. Initial Sources of EVD Information by Community EVD Status

Sources where households first heard about Ebola in ODF communities (n=98) and non CLTS communities with Ebola (n=231)



Focus groups across different community categories described very different responses to Ebola messaging and information in the early phase of Ebola response. FGDs in CLTS/ODF communities specifically mentioned increased hand washing as one of the most important Ebola response measures adapted by community members as a result of information campaigns. Respondents also indicated that Natural Leaders had credibility and were trusted sources of information due to the relationships built during the ODF verification process. Natural leaders may have helped to reinforce information provided by other sources.

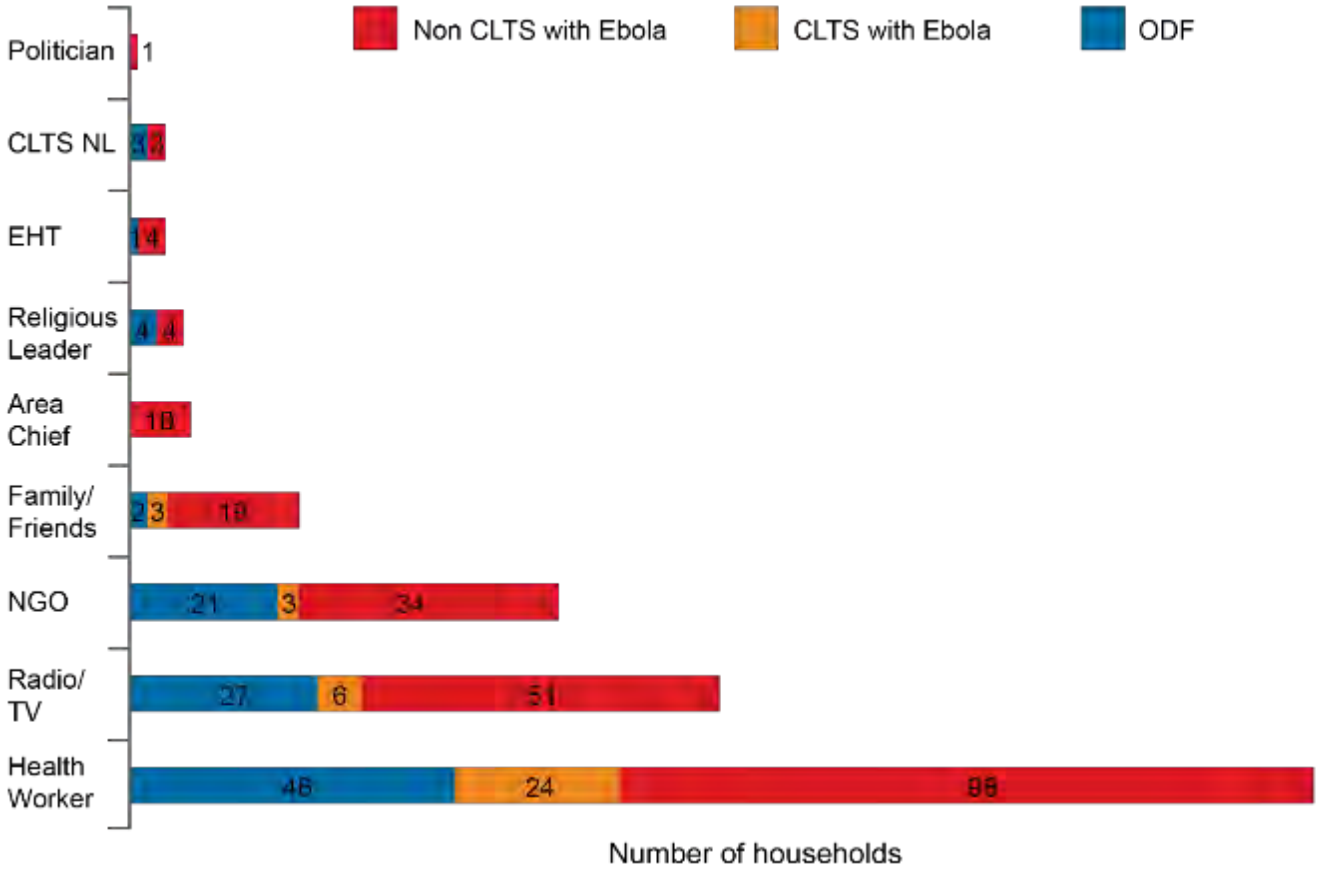
> *"Before the outbreak some of us (had heard of) Ebola from Congo. When the outbreak came (here), we didn't believe it was real (Ebola). After it became serious, our brothers in the diaspora sent us money to buy medicines. This was the time we began to really believe it and started to listen to the Ministry of Health awareness messages on the radio and also to advice from our family and friends. By that time we had many cases and we were willing to follow the advice from these messages. We started hand washing practices. But many people had already died from the Ebola virus."*
>
> *– Men's FGD, EVD Community, Bakadu, Quandu Gboni, Voinjama District*

Focus group participants and key informants in Ebola-affected communities confirmed CHT assertions regarding strong local resistance to Ebola guidelines and preventative measures in the first stage of Ebola response. EVD communities confirmed that denial or "ignorance" of Ebola as a "real" disease made them resist early information about prevention and resulted in many fatalities. CHT representatives indicated that communities where Ebola was present were reluctant to change traditional practices, adopt recommended measures and to comply with new requirements, although compliance is now mainstreamed across all communities in the post epidemic context. Survey data support this assertion and demonstrate that the majority of all respondents, regardless of community EVD status agreed that "Ebola is preventable," and were able to identify several symptoms of Ebola as well as note appropriate response measures to suspected symptoms or infections.

> *"We heard the Ebola news over radio. The Ministry of Health gave us educational messages through the radio. Also Global Communities used to carry awareness and sensitization into our community. From (that) point we believe (sic) that this sickness is real (exists) and we continue to use preventive measures…The community accepted the information willingly and followed all advice."*
>
> *– FGD focus groups (men and women) in ODF communities Upper Walker, Dehdehsi in Voinjama*

Communities generally cited radio information and follow up information provided by NGOs (specifically Global Communities) as important sources of information for Ebola; however, focus group responses from ODF communities that had no EVD cases varied when compared to responses from focus groups in communities with EVD cases. Both cited health workers as the most trusted source of information (see Figure 5), but non-CLTS communities explained that radio is now the primary information source and expressed an increased willingness to adhere to broadcast information and instructions compared to the onset of the Ebola outbreak.

Figure 5. Most Trusted Sources of EVD Information by Community EVD Status



It is possible that the most important difference between communities was greater receptiveness of ODF communities to messages about Ebola prevention and care-seeking developed through CLTS through interactions with the community. However, further validation of this assertion should be investigated in future research efforts.

Question 3: If there was variation in both the providers of public health messages and the support and information provided did some seem more effective than others?

According to the World Health Organization, "Community resistance must be tackled by all outbreak responders with the greatest urgency. During 2014, (we) learned that community leaders, including religious leaders as well as tribal chiefs, can play an especially persuasive role in reducing high-risk behaviors."[25] Global Communities embraced these approaches successfully early in the IWASH program and expanded them in their Ebola response. According to community FGDs, differences between providers of public health messages and support to the community level were greatest at the beginning of the epidemic.

By the time of the study, both ODF and EVD communities ranked health workers, radio and NGOs in the same order as most trusted sources. To answer this question retrospectively, the survey asked about "first source of information about EVD" followed by "most trusted source" of information. Communities with EVD changed the sources of information they responded to over the course of the epidemic. By the time of the study, over four months after the last case of Ebola in Lofa County, both CLTS/ODF and EVD communities listed (in this order) "health workers", "radio" and "NGO"s as the most trusted sources of information, so no specific variation between providers was detected.

Government was not mentioned specifically in the survey as a source, but health workers, radio and all major NGOs working in Lofa County implement their programs jointly with the GoL. FGDs identified the GoL as important in providing help to them during the epidemic. This was mentioned most frequently in EVD communities.

Overall, 37% had first heard about Ebola from a source they trusted; health workers (43%) were the most trusted source of information. But coverage of trusted sources varied. Lofa County has a dearth of health human resources, and shortages increased with the health worker deaths from Ebola. Many health workers do not come from the area, do not speak local languages and were not the *initial* source of information for many survey respondents. In addition, the 2013 LDHS found only 48% of men and 20% of women overall listened to the radio at least once a week in Lofa County[26] (this data included both urban and rural areas of the county). Household survey data found that 45% of households said they had access to a radio in their community; of those, over 82% said they received them in 2014 as part of the Ebola emergency response effort.

Fifty-six percent of households in CLTS communities had received WASH training from a Natural Leader. By definition, training from a Natural Leader is linked only to IWASH CLTS. Most respondents who had received training from Natural Leaders indicated that trainings covered both overall hygiene and (later) Ebola topics, including hand washing with soap at critical times, constructing hand washing stations, covering water containers, and using clothes lines and dish racks.

Messages communicated through different channels were most frequently in Liberian English (52%) but many survey respondents said that they (77%) would have preferred the messages in a different language.[27] Most households (63%) reported having a WASH NGO in the community before Ebola outbreak, but not specifically IWASH. The presence of NGOs implementing WASH activities was reported more often in CLTS/ODF communities (73% vs 56%).

Focus group discussions with Global Communities and key informant interviews with CHT managers helped to explain the different findings between ODF and EVD communities. EVD communities indicated that they did not trust or believe initial reports of Ebola or guidelines that were transmitted through various sources and preferred the advice of relatives, including diaspora, who also sent them money to buy medicines from local pharmacies. Respondents refuted the possibility of taking preventive measures, such as changing their usual hygiene practices (including traditional burial practices where relatives bathe, dress, braid the hair and lie next to the deceased, sometimes for several days).

[25] What needs to happen in 2015, WHO, January 2015

[26] 2013 Liberia Demographic and Health Survey (LDHS), 2014

[27] More information about sources of information and which sources were trusted can be found in the Household Survey Report, available upon request.

Focus group discussions with verified ODF communities suggested a level of awareness and practice of protective hygiene practices before the Ebola outbreak, and expressed confidence that these behaviors explain the lack of infections and transmissions in their communities. Some respondents from verified ODF FGDs indicated that individual households *increased* their efforts once Ebola was confirmed as a threat and that they were also accustomed to Natural Leaders, whom they already trusted, to bring them information. Respondents credited Global Communities and the IWASH program for building capacity through CLTS that allowed them to prevent the spread of Ebola to their communities.

KIIs and FGDs confirmed that NGOs, including Global Communities were judged "effective" by both communities and CHT counterparts. This should be interpreted in the context of very heavy NGO activity that was still ongoing at the time of the study. These NGO activities include "handouts" of hygiene supplies, hygiene promotion, and sometimes money to EVD affected households and communities. CHT representatives went further and described Global Communities as a "very effective" partner because they were already heavily integrated with the GoL at the county level in WASH activities well before the outbreak. This facilitated collaboration in managing the response. CHT representatives cited only a few examples of small local NGOs that were "not effective" because they did not coordinate their activities with the county authorities and sometimes alarmed the already distraught population with inappropriate Ebola messages.

Question 4: What was the role of the Liberian government, donors, NGOs and other service providers in Ebola education, prevention and response? What key approaches were used?

The Government of Liberia (GoL) initiated several measures to address Ebola, including border closures, school closures, facilitating access to functioning health centers, and issuing restrictions for public gatherings and high-risk behaviors such as "bush meat consumption." In addition, GoL institutions channeled critical health and Ebola-specific information through public media, supported training and capacity building as feasible, and provided emergency health supplies, as well as security services to response agencies, when and where available. GoL informants credited donors with providing financial support to NGOs and the GoL to implement its EVD response plan.

Since late 2014, UNICEF-supported NGOs (including Global Communities) have been very active in providing direct support to communities for Ebola education and response through hygiene promotion and distribution of materials (buckets, chlorine, etc.). By late 2014, several additional international NGOs, including Plan International and Samaritan's Purse were involved in these activities. Radio messages regarding case detection, care-seeking and prevention were broadcast in Liberian English and indigenous languages by local radio stations in Lofa County; however, access to radios at the overall community level was low, and lower in non-CLTS communities where EVD was present. As noted, to increase access to critical broadcast information, Global Communities and other response agencies engaged in radio distribution. In the later stages of Ebola response, a mobile phone hotline was established and communities were encouraged to report cases so they could be linked to health facilities.

As time progressed and information campaigns intensified, communities were saturated with information through mass media, government, tribal officials, religious leaders and health workers. Fortunately, most of the information sources conveyed consistent messaging.[28] Health workers (CHT and DHT) and radio messages were supplemented by community-level information and mobilization campaigns, led by NGOs.

Already embedded with GoL WASH programming at the County and District level, IWASH was well positioned to collaborate closely through Community Health Teams and provided support to CLTS focal persons working at the National, County and District levels. As a result of constant collaboration in the years leading up to the Ebola outbreak, trust and good working relationships had already been established between the government and the Global Communities. Community-based Natural Leaders already active in IWASH supported hygiene promotion through the Natural Leaders Network (NLN) established in the IWASH CLTS program, and also continued to trigger new communities for CLTS without significant external support.

[28] This approach has been cited by WHO as a "lesson learned" in successful approaches to the epidemic.

According to the CHT, this facilitated quick planning and action, particularly because Global Communities implemented IWASH through technically sound staff from a local office in Lofa County, in close proximity to the county CHT office. CHT representatives reported that Global Communities' technical capacity and ability to quickly mobilize resources and get to the field were important and enabled them to reach communities with essential materials, training and supervision. Additionally, while the IWASH program created conditions for healthy practices and apparent risk reduction prior to the Ebola outbreak, supplemental services and activities introduced by other Global Communities programming, including safe burial teams and intensive hygiene promotion (with hygiene kits) may have added value during the emergency phase. Analyzing the impact and contribution of this USAID/OFDA-funded programming on Ebola transmission and case fatalities in Lofa County is outside the scope of this research but may present an opportunity for further investigation.

Question 5: How did Global Communities refocus the IWASH project to address Ebola? What were the strengths and weaknesses of this approach?

Emergency Distribution

IWASH collaborated with members of the Lofa CHT and supplied three front-line health centers on the border with neighboring Guinea that had no basic preventive materials and provided soap, chlorine, WaterGuard®, latex gloves, jerry cans, and nose masks. IWASH staff worked with gCHVs (Liberian Community Health Workers) and Natural Leaders to provide community education and sensitization about the importance of basic hygiene and safe behaviors needed to stop disease transmission. Ebola-specific information about safe burial practices, avoiding shaking hands and not consuming bush meat were added to hygiene messages. Messages also encouraged people to contact local health workers as soon as anyone in the community became sick. GoL and IWASH also aired integrated radio spots that went out into the wider community on market days.

CHT and Lofa County WASH partners reported that IWASH provided a solid foundation and framework that supported EVD activities, as many activities were already jointly implemented when the first case of EVD entered Lofa County from Guinea. Global Communities appropriately refocused IWASH activities and supplied soap and chlorine supplies for hand washing in the border areas. Global Communities organized community-wide meetings including Community Health Teams, government officials, Natural Leaders and traditional leaders to elaborate action plans for preventing the spread of Ebola in their communities.

Relationships and Partnerships

Well-established relationships and joint implementation of WASH activities at the county, district and community levels, developed over a significant period of time through IWASH prior to the Ebola outbreak, provided the foundation for collaborative planning. WHO has confirmed that these foundations at the district (similar to counties in Liberia) and sub-district (similar to health districts in Liberia) levels are important to an effective epidemic response. "Outbreak responders learned the importance of tailoring response strategies to match distinct needs at district and sub-district levels. An understanding of transmission dynamics at the local level usually reveals which control measures are working effectively and which ones need improvement."[29] IWASH staff and program infrastructure was already deeply integrated with their GoL partners for IWASH at these levels of government. Global Communities also helped to establish the National-level WASH task force, convening key stakeholders (and local representatives of key ministries), so they were already well-positioned before the epidemic. The importance of developing these relationships are an important lesson for any national or regional CLTS/WASH program.

While working with multiple ministries at several levels certainly provided a strong foundation that facilitated the response, it was a time consuming process and Global Communities provided financial support to the government for many routine tasks, such as meetings, staff and travel that will need to be assumed by GoL in the future. Joint planning and ability to collaborate with other partners through support to Task Forces and regular meetings of partners is also a valuable feature

[29] WHO, "What needs to happen in 2015," January 2015

of the IWASH approach. As the country returns to development programs after being declared “Ebola Free”, the long term sustainability, including financing, for WASH and CLTS to be incorporated into national development plans with limiting the operational role of international NGOs will be need to be addressed.

Other factors beyond the role of the project (poor roads, weak health treatment infrastructure, and some cultural factors) presented multiple challenges. Working with multiple government ministries and private partners (such as other NGOS) through task forces and working groups developed trust between partners and allows for synergies of each partner’s strengths. As already mentioned, these relationships take time and developing them for the first time in the midst of a crisis can be exceeding difficult, especially with the influx of new players that are responding only to the emergency needs with no intention to play any role in the long term development of the sector. Supporting the GoL to remain “in control” of the sector is an important role Global Communities has continued to play in spite of the crisis.

Community and Local Empowerment

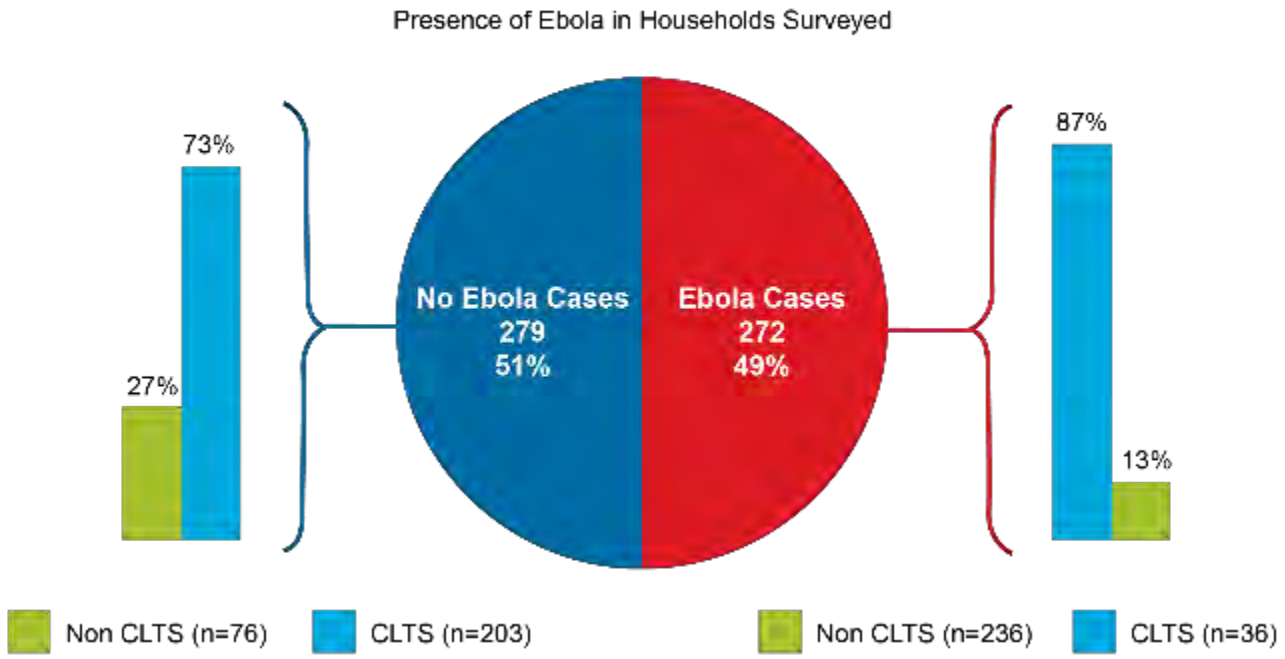
At the community level, foundations for community mobilization and collective action based on the communities’ own perceived needs are “triggered” through CLTS approach. A core component of this process includes capitalizing on existing community assets (such as Natural Leaders) and enabling communities to identify the resources that they need within their own communities (such as materials to build latrines). The result of community strengthening is an empowerment effect, decreasing a sense of dependency on outside entities. Establishing and supporting networks of effective community mobilizing agents (such as NLN), supported with appropriate and consistent monitoring and supervision, and continuing to engage these human capital resources in ongoing programs can support rapid mobilization for possible emergency activities while facilitating future development activities.

Question 6: Is there evidence that the existence of IWASH improved the health status of and/or ability of communities to protect themselves from the spread of the Ebola virus? If so, what differences can be documented?

Differences in EVD Prevalence in Sample Community Categories

Quantitative analysis of the household survey results found that out of 551 households sampled, 272 (49%) were in communities where at least a case of EVD was confirmed. Of the 272 households that were in Ebola affected communities, 36 (13%) were located in one community that had benefited from the CLTS project but dropped out and did not reach ODF. The remaining 236 households (87%) were in communities that had not participated in the CLTS project (see Figure 6).

Figure 6. Reported EVD cases (in 2014) according to participation in Global Communities CLTS programs in Voinjama and Kolahun health districts, Lofa County Liberia



Overall, households in CLTS communities were **17 times** less likely to have any cases of Ebola than households in non-CLTS communities.[30]

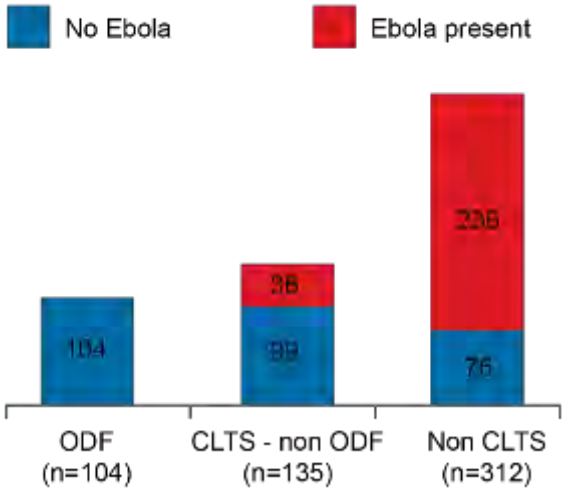
Correlation is a measure of association between two variables and measured by with a calculation represented by "R". Values for correlation are usually between -1 and +1, with a value of 0 implying that there is no correlation at all. The closer the R falls to 1 and away from zero, the higher the correlation and vice versa. The study found an **R of negative 0.6** indicating a *strong inverse correlation* between Ebola and CLTS. The correlation strongly infers that CLTS had an effect on community resistance to Ebola, but cannot directly confirm a causal relationship.

Although the study was intended to measure differences only between verified ODF and EVD- infected communities, data indicate that communities that that had participated in CLTS but not achieved verified ODF status also had much lower chance of contracting Ebola. Only one out of 18 ODF and non-ODF CLTS communities contracted Ebola, though limited IWASH program data was available for CLTS communities that were not validated as ODF. This is due to the fact that communities failing to take significant action toward reaching ODF were no longer monitored after a certain point by program staff. However some protective effect was likely provided by inherent characteristics of communities that participated in CLTS, or by the impact of CLTS triggering activities on community motivation to achieve verified ODF status. Further exploration of causal factors merits additional attention in light of the significance of an apparent correlation between CLTS and reduced Ebola risk.

[30] Statistical analysis resulted in an odds ratio of 0.06 for incidence of Ebola in CLTS households versus non-CLTS households, indicating a strong negative association between involvement in CLTS and incidence of Ebola (available upon request)

Findings from the household survey (see Figure 7) confirmed that there were no cases of EVD in any of the 104 households in ODF communities. Survey results also indicated lower levels of Ebola infection in communities that were actively engaged in CLTS but did not achieve full ODF status. Out of eight non-ODF CLTS communities, only 36 households (27%) of one community were affected by Ebola. All of those EVD-affected households were located in one community that had benefited from the CLTS project did not reach ODF status. Qualitative investigation of the one community that was triggered for CLTS but did not reach ODF status found there had been internal conflict that had destroyed the community cohesion that may have enabled them to successfully achieve ODF status.[31] In comparison, 236 households (76%) across 23 of the 25 surveyed communities that did not participate in CLTS programs reported confirmed Ebola cases.

Figure 7. Reported EVD cases in households (in 2014) according to participation in Global Communities CLTS programs



Survey data, FGDs and KII evidence all support the hypothesis that the adoption of hygiene behaviors promoted by CLTS is correlated to reduced risk of Ebola in verified ODF communities; however, more research through well-designed controlled studies are recommended in order to determine any causal relationship ODF status and human disease transmission patterns. While ethical considerations may preclude the conduct of such studies during a rapidly-spreading deadly disease like Ebola, efforts to understand whether ODF status in a community can predict vulnerability to other communicable diseases may be possible, and could serve as a model for future testing of ODF status as a protective factor against infectious diseases that result from personal contact and poor hygiene.

Positive Behaviors to Guard against EVD

At the time of the study, both EVD and non-EVD communities reported significant increases in the adoption of specific positive behaviors, and variance in common water and sanitation-related infectious disease rates between CLTS and non-CLTS communities was observed. Relevance of these factors to Ebola transmission has been inferred, but not confirmed, by global health researchers. The results of additional targeted research could provide a foundation for developing a set of common indicators that could be used by both the WASH and health sectors.[32]

Public health programs relevant to WASH programs currently measure change using two approaches. One approach is to measure change in disease prevalence at two points in time before and after the intervention. Examples include diarrheal disease, respiratory diseases, intestinal parasites and some skin diseases. Prevalence data for these diseases before and after CLTS was started was not measured in the IWASH program, although the study team attempted to estimate trends during the IWASH project from CHT health statisticsbut was unsuccessful in obtaining relevant data. FGDs and KII respondents with CHT officials independently volunteered perceptions that diarrheal diseases had significantly decreased in CLTS communities, and that CLTS/ODF communities reported fewer households with intestinal parasites and skin diseases.

Another way public health researchers attempt to determine changes in health status involves measuring increased *coverage* of evidence-based behaviors known to have an impact on the specific water and hygiene-related diseases already mentioned. Indicators to measure these changes include hand washing with soap/ash/chlorine at critical times, point of use water treatment, latrine use, and safe disposal of feces (including children). Monitoring data to qualify for ODF status documents some changes in these behaviors at each community, but not at the household level. In the survey,

[31] Lofa County CLTS focal persons

[32] Measuring Health Impacts of WASH programs webinar with Johns Hopkins University School of Public Health and CORE group, January 2015

however, there were differences in self-reports of these key behaviors with significantly higher percentages of ODF communities using latrines as compared to EVD communities. Other indicators, such as presence of hand washing stations and clean latrines were directly observed by the survey team in a larger percentage of CLTS communities than in non-CLTS communities.

Numerous studies linking increased coverage of hand washing with soap and/or POU water treatment and decreased diarrhea and respiratory illness (primarily in children) have been conducted;[33] however, published studies directly linking water and hygiene behaviors to preventing Ebola transmission are less prominent. Observational studies and anecdotal reports have noted that improved hygiene practices, especially hand washing and safe disposal of body fluids (including from dead bodies) appear to reduce the incidence of new EVD cases, but more research on these practices as well as understanding the EVD epidemic curve[34] is necessary to fully understand how hygiene reduces individual risk of contracting Ebola.

Understanding Natural Leaders

Statistical analysis of multiple factors in the household survey showed that "Training by a Natural Leader" (a proxy for CLTS) emerged as an important and unique difference between communities that contracted Ebola and those that did not. Details of the regression analysis can be reviewed in the survey report.[35] By definition, "Training by a Natural Leader" was a factor in the household survey that was unique to IWASH CLTS. Findings are sufficient to support a statistically significant correlation between CLTS methodology employed by IWASH through Natural Leaders and whether a community became EVD, but the study does not identify which components of CLTS was the most important. Research regarding human health behavior changes indicates that that training WASH topics, "messaging" or even "triggering" were probably not sufficient to transition a community from "awareness" to "taking action." Factors such as trust, NL leadership skills, community's collective capacity to respond to shocks ("resilience"), supportive supervision or other factors may also have contributed to the results, but additional research will be needed to identify which of these, or other factors might have been the most important.

The direct relationship with specific CLTS practices and prevention of community level infectious diseases has not yet been documented in the scientific literature. Empirically, EVD transmission rates and infections decreased as recommended WASH behaviors promoted by NL (such as hand washing and household hygiene improvement) increased and became mainstream in high risk areas. Community structures (NLs, engagement of community governance structure, enforcement mechanisms (such as fines) that were put in place to mobilize and maintain the behaviors required will all need to be assessed to determine the significance of each measure in Ebola outcomes for a given community. Strict adherence to national CLTS protocols without short-cuts or "give aways" that may have compromised intended results facilitated a review of outcomes and impacts associated with implementation of "the full CLTS package."

Relationship between CLTS Natural Leaders and EVD

Fifty-six percent of households in CLTS communities had received training from a Natural Leader. The remaining households in those communities did not receive training directly from a Natural Leader, although they may have participated in CLTS activities in other ways. Most survey participants specified that NL training included overall hygiene topics covered during triggering, as well as Ebola-specific topics once the epidemic broke out. By definition, training from a Natural Leader is linked only to IWASH CLTS and therefore indicates an effect of CLTS. Statistically significant differences in incidence of EVD were found between communities that reported training by a NL and those that did not (Figure 8). Nearly all (91.5%) of the EVD-affected households had not received training from an NL. The 45.8% of households that remained Ebola-free despite not having NL training include households in ODF/CLTS communities that

[33] Aiello, A., et al. Effect of Hand Hygiene on Infectious Disease Risk in the Community Setting: A Meta-Analysis, American Journal of Public Health, August 2008; Luby, SP, Effect of Handwashing on child health: a randomized control trial, The Lancet, July 2005

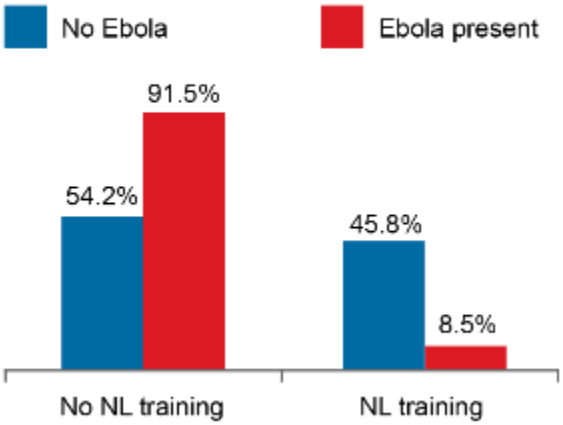
[34] Epidemics of many infectious diseases have a tendency (but no guarantee) of ending over time with, or without intervention

[35] Available upon request

did not receive training directly from an NL. The 8.5% of EVD-affected respondents reporting NL training are assumed to represent the single non-ODF CLTS community of 36 households affected by EVD that had dropped out before reaching ODF. Although NL training is a proxy for CLTS, findings from the qualitative portion of the study suggest that this particular aspect of CLTS may have had a protective effect against Ebola in the communities.

The research does not assert that ODF status equates to the absence of Ebola or resistance to Ebola in the community. However, survey data do indicate that the process of achieving ODF status, which includes significant change in various hygiene behaviors and sanitation practices provide an enabling environment, and can be interpreted as building protective factors in the community. Given that communities also commit to taking specific and measurable actions to achieve verified ODF status, behavioral indicators are likely to be higher in CLTS/ODF communities than in communities where these actions are not taken. In this context, a more detailed analysis of individual CLTS components that result in successful ODF verification, and further examination of behavior indicators will support further understanding of any causality in the relationship between Ebola transmission rates and CLTS programming.

Figure 8. EVD-status of households according to NL training



NLs have continued to be active in their communities and engaged in (non-IWASH) hygiene promotion activities as part of the continuing EVD response. Interestingly, verified ODF communities have developed enforcement mechanisms (such as fines) for any return to open defecation practices, indicating that behavior change was sustained for at least one year in ODF communities. ODF communities and NLs also reported a perceived reduction in diarrheal illness even prior to the EVD outbreak as a result of improved feces disposal. The study team was unable to verify this with CHT data. Survey enumerators, on the other hand, who were not involved in IWASH, and local authorities observed clear differences in cleanliness and observable feces between ODF communities and non-ODF communities.

Conclusions from the Study Findings

The study confirmed that there were no EVD cases in ODF communities. CLTS communities, even those that dropped out before reaching ODF, were 17 times less likely to have EVD cases than communities that had not participated in CLTS. These findings support a strong and significant correlation between successful implementation of CLTS (through ODF verification) and significantly reduced risk of EVD (0% in the study sample). Training by a NL (by definition an intervention of CLTS) was also significantly correlated with decreased risk of EVD. This supports findings from qualitative methods that positive behaviors in hand washing, latrine use, POU treatment of water, and safe disposal of feces that started prior to the EVD outbreak were significantly higher in CLTS/ODF communities than in non-CLTS communities and may have provided protection against EVD transmission on those communities.

Because verified ODF status requires that specific behaviors and physical infrastructure are maintained in the community, the presence and continuation required behaviors and stewardship of WASH infrastructure are further evidence that ODF communities took action to address hygiene and sanitation prior to the Ebola Outbreak. The study cannot identify which *specific behaviors or processes* might have been more important than others; further analysis is required to fully understand the importance and contribution of each measure to ensuring community health and reducing Ebola risk.

While this study establishes an existing *correlation* between adoption of CLTS behaviors and verified ODF status prior to the EVD outbreak and resistance to EVD, the evidence does not conclusively isolate CLTS as the only protective factor. The full impact of CLTS on Ebola rates is inconclusive and requires additional research, as well as a more in-depth comparative analysis between non-CLTS communities who did not contract Ebola and ODF communities. In addition,

further examination of the role of trust and social capital in communities with low or no Ebola caseloads will provide valuable insight regarding where future programming efforts should invest time resources and energy in order to provide the greatest level of protection against future health epidemics. Expansion into larger communities in the IWASH project area, especially in semi-urban areas that was planned but curtailed due to the epidemic, still needs to be implemented and tested. Application of CLTS methodologies that encourage ODF and sustainable maintenance of healthy hygiene practices in peri-urban and urban areas should constitute a priority.

Lessons Learned

IWASH activities, at both national and community levels, strengthened local organizational structures and capacity through strong collaborative partnerships and joint implementation of WASH programs with the GoL. Global Communities was therefore well-positioned to support community-based prevention and response measures when the Ebola outbreak occurred. This collaboration was extremely important to enabling programmatic agility and responsiveness to address all aspects of the Ebola emergency response. Well-established relationships and joint implementation of WASH activities with partners, including the GoL at the county, district and community levels, developed over several years, but prior to the epidemic, provided the foundation for collaborative planning and implementation.

Global Communities' support to IWASH communities was decidedly a factor in the success of Ebola response in Lofa County. CLTS strengthened community capacity to draw upon their own resources and increased community "resilience," enabling communities to absorb the shock of the EVD outbreak. Structures developed by CLTS at the community-level were not EVD-specific but were intended to provide sustainable mechanisms to maintain community health and will likely remain in place as a foundation for additional community-based development activities.

> *"We see the results and the people living in the districts can see it too. You can tell the community is cleaner and more sanitary as soon as you enter…People are building and using latrines in places where they never succeeded before."*
>
> *– Community Members, Lofa County*

Global Communities made major contributions to the GoL to adapt CLTS to the Liberian environment. With additional support for implementation, quality could be maintained, communities could know what was expected of them and monitor their progress towards ODF. The study team felt that IWASH's success in achieving such a high number of ODF communities in their two health districts, when NGOs implementing ODF in other Lofa health districts had not completed any,[36] was largely due to following the specific protocols: quality assurance, monitoring and the verification processes that were adopted at the national level with Global Communities' encouragement. GoL was engaged at every step including when providing supportive supervision, a critical element in community-based programs working with volunteers. Partners and NL in Lofa County remain very enthusiastic about CLTS because results have taken hold in the long term, as CLTS is now included in the national pre-service education curricula for health workers, including EHTs, and will promote sustainability through large numbers of Liberian WASH professionals trained to implement CLTS throughout Liberia.

IWASH maintained good CLTS monitoring records in a computer database that was easily sortable and accessible, providing timely answers to questions posed by the study team. Available data was very valuable in providing evidence to the team about activities and processes that had taken place in the past. However, the research team notes that electronic records, data flow and database processes need to be updated to be useful in future programs.

[36] KII with Lofa County and Global Communities

Recommendations

If linkages between IWASH and EVD resistance/prevention can be documented, what recommendations can be provided for future programming linking WASH to prevention of infectious diseases, including EVD? Are there recommendations for future development programs that might need to quickly refocus programming to respond to public health crises, such as Ebola?

1. Additional detailed epidemiological studies should be undertaken to understand more about the patterns of Ebola transmission within the population as well as households and communities that contracted EVD. The presence and behavior of "positive deviants" (those who were not infected when other similar households or individuals in similar circumstances were infected) could be studied to determine what protective factors supported resistance to Ebola despite high risk and proximity. Global Communities should consider additional research regarding the only CLTS community that did not attain ODF status (and any others that were not included in the study sample) and identify any factors, conditions, characteristics, or exposure that increased vulnerability to Ebola. Global Communities should also make the data set from the household survey and CLTS monitoring records available for any ongoing or future WASH and Global Health epidemiology and Social and Behavior Change (SBCC) studies.

2. Global Communities should continue to share their experience of the CLTS/ODF experience in the WASH task forces and other development fora and also contribute to ongoing analysis in the health sector regarding protective factors observed in communities and households.

3. If specific health outcomes from CLTS are to be proven in the future, then well-designed Operations Research should be included in the design of future WASH or CLTS programs. If these studies are to include health outcomes, then a population-based Knowledge, Practice and Coverage (KPC) survey (or similar measure) should be conducted at baseline and at the end of the program and analyzed as part of the program results.

4. Only 32% and 28% of all the communities in Kolahun and Voinjama districts respectively were covered by the IWASH CLTS project. The Ebola experience has increased demand for increased sanitation, especially latrines, in Lofa County. Global Communities should build upon public momentum created during ODF verification ceremonies and successful demonstrations of EVD resistance that have increased awareness regarding the necessity of healthy and hygienic practices in creating an enabling environment for community prevention and mitigation against health epidemics. Global Communities should document CLTS implementation methodology for public review, including: selection criteria for the Natural Leaders, developing Natural Leader Networks, training curriculum and methods used, data collection tools, reporting structures, any supervisory checklists, etc. so that partners that want to adopt or support the strategy can benefit from the Global Communities' experience.

5. Expansion into larger communities, including those located in urban and semi-urban areas that was curtailed due to the epidemic, should be resumed and the adapted methods to implement CLTS in those types of communities should be tested and documented.

6. IWASH databases proved extremely valuable for documenting how IWASH monitored the entire CLTS implementation process through ODF verification. Some recommendations have been made to Global Communities regarding a need to update data capture methods, databases and use of newer GPS systems. Future programs would also benefit from follow up stronger documentation of reasons or factors that explain why "drop-out" communities did not continue to ODF status. Global Communities should continue their collaboration with GoL in updating WASH indicators for monitoring and evaluation (GoL has already identified and planned to revise their indicators). In particular, ODF verification criteria included in checklists need to be weighted according to the importance of each of the criteria.

7. Additional opportunities for linking WASH to the health structure are evident. Although EHTs are supervising Community Health Volunteers and act as CLTS focal points at the district level, WASH activity connections with health

programs at the community level could be strengthened, especially in relation to disease prevention. Linking NLNs with programs that can sustain their function in water and sanitation such as income generation (piloted in IWASH) or community savings and loan groups may support them to continue without external or direct government financial support. This has been started to some extent through the WASH entrepreneurs. Other forms of "motivation" such as training, recognition and engaging them in future activities (such as the current hygiene promotion) can help them continue to remain active.

8. If Global Communities wants to measure health impacts of future WASH programs, baseline surveys of relevant health-related performance indicators should be collected before and after interventions are implemented to support further analysis of the public health impacts of WASH programming. Assessing the disease-related impacts of WASH and CLTS will not be possible without health related monitoring and evaluation methods embedded in WASH programs. The international public health and development communities already recognize the need for better evidence-based indicators of success for CLTS and WASH overall. Global Communities' WASH experts should contribute to these discussions. Data collected in the household survey and the IWASH monitoring database could be a rich source for research by schools of public health, health and WASH partners programs and for EHT and health students in Liberia. The WASH cluster that meets regularly in Monrovia may identify additional ways to use the databases and survey results to support research. Overall, data from the study survey can add additional depth of understanding about the socioeconomic, education and cultural influences on adoption of prevention behaviors for Ebola and the diseases which were prevalent in the area prior to the crisis.

Opportunities for Program Strengthening

Disposal of Child Waste: The household survey revealed that high percentages of households, even in ODF communities, did not always practice safe disposal of child fecal matter (not buried or disposed of in latrines). This is consistent with the findings in the 2013 LDHS. CLTS training should increase emphasis on safe disposal of child feces, include it in monitoring and add this to the ODF criteria checklist. Hand washing at some critical times is high in both ODF and non-ODF communities, but the survey indicated hand washing at other times need strengthening to improve overall health impacts.

Deworming: Routine deworming of children will be one way of supporting and sustaining the improved sanitation status from CLTS. The CHT, and not Global Communities, would be the best ones to do this through their community health or school health programs.

Gender Balance in Program Activities: Only 20% of NLs in the project were female. FGDs in ODF communities cited literacy requirements (needed to fill out reporting forms) as the barrier to female participation because their levels of education are significantly lower (in a population where 2/3 of the population has not completed primary school). Women expressed an eagerness to participate as NLs and male NLs suggested "pairing" may be a solution if women met all of the other NL characteristics. USAID-funded health programs are now required to report on gender considerations in their programs. Global Communities should document how gender is considered in their CLTS programs, and contribute to developing methods to make CLTS programs more inclusive of women volunteers.

Additional Issues Identified by the Team

The need for joint programming between the public health sectors (especially maternal, newborn and child health) and WASH experts have been acknowledged by both disciplines for decades, but the "way forward" toward successful collaboration and implementation (along with appropriate monitoring and evaluation indicators of progress toward objectively measurable impact) have yet to be mainstreamed at a global level; therefore, opportunities to demonstrate if/how CLTS has measurable health impacts (disease reduction, improved treatment, increased child growth, health expenditures, etc.) are limited, even when empirical data suggests otherwise.

Households must to have *access* to water, whether clean or not clean. During much of the year, access to water in many CLTS and non-CLTS communities decreases. This is not a shortcoming of CLTS per se, but indicates that there is still more to be done to address overall gaps in WASH needs in Lofa County. Many wells and hand pumps installed by donors during the emergency programs after the Liberian Civil War and the recovery period have ceased functioning due to many factors; one of these is lack of maintenance of wells and hand pumps in communities. Community water committees established for this purpose when they were installed during that time have largely become inactive. IWASH began to address this issue by training pump mechanics, but access to operations and maintenance goods and services is not universal. While not a deficit of CLTS, water supplies are poor in both ODF and non-ODF communities. This highlights a continuing need for partners to advocate for support for the GoL to address the global and structural constraints that prevent access to clean water.

Local enumerators hired for the IWASH survey reported to the study team that EVD communities have large numbers of individuals in need of sustained psychosocial support due to severe emotional distress and hardships associated with the deaths of their relatives. Identified needs include psycho-social support as well as additional attention to re-establishing livelihoods and family systems. Some women are widows with no means of support, and many children to support, including the children of co-wives who died. Women's FGDs in EVD communities reported that they needed help to get their children into school. It is unclear the basis for this concern and Lofa County schools were in process of reopening at the time of the study. These concerns are unrelated to the IWASH project but their concerns were relayed to USAID.

Global Communities is not expected to develop a program to address the severe psychological trauma experienced in EVD communities; however, monitoring this trend in program areas and allowing for a referral system can benefit the larger population with mental health needs.

Annex X: Environmental Compliance

Water Facilities

Rehabilitation of Water Facilities

A. Water Quality Testing

All hand pump installations and repairs that have been support by the IWASH program have been tested with the cooperation of the appropriate County Environmental Health Technicians. The documentation of these test results is filed both with Global Communities and with the County Health Offices.

Construction & Operation of New Water Points

A. Soil Deposition

Excess soil produced from the excavation of the wells has been either distributed evenly in the area, or used by community members for local construction. No leaps of soil have been left in the construction area.

B. Vegetative Disturbance

Minimal vegetative disturbance was made in well construction as these wells we located in areas proximal to communities or health centers that are already cleared of vegetation.

C. Safety

The major risk to human safety during construction is for a person to fall into an unattended well hole. This risk was mitigated by covering the holes with logs or tin roofing material. Barriers were also constructed to preclude people or animals from wandering into the excavation area.

D. Contamination of Well

Well contamination has been mitigated by three consistent procedures:

1. Siting: all new wells are site well beyond the 100 minimum spacing from a latrine.
2. Drainage: proper brisk and cement drainage channels are constructed to transport wastewater from the well area.
3. Fencing: basic fencing is constructed for community wells, for health facilities the compounds are already fenced.

E. Well Depletion

No high volume extractive pumps have been used in the well implementation, standard Afridev hand pumps have been used.

F. Water Contamination Post Collection

Use of WaterGuard has been promoted throughout the IWASH program as a key component. Point of use water treatment is the best way to ensure that water collected from an unchlorinated source has a residual chlone level to guard against contamination after collection.

Urban Latrines

Excavation

A. Soil Deposition

Soil excavated for the septic tank and foundation construction has been either been used for grading in the vicinity of the latrine or made available to community members for local construction activities. Waste material such as broken bricks and material packaging has been disposed of at the solid waste management site.

Construction

A. Site Grading

Grading of the latrine site has been facilitated by soil made available by the excavation activity onsite.

B. Vegetative Disturbance

All urban latrines were located in areas where vegetation had already been disturbed by urban development activity. No significant vegetation values existed. In the Paynesville City Corporation location, flowering plants have been planted to enhance the environment.

C. Air Quality Degradation

Typical sources of air quality degradation were not an issue: dust from aggressive excavation with equipment and exhaust from construction equipment. No heavy equipment was used on the site and the excavation was performed during rainy season, so dust and exhaust were not an issue. Water based and non-lead paints were used to mitigate the potential for vapor toxins.

Operation

A. Septage Disposal

Disposal of septage from the urban latrines is the responsibility of the Paynesville City Corporation. A Memorandum of Understanding has been signed by the Mayor of PCC agreeing to maintain and operate the facility within guidelines requiring the collection and disposal of septage by only licensed septage collecters. The disposal site at Fiama is the recommended disposal site.

<u>Household Latrines</u>

Construction

A. Siting

Training of Natural Leader and includes specific siting instruction consistent with the National WASH Manual, which specifies latrines to be constructed at least 100 feet from water sources. IWASH staff strongly encourage a wider margin of separation for siting. Monitoring of CLTS communities includes ensuring that

these instructions have been followed for siting. All latrines have been constructed more than 100 feet away from well sites.

B. Material Selection

CLTS latrine construction typically makes use of the building materials that the community member has used for constructing their own home. This is often forest materials including sticks and mud, or mud bricks for wall, dirt floor, and thatch or tin roof. Material selection is a safety issue for slab latrines, but IWASH encourages all communities to use a "Slab-less VIP Pit Latrine" design. The wooden slab used by many villagers before this design was created posed serious safety problems.

C. Construction Method

IWASH recommends the "Slab-less VIP Pit Latrine" design which precludes the risk of latrine users falling through rotten wooden latrine slabs. The latrine pit is located behind the superstructure and fenced off to prevent people from climbing on the cover. This design has become the standard in IWASH CLTS communities.

D. Hand Washing Station

Hand Washing Stations are a requirement for communities progressing to Open Defecation-Free status. These facilities are designed based on suggestions from IWASH staff, Natural Leaders, and EHTs. All of these facilitators encourage community members to construct their hand washing facilities with drainage for the runoff water.

Annex XI: Cost Share

Overview

Cost share for the IWASH project was anticipated to be $600,000 at the point of project proposal. Contributions from normal activities of the IWASH program exceeded the $600,000 budget during the program period. In addition, new activities implemented in response to the Ebola crisis, hygiene promotion using UNICEF provided kits, netted an additional $482,237.81. The total cost share for the IWASH program is $1,098,274.29, or 183% of budgeted cost share.

CLTS Contribution

Contributions from community were smaller than anticipated for several years and did not increase significantly until CLTS gained momentum in FY 2013 and FY2014 when the number of community latrines, hand washing facilities, dish racks, and garbage pits increased. These local facilities contribute small amount of cash value to cost share, but significant value in potential health benefits. With the high number of communities triggered and progressing to Open Defecation-Free status, a significant amount of community cost share was ultimately realized ($239,329.35).

PPP Latrine Contribution

The Chevron funded PPP construction contributed a significant benefit to urban sanitation and hygiene in the Greater Monrovia area. Five latrines were built through the cofounding by Chevron of construction. These construction costs and the land donated by community provided a cost share benefit of $146,239.13.

PSI Contribution

PSI, a partner on the IWASH project, contributed cost share through skilled worker hours and direct cash contributions to activities of $230,468.

UNICEF Hygiene Kit Contribution

During the response to the Ebola outbreak, IWASH engaged in hygiene promotion utilizing hygiene kits provided by UNICEF. This work was done in IWASH target counties – Bong, Nimba, and Lofa. A total of 14,297 kits were distributed. Each kit contained: soap, chlorine, WaterGuard, measuring devices, a bucket with a spigot, a jerry cans, and gloves. After hygiene promotion, 25 communities were triggered for CLTS and 27 communities were verified as ODF. The value of the hygiene kits contributed by UNICEF $482,237.81.

Source of Contribution	Amount of Contribution
CLTS	$239,329.35
PPP Latrine	$146,239.13
PSI	$230,468.00
UNICEF	$482,237.81
Total	$1,098,274.29

PPP