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WASH SUSTAINABILITY INDEX TOOL ASSESSMENT: LIBERIA

FINAL REPORT

JULY 2015

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DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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ACRONYMS AND ABBREVIATIONS

AfDB	African Development Bank
AfT	Agenda for Transformation
CDF	County Development Fund
CHO	County Health Officer
CHP	Community Hand Pump
CHT	County Health Team
CLTS	Community-Led Total Sanitation
CSB	Community Services Bureau
CSO	Civil Society Organization
CWT	County WASH Team
DfID	Department for International Development (UK)
EHT	Environmental Health Technician
EMIS	Education Management Information System
ENT	WASH Entrepreneurs
EPA	Environment Protection Agency (Government of Liberia)
FY	Fiscal Year
GDP	Gross Domestic Product
GNI	Gross National Income
GoL	Government of Liberia
GPS	Global Positioning System
HDB	Hand Pump Density Breakpoint
HP	Hand Pump
IHP	Institutional Hand Pump
iWASH	Improved Water, Sanitation, and Hygiene (USAID Project)
IWRM	Integrated Water Resource Management
JMP	Joint Monitoring Program

LD	Liberian Dollars
LWSC	Liberia Water and Sewer Corporation
M&E	Monitoring and Evaluation
MDG	Millennium Development Goal
MIA	Ministry of Internal Affairs
MoE	Ministry of Education
MoF	Ministry of Finance
MoHSW	Ministry of Health and Social Welfare
MoU	Memorandum of Understanding
MPW	Ministry of Public Works
NGO	Nongovernmental Organization
NRWASHP	National Rural Water, Sanitation and Hygiene Programme
NWRSB	National Water Resource and Sanitation Board
NWSHPC	National Water, Sanitation and Hygiene Promotion Committee
O&M	Operation and Maintenance
ODF	Open Defecation Free
PRS	Poverty Reduction Strategy
PSI	Population Services International
PTA	Parents and Teachers Association
RWSD	Rural Water Supply Division
RWSSB	Rural Water Supply and Sanitation Bureau
SIT	Sustainability Index Tool
SO	Strategic Objective
SP	Service Provider
SWA	Sanitation and Water for All
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
USD	United States Dollars
WASH	Water, Sanitation, and Hygiene
WASHCOs	Water, Sanitation, and Hygiene Committees
WHO	World Health Organization

WSP	Water and Sanitation Program
WSS	Water Supply and Sanitation
WSSC	Water Supply and Sanitation Commission

EXECUTIVE SUMMARY

OVERVIEW

The Water, Sanitation, and Hygiene Sustainability Index Tool (WASH SIT) was developed through joint funding from Rotary International and USAID as part of the International H2O Alliance. The tool covers a range of quantitative and qualitative indicators grouped under the five main factors that influence the sustainability of services: **institutional, management, financial, technical, and environmental**. The SIT utilizes data collected from multiple sources, recognizing that factors for sustainability include practices at the household and service provider levels, as well as the enabling environment at the sub-national and national levels. More information on the WASH SIT, including an overview of the methodology modified for application in Liberia, can be found at www.washplus.org/rotary-usaid.

The overall purpose of the WASH SIT assessment in Liberia is to inform USAID WASH programming under the Agency's Water and Development Strategy, particularly with respect to sustainability of water supply interventions. Outputs of the SIT will contribute to the development of planned sector investments and inform the ongoing dialogue between USAID/Liberia, the Ministry of Public Works (MPW), other relevant Government of Liberia (GoL) ministries, and other development partners and sector stakeholders. While the SIT provides a sector-wide perspective, it does so through the lens of the interventions of a specific project in Liberia. The entry point for the application of the SIT is the USAID Improving Water, Sanitation, and Hygiene (iWASH) Program.

LIBERIA WASH SECTOR CONTEXT

Existing challenges to Liberia's WASH sector were exacerbated during the 1999–2003 conflict and most recently with the 2014–2015 Ebola outbreak. To meet the Millennium Development Goals (MDG) target, Liberia must reach national rates of access to improved drinking water and sanitation of 79% and 67%, respectively. The latest figures from the Joint Monitoring Program suggest that Liberia is making good progress toward achieving the target for drinking water (current total access is at 76% and rural access at 63%) but the targets for sanitation may not be reached (current total access is at 17% and rural access at 6%). In the counties included in this assessment, current access (assuming waterpoint capacity of a maximum of 250 people) is Bong at 32%, Lofa at 43%, and Nimba at 34%¹.

The primary government entities with a mandate for WASH services provision in Liberia are the MPW, Ministry of Health and Social Welfare (MoHSW), and Liberia Water and Sewer Corporation (LWSC). The key policy and planning instruments in the WASH sector in Liberia include the Water, Sanitation, and Hygiene Sector Strategic Plan (2012–2017), the WASH Sector Capacity Development Plan (2012–2017), the Water Supply and Sanitation (WSS) Policy (2009), and the Integrated Water Resources Management (IWRM) Policy (2007). These policies and planning instruments delineate the institutional and legal framework for the sector. However, despite recent movement toward a more unified and streamlined sector structure, the sector mandates are fragmented among several ministries and agencies. In addition, the framework proposed by the WASH Sector Strategic Plan required the establishment of new agencies that have not yet been fully established. In addition to these institutions, international civil society organizations (CSOs) play an active role in the WASH sector, with many international

¹ World Bank Water and Sanitation Program (WSP). (2011). Liberia Waterpoint Atlas, Final Review Version. August 2011.

nongovernmental organizations (NGOs) working directly with county governments and in the installation of hand pumps throughout the country.

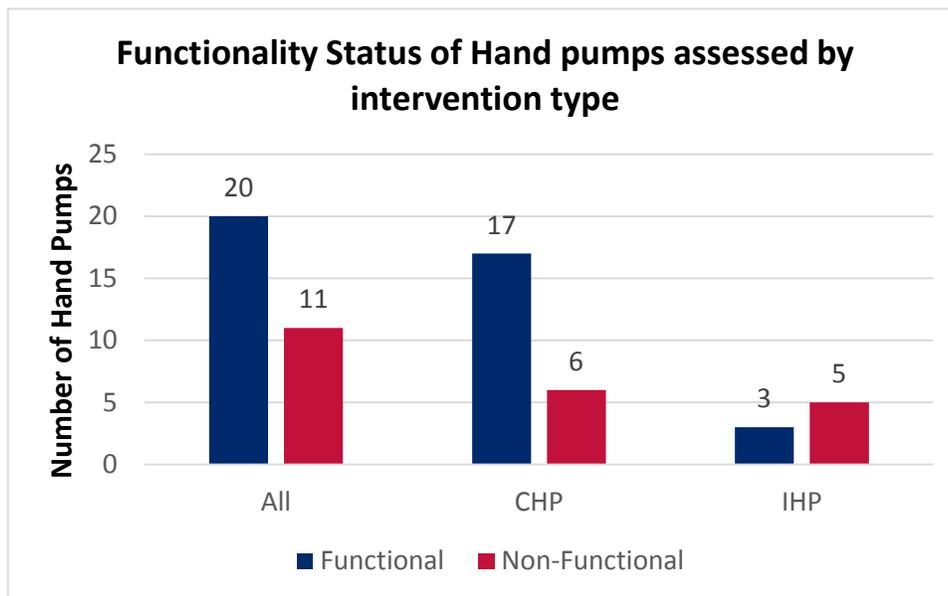
SUMMARY OF METHODOLOGY

The WASH SIT utilizes both primary and secondary data collected through a desk review, key informant interviews, focus groups discussions, and observation at various levels (national, decentralized, and service). In Liberia the “decentralized” level includes both the county and district governments. In this assessment, it was determined that data collection activities would not include households due to the sensitivities and logistical issues resulting from the Ebola outbreak. In all other ways, the team followed the WASH SIT methodology. See Annex 2.9 for details on the methodology and sampling protocol.

The iWASH program interventions on which this assessment focused were community hand pumps (CHPs), institutional hand pumps (IHPs), and WASH entrepreneurs (ENT). The assessment included intervention communities (iWASH) and non-intervention communities. A total of 23 CHPs (10 intervention and 13 non-intervention communities) and 9 institutions (6 intervention and 3 non-intervention institutions) were selected for hand pump assessments. Entrepreneurs from nine communities (all intervention communities) were interviewed for the ENT survey. Data was also collected from key informants in relevant government agencies at district, county, and national levels.

TECHNICAL ASSESSMENT RESULTS

As part of the assessment, technical inspections (general status inspection, sanitary inspection, fecal coliform test, and a leakage and discharge test) were conducted on each of the hand pumps. The overall functionality rate of the hand pumps surveyed was 64.5% (n=31), which is similar to the overall functionality rate of the six districts surveyed (65%) as calculated from the 2011 Water Atlas data. The institutional hand pumps recorded a lower functionality (37.5%). The functionality status of the pumps by intervention type is presented below:



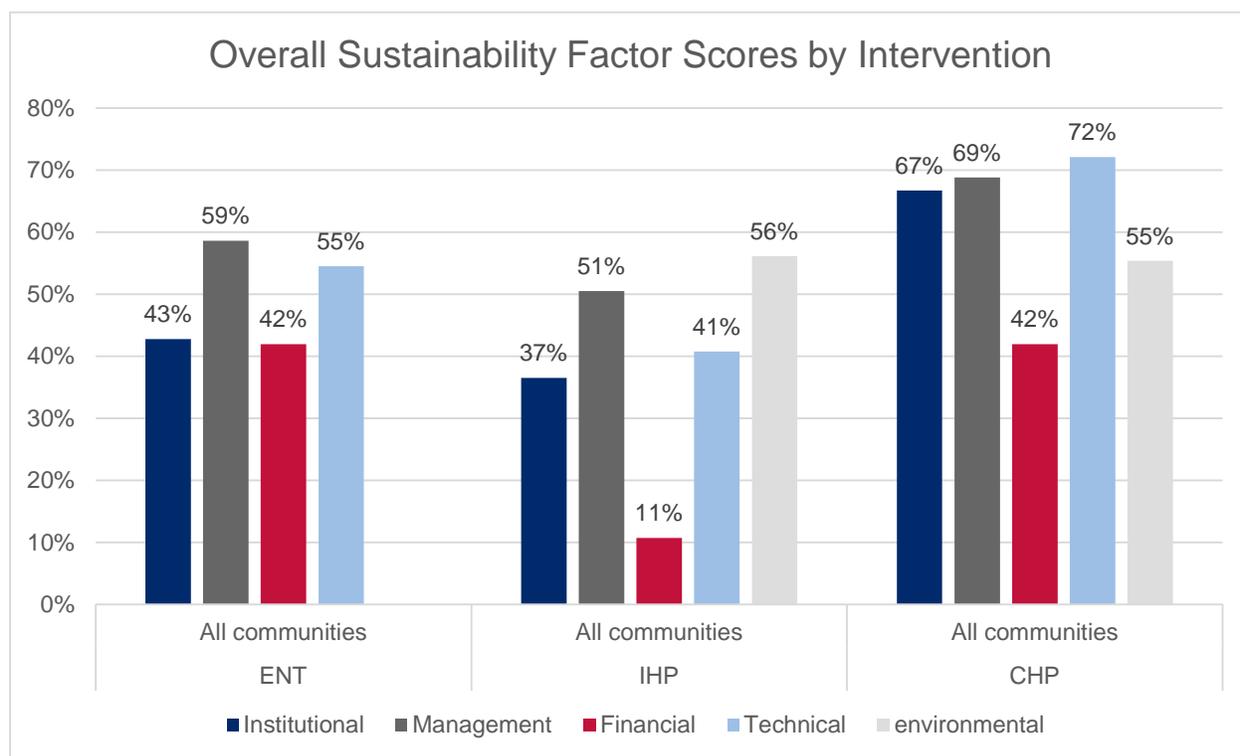
Forty percent of all functional pumps assessed (n=20) tested positive for fecal coliform. About two-thirds of the functional IHPs (n=3) and one-third of functional CHPs (n=17) tested positive for fecal coliform. The pumps were also assessed for contamination risk using the sanitary inspection score card (see Annex 3 for details). The majority (70%) of the functional pumps had a low (0-2) contamination risk. A technical

performance inspection was conducted on all functional hand pumps. Only 58% (n=19) of pumps assessed passed the discharge test, while all but one hand pump passed the leakage test.

SUSTAINABILITY FRAMEWORK RESULTS

The status of WASH services at any one time is clearly important to the beneficiaries utilizing these services; however, a key assumption of the WASH SIT is that measuring functionality alone does not explicitly provide insight on how the services will perform in the future. Without the right financing and capacities in place at all levels, and without sufficient long-term support and oversight, the status of services will almost certainly deteriorate over time. Therefore it is necessary to assess not only the current status of the services but also the overall likelihood that these services will continue.

The overall sustainability of the interventions in the three counties visited during the SIT application was mixed. Considering all intervention types, the scores ranged between 11% and 72%. In general, the factor scores for CHPs were higher than for the other interventions. However, scores for the financial factor were the lowest across all interventions, with IHPs recording only 11%. The sustainability factor scores for each intervention type are as shown in the following figure.



The overall sustainability scores for the IHP and CHP interventions were highest at the national level and lowest at the service level. For the ENT interventions, the scores were highest at the district and service provider levels. Although it is encouraging to see relatively good scores at the decentralized and national levels, apparent weaknesses and low scores at the service level are of particular concern given that this represents the “front line” of WASH service delivery.

KEY FINDINGS

Indicators with low scores tend to be risk factors to sustainability, while those indicators that have high scores may be considered drivers of sustainability. Key findings have emerged from an analysis of risk

factors and drivers of sustainability from both primary (interviews) and secondary data. Secondary data was obtained through a review of relevant documents and policies in the Liberian WASH sector and experiences of the national and international WASH experts involved in this assessment. The findings presented in this report focus on the rural water services interventions: CHP, IHP, and ENT.

Positive **drivers of sustainability** identified through the analysis should be considered in conjunction with the risks identified and seen as areas of good practice to be built on where possible. The drivers of sustainability identified during the assessment include:

- **Enabling and supportive policy environment (CHP and IHP):** The key driver for sustainability identified during the assessment was the national policy environment, which scored consistently high for CHP and IHP across all levels. This is reinforced by the existence of implementable planning documents that delineate strategies for achieving MDG targets for water and sanitation as well as the targets set in the Government's Agenda for Transformation.²
- **Efforts to streamline the WASH sector planning and implementation functions under one governance body:** The establishment and operationalization of some of the institutions/agencies proposed under the WASH Sector Strategic Plan have improved the coordination of activities and stakeholders in the sector. Notably the National Water, Sanitation, and Hygiene Promotion Committee (NWSHPC) has been instrumental in facilitating the implementation of a number of key activities aimed at stimulating development and promoting coordination in the sector.
- **Clearly defined roles and responsibility of WASH staff at the sub-national level with regard to rural water services:** The MPW has decentralized some of its functions to the counties as part of the overall decentralization process in Liberia. WASH functions under the ministry are carried out by county WASH teams (CWTs), comprising a county WASH coordinator, a pump technician, and a social worker. CWT roles and responsibilities are clear and understood by the staff involved in WASH activities management at the county and service levels.
- **Presence of functional management structures at the water service provider level:** At the service level, a majority of CHPs and IHPs have a management structure (WASH committee or institutional management committee) in place for general management and maintenance of the pump as well as to ensure the proper use and care of pumps. This is reinforced by the presence of national policy that recognizes community management. The WASH Sector Strategic Plan acknowledges the government's limitations in providing and servicing all water and sanitation facilities in rural areas, and it recognizes the role of community ownership and management in ensuring ongoing sustainability.
- **Adherence to technical standards and guidelines for water infrastructure construction (CHPs and IHPs):** The majority of CHPs assessed meet standards/norms in terms of basic level of service, siting, and public health risk and water quality. Most communities visited also had access to a trained pump technician in the community or nearby.
- **High demand for ENT services:** It is clear that there is a need for the WASH services (most especially the need for pump repair services) and sufficient demand for WASH entrepreneurs to earn a livelihood from the WASH activities alone. This may be a source of motivation for the entrepreneurs to keep offering services.

² The Agenda for Transformation (AFT) is the GoL's five-year development strategy. It follows the Lift Liberia Poverty Reduction Strategy (PRS), which raised Liberia from post-conflict emergency reconstruction and positioned it for future growth. It is the first step in achieving the goals set out in Liberia Rising 2030, Liberia's long-term vision of socioeconomic development. The AFT sets out precise goals and objectives that Liberia will achieve in the next five years (2012-2017) to take the necessary steps toward its long-term goals, which are to become a more prosperous and a more inclusive society.

Critical **risks to sustainability** of services were identified as the following:

- **Low funding and lack of clear objectives for Rural Water Services in WASH sector financing (CHP and IHP):** Interviews with key informants from the MPW and MoHSW at the national level showed that funding is the biggest challenge in the sector. Within the GoL budget, funding for the WASH sector is low. There is no single national budgetary allocation for the WASH sector; funding for it is disbursed through four different budget sectors: municipal government, health (MoHSW), energy and environment, and the infrastructure and basic services (MPW). In addition, within the budget of the MPW (the key ministry in WASH activities implementation), no clear objective is attached to rural water services.³ The key ministries supporting operation (MPW and MoHSW) receive only administrative budgets, and there is no distinct budget line in either ministry for programming related to WASH.⁴ In FY 2013/14, WASH received only US \$2.5 million (0.4% of the national budget), down from US \$7.8 million (1.25% of the national budget) in FY 2012/2013. In addition, WASH expenditures in FY 2012/13, including government and donor sources, accounted for 10% of the estimated annual funding requirements in the Sector Investment and Capacity Development plans.⁵ Total funding requirements are estimated at US \$3.4 billion to reach 2030 targets of access to water and sanitation services throughout the country. In addition to the sector-wide financial resources constraints, only a small proportion of the available government funds are directed toward the rural water services.

There is an estimated funding gap of US \$450 million for the five-year period from 2012–2017. The funds allocated for infrastructure development through the County Development Fund (CDF) mainly go to primary and secondary roads, health facilities, and schools construction, with little attention to rural water services.⁶ Lack of sufficient funds has many repercussions. For example, the institutional framework proposed by the WASH Sector Strategic Plan aimed at reducing fragmentation and streamlining functions within the WASH sector has not been fully enacted mainly due to lack of funding resources.

- **Insufficient capacity at national and sub-national levels:** Government WASH sector institutions and agencies suffer from inadequate numbers of staff in key positions as well as insufficient financial and logistical resources. Various stakeholders interviewed during the assessment indicated that there was insufficient capacity at both the national and sub-national levels. However, the low capacity is most apparent at the county and district levels. At the county level, the CWTs are the only staff deployed under the MPW to coordinate and support all WASH activities in the county. At the district level, no staff are currently deployed under the MPW. In addition, the existing staff at both national and sub-national levels are not provided with adequate logistical resources to enable them carry out their mandates.
- **Fragmentation of the WASH sector:** Although remarkable progress has been made toward streamlining the WASH sector in Liberia, the functions within the sector are still spread across a number of different ministries. One bottleneck is that the national Water Supply and Sanitation Commission (WSSC) that should serve as the regulatory authority and policy setter (e.g., standards and norms for consumer services) has not yet been established. Similarly, the Rural Water Supply and Sanitation Bureau (RWSSB), whose primary role will be to assist in hardware procurement, provide technical support, and transfer knowledge and build capacity of county administration and village WASH committees, has not yet been established.

3 Liberia WASH Sector Investment Plan (2011–2017): Detailed Report –Volume 1

4 WASH Sector Strategic Plan for Liberia (2011–2017)

5 Government of the Republic of Liberia. Water, Sanitation, & Hygiene (WASH) Sector Performance Report 2013.

6 Ibid.

- **Non-standardized rural water services management structures at the service level:** Although the roles and responsibilities of community-based WASH committees are clearly defined, the national policies and guidelines are not prescriptive with regard to the committee composition. As a result, the composition and size of the committees encountered during the assessment varied greatly, with numbers of members ranging from 2 to 10, and a median of 4. None of the committees interviewed had a constitution or any other formalized (written) management mechanisms with which to augment the generally agreed-upon rules. Furthermore, the committees suffer from a lack of basic management skills.
- **No clearly established supply chain for genuine hand pump spare parts:** There is a real problem in accessing genuine spare parts at the service level, mainly because there are no spare part depots in most districts and transportation options are limited, especially in the remote areas. This at times forces the communities either to use improvised spare parts or wait for long periods to repair faulty pumps with the appropriate parts.
- **Lack of operation and maintenance (O&M) cost recovery mechanisms for rural water services at the service level:** Although tariffs for water supply services have been set and are collected regularly in most communities, the tariffs are not always based on actual or projected costs but are sometimes set by consensus depending on what the majority of community members perceive they can afford. As a result, the revenue generated by tariffs is insufficient to cover O&M costs. Inability to meet costs of spare parts and labor coupled with the unavailability of genuine spare parts close to the communities result in CHPs and IHPs that sit in disrepair for long periods of time. In addition, most of the communities are unwilling to pay for the pump maintenance and repair services and instead rely on NGOs or the government to carry out the pump repairs.
- **Weak monitoring of water services (sub-national and service levels):** The monitoring of water services and of the overall management by the community is irregular and generally very weak, with the lowest scores recorded from community-level respondents (M-D1b-9%). Most communities indicated that they do not receive regular visits by district/county WASH staff for monitoring, and those visits that did take place occurred during the commissioning of the water point or sporadically for disinfection of the wells, rather than on a regular schedule or when requested by communities.
- **Unclear policy provisions on institutional ownership of water points:** Although the national policies recognize the need for WASH facilities at institutions (i.e., schools and health facilities), there are no clear provisions for school ownership of water supply facilities. Objective 8 of the WASH Sector Capacity Development Plan proposes that a distinction be made between ownership and responsibility for maintaining institutional waterpoints such as schools, health facilities, and government buildings.
- **Inconsistent technical support to water services providers from sub-national level staff:** In general, provision of supportive services to the communities, institutions, and ENTs is poor. This is due to lack of adequate staff at county and district levels as well as limited logistical resources.

There were intervention-specific risk factors for the ENTs:

- **Poor policy environment (ENTs):** There are no guidelines or legislation in place at the national level to facilitate and enable the specific activities of ENTs. While the ENT concept is fairly new in the country and has only been implemented in the iWASH program target counties (Bong, Lofa, and Nimba), many hand pump mechanics have been trained by NGOs as part of their WASH programs across the country to carry out repairs of waterpoints. In spite of the large numbers of community pump technicians trained by NGOs over the years, there are no national guidelines to govern their training and set modalities for their service provision, including a certification or accreditation

process. In addition, there are no guidelines in place to help county WASH authorities to contract the entrepreneurs to conduct repairs on their behalf.

- **Lack of monitoring of ENTs by sub-national authorities:** Despite large networks of ENTs in the counties carrying out repair and maintenance works on IHPs and CHPs, it is apparent that county WASH authorities do not keep a registry of WASH entrepreneurs/mechanics. There is limited contact between the entrepreneurs, CWT, and district authorities, as the entrepreneurs are mainly contracted by communities instead of through the county or district authorities. Therefore, there is no clear system in place to monitor/coordinate their activities or ensure quality control for their services, and there is no clear or standardized process of certifying or accrediting the WASH entrepreneurs other than the training certificates issued by the training organization.
- **Limited engagement of the WASH entrepreneurs by county/district WASH staff:** Although the entrepreneurs are ideally placed to provide information on communal water supply facilities due to their numbers and proximity to the community, county authorities do not utilize the WASH entrepreneur network for collection of monitoring and evaluation (M&E) data. This could be because there are no provisions or guidelines for the county authorities to contract the entrepreneurs and as such, entrepreneurs are not contracted by county authorities to carry out repairs/maintenance of pumps or collect data. This is seen as a major lost opportunity.

RECOMMENDATIONS

NATIONAL LEVEL

There are a number of critical issues affecting sustainability of rural water services at the national level that need to be addressed. The issues as brought out by the SIT assessment reflect those previously identified and acknowledged by key GoL WASH sector planning documents (e.g., WASH Sector Strategic Plan and WASH Sector Capacity Development Plan) and other reports on the sector (e.g., African Development Bank's 2014 Situation Analysis Report for the National Rural Water, Sanitation, and Hygiene Program and the 2013 WASH Sector Performance Report).

In light of the critical risks identified in this assessment, the following is recommended:

- **Improve and increase sector financing.** WASH sector financing in Liberia is low and spread across several ministries and agencies. To meet the sector's needs, increased funds need to be allocated to the sector and WASH services need to be introduced in the national budget. In the interim, the budget sectors through which funds for WASH are released should have clearly disaggregated budget lines for separate WASH activities according to the sector needs. In addition, the government and development partners should focus on facilitating the commitments made by the GoL through the eThekwini Declaration (2008), and at the first high-level Sanitation and Water for All meeting in 2010.
- **Strengthen institutional framework and capacity development of national agencies.** The Liberia WASH sector has made great strides toward reducing fragmentation of functions in the sector as well as in strengthening institutional capacity to deliver on its mandate. However, there are still capacity challenges at national-level institutional instruments/agencies, and not all institutional instruments proposed for the WASH sector reform have been established. To overcome these challenges, the government should focus on funding the implementation of the priority elements of the national-level 2012 Capacity Development Plan and Sector Strategic Plan. Regarding strengthening of the institutional frameworks, focus should be put on facilitating the continued development of the National Water Resource and Sanitation Board (NWRSB) to fully undertake its roles and responsibilities. Efforts should be made to hasten the establishment and operationalization of the RWSSB and the WSSC to achieve the coordination and management of WASH activities under one

body. Capacity development, on the other hand, should focus on increasing professional staff and supportive staff for MPW to improve their capacity to supervise sub-national-level staff. In addition, funds should be made available to provide logistical resources.

- **Improve national WASH information management.** Some achievements have been made in the development of comprehensive WASH data such as the Waterpoint Atlas and establishment of the AKVO FLOW dashboard for reporting. However, M&E systems are still faced with challenges of irregular data submission and updating of the system. There is, therefore, a need to establish a national information system for water supply services, and to update the WASH inventory regularly.
- **Disseminate WASH policies/legislation, guidelines, and standards.** During the assessment, it was observed that approximately 25% of the staff at the district level and the service providers were unfamiliar with the provisions of key WASH policy documents. This appears to be attributable to generally poor dissemination of the documents at these levels, and in many cases, a failure of communication. It is necessary to support the translation of national documents into “simple English” and facilitate wide dissemination of the policies to improve accessibility for the service-level stakeholders.

COUNTY AND DISTRICT LEVELS

- **Support development of county WASH team capacity.** The greatest challenge at the county and district levels is the lack of sufficient human resource capacity and logistical resources. Similar to the national level, the issues of capacity at the county level are identified in the WASH Sector Strategic and Capacity Development plans. To overcome the capacity challenge, the government should focus on funding the implementation of the priority elements of the 2012 Capacity Development Plan for the sub-national level (i.e., increasing of number of personnel constituting CWTs, providing CWTs with logistical support, setting up a county WASH office, deploying WASH staff to the district level and providing them with logistical resources) and supporting training of existing staff.
- **Finance county WASH activities.** As at the national level, funding for WASH activities at the county level is low, and financing mechanisms are unclear. To improve services, there is a need to establish a budget line within the CDF and Social Development Fund for county-level water supply service activities to complement funding allocated through national programs.
- **Enhance extension services to the water service providers.** Extension services to the communities are hampered by the lack of capacity at the county and district levels. Increasing county staff and deploying district staff may take time to be realized as these are contingent on availability of funds and government procedures. As such, facilitating the contracting of WASH entrepreneurs by the county and the use of their network to collect monitoring data/information would help ease the load on the available staff while ensuring communities receive needed services.

SERVICE LEVEL

- **Establish a supply chain for hand pump spare parts.** At the service level, the greatest risk to sustainability is the unavailability of quality spare parts for hand pumps close to the communities. It is crucial for the government, in collaboration with WASH stakeholders, to develop a workable system to provide quality spare parts closer to communities. Based on interviews with the county WASH staff and district authorities and the situation observed on the ground, the most practical system would be to engage private business owners with established hardware stores within the counties to stock hand pump spare parts, especially the quick-moving parts. However, the private business option would work best if combined with the establishment of county-level depots through government initiatives, private sector investment, or a public-private partnership arrangement, from where even small businesses could buy the parts for retail in smaller cities and towns closer to the communities.

- **Enhance extension services to the community level water service providers.** It is necessary to expand and enhance extension services to the communal/institutional water service provider (CHPs and IHPs) on a more regular basis. This could be tied to the engagement and contracting of ENTs by the county/district authorities, since the entrepreneurs are closer to the communities and are greater in numbers than what the government is able to deploy at the district level.
- **Improve monitoring of rural water services at the community level.** The monitoring of communal and institutional rural water service facilities is weak and irregular. This may be due to lack of capacity at the district and county levels. Capacity needs to be increased at the county and district levels to enable staff to effectively and regularly monitor service levels at communal waterpoints.
- **Increase community WASH committee capacity for management of water supply service points.** In addition to the non-standardized composition and size of WASH committees, it was observed during this assessment that the WASH committees charged with management of the waterpoints have limited capacity to do so. It is necessary to build the capacity of community WASH committees to include comprehensive management skills and coach them on setting tariffs based on life cycle costs to improve the management of the waterpoints. In other words, professionalize the WASH committees to the extent possible.

1.0 INTRODUCTION

The Water, Sanitation, and Hygiene Sustainability Index Tool (WASH SIT) was developed through joint funding from Rotary International and USAID as part of the International H2O Alliance. The tool covers a range of quantitative and qualitative indicators grouped under five main factors that influence the sustainability of services: **institutional, management, financial, technical, and environmental**. The SIT utilizes data collected from multiple sources recognizing that factors for sustainability include practices at the household and service provider levels, as well as the enabling environment at the sub-national and national levels. More information on the WASH SIT, including an overview of the methodology that was modified for application in Liberia, can be found at www.washplus.org/rotary-usaid.

The overall purpose of the WASH SIT assessment in Liberia is to inform USAID WASH programming under the Agency's Water and Development Strategy, particularly with respect to sustainability of water supply interventions. Outputs of the SIT will contribute to the development of planned sector investments and inform the ongoing dialogue between USAID/Liberia, the Ministry of Public Works (MPW), other relevant Government of Liberia (GoL) ministries, other development partners, and sector stakeholders. While the SIT provides a sector-wide perspective, it does so through the lens of the interventions of a specific project. In Liberia, the entry point for the application of the SIT is the USAID Improving Water, Sanitation, and Hygiene (iWASH) Program. The following section describes iWASH in more detail.

1.1 IWASH PROGRAM

iWASH was a US\$10 million five-year (February 2010–February 2015) program implemented by Global Communities (previously CHF International) and Population Services International (PSI) with a primary focus on three counties: Bong, Lofa, and Nimba.

The projects under the iWASH program were designed to address both the supply of and the demand for water, sanitation, and hygiene products and services. Demand was addressed through a behavior change strategy. This strategy takes the approach of community-led total sanitation (CLTS), development of a WASH product and service guide, and social marketing principles employed to increase the uptake and effects of CLTS and the benefits of achieving open defecation-free (ODF) status.

In addition to the demand creation projects and activities, there are a number of aspects of iWASH that are focused on increasing the supply of WASH goods and services. These include:

1. Promotion (e.g., distribution and sale) of Water Guard, a point of use water treatment technology;
2. Construction and rehabilitation of water points and latrines for schools and health clinics;
3. Construction of urban latrines in greater Monrovia; and
4. Training of WASH entrepreneurs who function as natural leaders in CLTS triggering, hand pump mechanics, and small business persons supplying products such as Water Guard and soap.

1.2 INTERVENTION TYPES

The iWASH program includes both hardware and software interventions in water supply and treatment, sanitation services, and hygiene products and behavior change. Through conversations with USAID the range of interventions to be included in this assessment was limited to community hand pumps (CHPs),

institutional hand pumps (IHPs), and the training of WASH entrepreneurs (ENT). These interventions are described further in the following sections.

1.2.1 WATER SUPPLY INTERVENTIONS

The primary water supply intervention of the iWASH program was the rehabilitation of existing water points, both CHPs and IHPs (e.g., schools and clinics). When and where possible, individuals trained as hand pump mechanics under the iWASH program (i.e., the WASH entrepreneurs) were employed to perform the required repairs. In addition, iWASH was indirectly responsible for the rehabilitation and repair of various other water points when individuals trained by the program took the initiative to obtain work rehabilitating water points outside of the program communities. Table 1-1 presents a summary of the CHPs and IHPs rehabilitated either directly under iWASH or indirectly by the WASH entrepreneurs.

Table 1-1. Water Points Rehabilitated as a Result of the iWASH Program

County	Community Hand Pump (CHP)	Institutional Hand Pump (IHP)	Total
(# hand pumps)			
Bong	96	54	150
Lofa	42	54	96
Nimba	12	31	43
Grand Total	150	139	289

In addition to the water points that were rehabilitated, new water points were installed/constructed under the iWASH program. Table 1-2 shows a list of the newly constructed boreholes fitted with Afridev hand pumps. Similar to Table 1-1, these data are disaggregated by county and intervention type (i.e., community or institutional hand pump). All new construction was conducted by experienced contractors who were directly funded by iWASH.

Table 1-2. Newly Constructed Boreholes and Hand Pumps under the iWASH Program

County	Community Hand Pump (CHP)	Institutional Hand Pump (IHP)	Total
(# hand pumps)			
Bong	5	7	12
Lofa	11	4	15
Nimba	5	6	11
Grand Total	21	17	38

1.2.2 WASH ENTREPRENEUR

In response to 2011 sanitation market study conducted by iWASH, the program began identifying and training key individuals with entrepreneurial ambitions to start enterprises that can offer WASH services. The objective is that these WASH entrepreneurs would serve multiple communities or districts. The assumption is that these WASH entrepreneurs would gain the skills and experience through the contracts with iWASH and would then provide a more viable alternative (i.e., more responsive and less costly repair service) to contractors based in Monrovia or the county capitals.

A total of 46 individuals were targeted to receive training in hand pump maintenance and in manufacturing tippy-taps (Nimba: 10 individuals; Lofa: 20 individuals; Bong: 16 individuals). The methodology for engaging entrepreneurs varied by county; in Lofa and Nimba the WASH entrepreneurs

were drawn from the CLTS focal persons. In these cases, the program specified the number of women that were to be included. In Bong, the MPW selected the individuals that would be trained.

As of July 2014, WASH entrepreneurs under the iWASH program had repaired 289 water points, 43% of which was through a personal contract (i.e., not contracted by iWASH), as seen in Table 1-3 below. The percentage of personal contracts is highest in Bong County, perhaps due to the fact that trainees in that county were selected by government staff who could later share their contact information with communities for rehabilitation.

Table 1-3. Water Points Rehabilitated by ENTs Disaggregated by Contract Type

County	iWASH		Personal Contract	Grand Total
	During Training		Contract	
Bong	11% (n=16)	35% (n=53)	54% (n=81)	100% (n=150)
Lofa	11% (n=11)	54% (n=52)	34% (n=33)	100% (n=96)
Nimba	14% (n=6)	65% (n=28)	21% (n=9)	100% (n=43)
Grand Total	11% (n=33)	46% (n=133)	43% (n=123)	100% (n=289)

2.0 LIBERIA WASH SECTOR OVERVIEW

2.1 ACCESS STATUS

Existing challenges to Liberia’s WASH sector were further exacerbated during the 1999–2003 conflict and most recently with the 2014–2015 Ebola outbreak. To meet the 2015 Millennium Development Goal (MDG) target, Liberia must reach national rates of access to improved drinking water and sanitation of 79% and 67%, respectively, and the current estimates suggest that the water target will be reached but the sanitation will not. The latest figures from Joint Monitoring Program (JMP) suggest that 76% of the population is using improved drinking water sources and only 17% of the population is using improved sanitation facilities.

Technologies in rural areas are limited mostly to hand-dug wells with some boreholes and a few protected springs and piped systems. More than 80% of all water points in Liberia have Afridev hand pumps installed, despite a lack of formal standardization. Of the over 10,000 water points throughout the country, in 2011 only about half were fully functional and operational all year round (not seasonal).

According to the Water Point Atlas⁷, the coverage and access of the three counties that are the focus of the WASH SIT assessment is as follows;

Table 2-1. Water Atlas (2011) Coverage and Access in Bong, Lofa, and Nimba Counties

County	Coverage (population within 1.5 miles of a water point)	Access (assuming point capacity of max. 250 persons)
Bong	54%	32%
Lofa	67%	43%
Nimba	68%	34%

2.2 SECTOR OVERVIEW

A number of government ministries and agencies are involved with the WASH sector in Liberia. The three primary government entities involved in WASH are the MPW, the Ministry of Health and Social Welfare (MoHSW), and the Liberia Water and Sewer Corporation (LWSC). The key policy and planning instruments in the WASH sector in Liberia include:

- Water, Sanitation, and Hygiene Sector Strategic Plan (2012–2017);
- WASH Sector Capacity Development Plan (2012–2017);
- Liberia WASH Compact, Sanitation and Water for All (SWA): A Global Framework for Action (2011);
- Water Supply and Sanitation (WSS) Policy (2009); and
- Integrated Water Resources Management (IWRM) Policy (2007).

⁷ World Bank Water and Sanitation Program (WSP) (2011). Liberia Waterpoint Atlas, Final Review Version. August 2011.

The above policy and planning instruments delineate the institutional and legal framework for the sector. However, despite recent movement toward a more unified and streamlined sector structure, the sector mandates are fragmented among several ministries and agencies. The framework proposed by the WASH Sector Strategic Plan required the establishment of new agencies that have not yet been fully established. The proposed new agencies with the mandate and responsibility for water supply and sanitation and their status are as follows:

- National Water Resources and Sanitation Board (NWRSB) – **newly re-established and in initial stages of operationalization**
- Water Supply and Sanitation Commission (WSSC) – **not established**
- National Water, Sanitation, and Hygiene Promotion Committee (NWSHPC) – **established and fully functional**
- Rural Water Supply and Sanitation Bureau (RWSSB) – **not established.**

Despite the improvements occasioned by the new institutional framework and notably the NWSHPC, significant disconnects remain across ministries and between different levels of staff within individual ministries. The MPW has been designated as the lead sector ministry, but it faces significant challenges around human capacity and financial resources—a symptom of the limited attention given to WASH on the government agenda. Other government ministries play a less significant role compared to the MPW. Below is a summary of the mandates and functions of the main institutions involved in WASH in Liberia.

- 1) **Ministry of Public Works (MPW):** Planning, design, construction, management and maintenance of public works projects. These include water infrastructure in communities below 5,000 in population as well as roads, bridges, airfields, etc.
- 2) **Liberia Water and Sewer Corporation (LWSC):** Planning, construction, management, and maintenance of water and sewage services in the county capitals and in population centers that have 5,000 people or more.
- 3) **Ministry of Lands, Mines, and Energy (MLME):** Overall responsibility for water resources management (including policy and regulatory functions). The Liberia Hydrologic Services serves as the Secretariat that is the repository for technical information and data on Liberia water resources.
- 4) **Ministry of Health and Social Welfare (MoHSW):** Responsible for sanitation and hygiene as well as setting of water quality and environmental health standards. The planned upgraded Directorate for Community Mobilization and Hygiene Promotion is located within this ministry.
- 5) **Ministry of Education (MoE):** Responsible for school health and hygiene hardware in the country's 4,113 schools (private and public). Software training falls under MoHSW.
- 6) **Ministry of Internal Affairs (MIA):** Responsible for the coordination of county-level infrastructure construction financed from the Social Development Fund.
- 7) **Ministry of Finance (MoF):** Mandate to collect revenue, engage in loan arrangements, disburse government funds, and service the national debt. State corporations like LWSC whose operations do not generate sufficient revenues are supported by the ministry to stay in business.

At the county level, government authorities are headed by a County Superintendent and have responsibility for the facilitation and oversight of WASH activities at the sub-national level. The structure of the county local authority can vary but always includes a County Health Team (CHT) that includes environmental health staff. The county structure also includes a Planning Officer and an Infrastructure Engineer who often does not have WASH experience. The district-level structures also include a District

Development Committee, and the county-level structures report to the MIA. Capacity at the county and municipal levels is extremely limited.

In addition to these institutions, international civil society organizations (CSOs) play an active role in the WASH sector, with many international nongovernmental organizations (NGOs) working directly with county government and in the construction of hand pumps throughout the country. The Liberia WASH sector has numerous active donors and implementers. The largest single bilateral or multilateral aid organization is the African Development Bank (AfDB), followed by the Water and Sanitation Programme (WSP), USAID, United Kingdom's Department for International Development (DfID), and the United Nations Development Programme⁸. The CSOs and international NGOs play a crucial role in Liberia's WASH sector especially in financing of sector activities.

⁸ Israel, M and Favazza, D. (2014). Liberia Wash Sector Assessment Desk Review: Wash Sector Status And Trends.

3.0 WASH SUSTAINABILITY INDEX TOOL

The WASH SIT utilizes both primary and secondary data that is collected through a desk review, key informant interviews, focus groups discussions, and observation at various levels. These levels are generically referred to as “national,” “decentralized,” and “service.” In Liberia the “decentralized” level includes both the county and district governments. Table 3-1 provides a general list of the key informants interviewed for each of three intervention types considered in this assessment. See Annex 1 for a detailed list of the key informants.

Excluded from this table are households. It was determined that data collection activities would not include households due to the sensitivities and logistical issues resulting from the Ebola outbreak. In all other ways the methodology of the WASH SIT was followed. See Annex 2 for more information on the contextualization, pre-testing, pilot testing, quality control, etc. For additional information on the WASH Sustainability Index Tool (SIT) methodology, visit <http://www.washplus.org/rotary-usaid>.

3.1 SAMPLE FRAME SELECTION

This key selection criteria for the enumeration areas was based on the findings of Foster⁹ who determined that non-functionality was correlated to the distance that the hand pump was situated from the county capital. Using the data from the Water Atlas, the non-functional hand pump increased by 8% with each additional 10 kilometers from the county capital. As a result, a total of 10 communities were selected from each of the three counties (Bong, Lofa, and Nimba): five intervention communities (i.e., from iWASH) and five non-intervention communities. These communities were selected considering the distance from the nearest spare parts supply depot. Table 3-2 shows how communities were categorized into three groups (A-C). Within each group, one or two communities were selected.

Table 3-2. Selection Criteria for Communities Included in the Survey Sample

Group	Definition	Intervention	Non-Intervention
Group A	$X < 20$ km	2 communities	2 communities
Group B	$20 \leq X < 40$ km	2 communities	2 communities
Group C	$X \geq 40$ km	1 community	1 community

Where X is the distance to the nearest hand pump supply depot which also corresponds to the county capital for Bong and Lofa counties.

⁹ Foster, T. (2013). Predictors of Sustainability for Community-Managed Hand pumps in Sub-Saharan Africa: Evidence from Liberia, Sierra Leone, and Uganda. *Enviro Sci & Tech*.

Table 3-1. Summary of the Stakeholders and Institutions Consulted for Each Investigation Level of the SIT

Intervention Type	Service Level (S)		Service Authority (D)		National (S)
	Service Provider	Local Authority/ Stakeholder	District Level	County Level	
Community Hand Pump (CHP)	1) Community WASH Committee	2) Town Chief	1) District Commissioner	Ministry of Public Works (MPW) 1) County WASH Coordinator 2) County Pump Technician Ministry of Health and Social Welfare (MoHSW) 3) County Health Officer (CHO) 4) County Health Team 5) Community Health Division Director (CHDD) Environmental Protection Agency (EPA) 6) Environmental Health Technician (EHT) Supervisor	Ministry of Public Works (MPW) Ministry of Health and Social Welfare (MoHSW) Environmental
Institutional Hand Pump (IHP)	1) School authorities	2) Town Chief	1) District Commissioner 2) District Education Officer	MPW 1) County WASH Coordinator 2) County Pump Technician MoHSW 3) CHO 4) County Health Team 5) Community Health Division Director (CHDD) Ministry of Education 6) County Education Officer (CEO) EPA 7) EHT Supervisor	Ministry of Public Works (MPW) Ministry of Health and Social Welfare (MoHSW) Ministry of Education (MoE) Environmental
WASH Entrepreneur (ENT)	1) WASH Entrepreneur OR 2) Natural Leader/ local pump technician	1) Natural Leader 2) Town Chief	1) District Commissioner	MPW 1) County WASH Coordinator 2) County Pump Technician MoHSW 3) CHO 4) County Health Team 5) Community Health Division Director (CHDD) EPA 7) EHT Supervisor	Ministry of Public Works (MPW) Ministry of Health and Social Welfare (MoHSW) Environmental

The non-intervention communities included in the survey were selected by their proximity to the intervention community (i.e., each intervention community was matched with the nearest non-intervention community to ensure that they fell in the defined categories). In Lofa County, however, two of the intervention communities (and consequently two non-intervention communities) that had been selected using the above criteria were not accessible due to heavy rains in the region at the time of the assessment. These communities were replaced by other intervention communities in the general area that were accessible.

3.2 FINAL SAMPLE FRAME

3.2.1 COMMUNITY HAND PUMPS

A total of 23 communities were selected for CHP surveys. This included 10 intervention communities (communities where the iWASH program had either rehabilitated or constructed a community hand pump) and 13 non-intervention communities. The communities surveyed are located in five different districts (see Table 3-3).

Table 3-1. Community Hand Pump: Communities Surveyed by County and District

County	District	Intervention Communities	Non-intervention Communities	Total
Bong	Jorquelleh	2	2	4
	Kokoyah	2	3	5
Lofa	Kolahun	2	2	4
	Voinjama	2	3	5
Nimba	Sanniquellie Mahn	2	3	5
	Total	10	13	23

3.2.2 INSTITUTIONAL HAND PUMPS

A total of nine institutions (schools) were selected for IHP surveys. This included six intervention institutions and three non-intervention communities. Initially, a total of eight intervention institutions were targeted for survey, but one institution in Kpotomai community was inaccessible at the time of survey due to heavy rains and there was no other intervention institution in the area to replace it. The schools at Karmodu community in Voinjama (intervention) and Samay community in Jorquelleh (non-intervention) were out of session and as such only observable information/data was collected.

The institutions surveyed fell into five districts (see Table 3-4 below). Both of the non-intervention institutions were surveyed in Gbehley-Geh District.

Table 3-2. Institutional Hand Pumps Surveyed by County and District

County	District	Intervention	Non-intervention
Bong	Kokoyah	2	-
	Jorquelleh		1
Lofa	Voinjama	1	-
Nimba	Gbehley-Geh	2	2
	Sanniquellie Mahn	1	-
Total		6	3

3.2.3 WASH ENTREPRENEURS

Entrepreneurs from a total of nine communities were selected for ENT surveys, all of which were intervention communities. The communities fell into five districts (Kokoyah, Jorquelleh, Sanniquellie Mahn, Kolahunm and Voinjama) in the Bong, Lofa, and Nimba counties. Data was also collected at district (MoHSW/NCHT-District Health Officer, MIA-District Commissioner), county (MPW-WASH Technician/Coordinator, MoHSW-CHO, EPA-EHT Coordinator), and national levels (MoHSW and MPW).

4.0 IWASH SIT ASSESSMENT RESULTS

The following sections present the results of the assessment. A technical inspection was performed on each of the hand pumps; these results are presented in Section 4.1. In addition, data were collected to assess the likely long-term sustainability of the services. These results are presented in Section 4.2 and are disaggregated by intervention type (CHP, IHP, WASH entrepreneur).

4.1 RESULTS: TECHNICAL INSPECTION

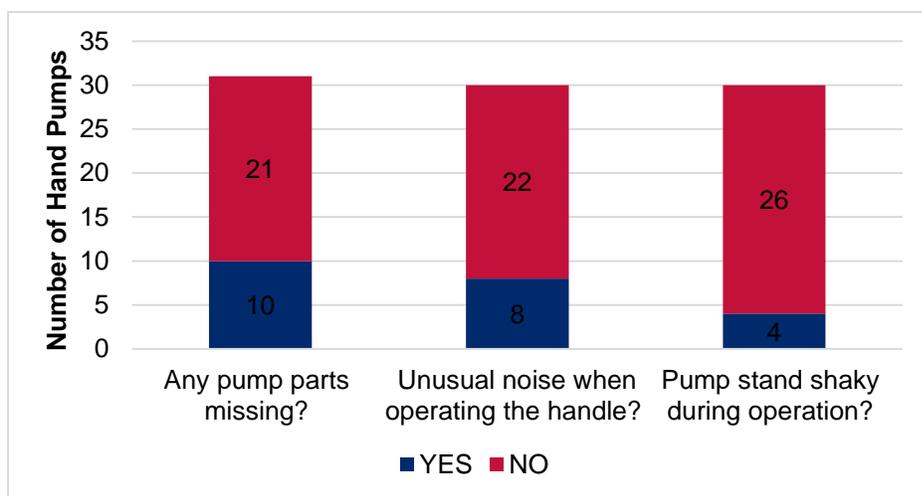
4.1.1 GENERAL

All the water points inspected were fully lined/reinforced and fitted with Afridev hand pump except for that in Lowley School where the pump head was missing (see Table 4-1 below). The majority (24 out of 31) of pumps inspected had a name plate to show the details of manufacturer, manufacture date, and serial number; however, the plates had faded and the details were not legible for nine of these.

Table 4-1. Type of Well and Pump by Intervention Type

Type of Well and Pump	CHP	IHP	Total
Hand-dug well with Afridev hand pump	18	5	24
Shallow drilled well with Afridev hand pump	4	2	6
Borehole with Afridev hand pump	1	0	1
TOTAL	23	7	30

Figure 4-1. General Status of the Pumps Inspected



The condition of the bearings was normal in 22 of the pumps, broken in 6 and worn in 2. All functional pumps had clear water with no smell or sediment, with the exception of one pump (at Kpairplay School) that had colored water with sediment. The general condition of the pumps inspected is as shown in Figure 4-1.

The most common part missing from the hand pumps was a U-seal, which is considered a fast-moving part. This part was the cause of failure in approximately 3% of the hand pumps from the Water Atlas study. The U-seal was missing from 6 out of the 30 hand pumps (Table 2).

Table 4-2. Missing Pump Parts Documented During the Survey

Missing pump part	No. of pumps
Pump head*	1
U-seal	6
Foot valve	1
Sprout**	1
Plunger valve	1
Pump head bolts	1

* The pump head at Lowley Public School was stolen and has not been replaced since August 2014

** The pump was working but the sprout was broken and needed replacement

4.1.2 FUNCTIONALITY STATUS

About one-third (11 out of 31) of all pumps were not functioning at the time of inspection. The institutional hand pumps recorded a lower functionality than community hand pumps, with five out of eight (62.5%) of the institutional pumps being non-functional (see Figure 4-2). Jorquelleh District pumps had the best functionality rate with all pumps assessed within the district functional at inspection time, and those in Gbehley-Geh had the worst with only one out of four pumps assessed as functional (see Figure 4-3). In addition, two of the non-functional pumps in Gbehley-Geh District had been down for nine months (Lowley School) and one for more than one year (Zorgowee School). Although the reasons for failure to carryout repairs on these pumps could not be fully established, discussion with the school authorities indicated that the schools had no funds to cover the repair costs. In addition, the school authorities had no knowledge of who they could report the breakdown to in the district/county offices.

Figure 4-2. Hand Pump Functionality Status by Intervention Type

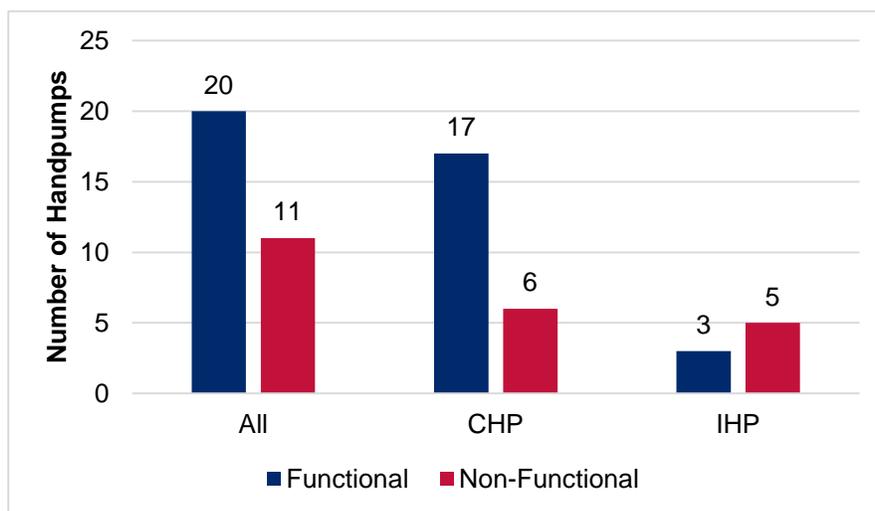
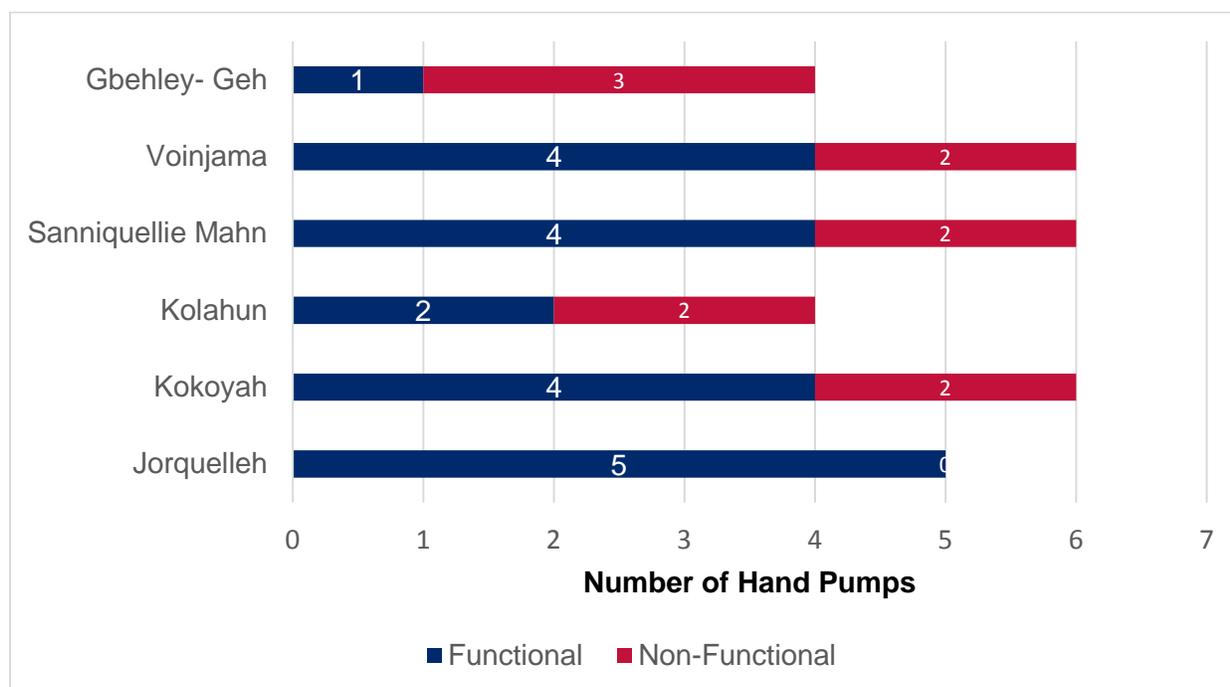


Figure 4-3. Hand Pump Functionality by District



The overall functionality rate of the hand pumps surveyed was 64.5%, which is similar to the overall functionality rate of the six districts surveyed (65%) as calculated from the 2011 Water Atlas data. See Table 4-3 for details of functionality rates in the districts.

Table 4-3. Survey Functionality vs. Water Atlas Functionality Rate by District

STATUS	BONG		NIMBA		LOFA		ALL
	Jorquelleh	Kokoyah	Sanniquelleh Mahn	Gbehley-Geh	Voinjama	Kolahun	
Water Atlas functionality rate	34%	31%	71%	77%	66%	68%	65%
Survey functionality rate	100%	50%	67%	33%	50%	50%	65%

4.1.3 SANITARY INSPECTION AND WATER QUALITY

A sanitary inspection was conducted for each hand pump using a score card adapted from the WHO to the Liberian context (see Annex 3 for more details). A sanitation score was obtained for each hand pump by reviewing the score card questions and counting the number of “Yes” responses. The “contamination risk score” has a potential 11 points. Ratings are as follows: very high (9–11), high (6–8), intermediate (3–5), and low (0-2). The contamination risk score is then compared to the results of the fecal coliform test that was conducted on water samples obtained from each hand pump (Figures 4-4 and 4-5).

Figure 4-4. Fecal Coliform Results by Intervention Type

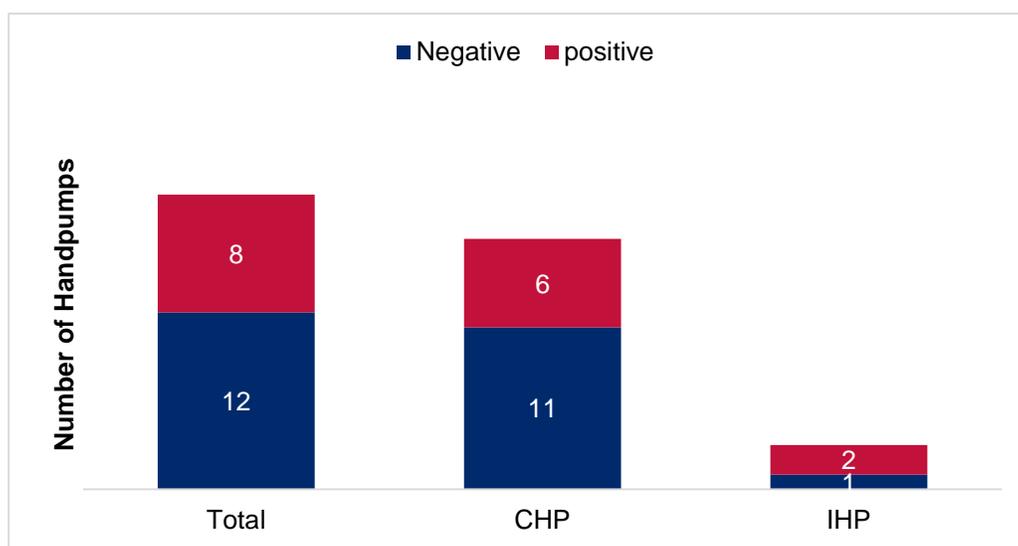
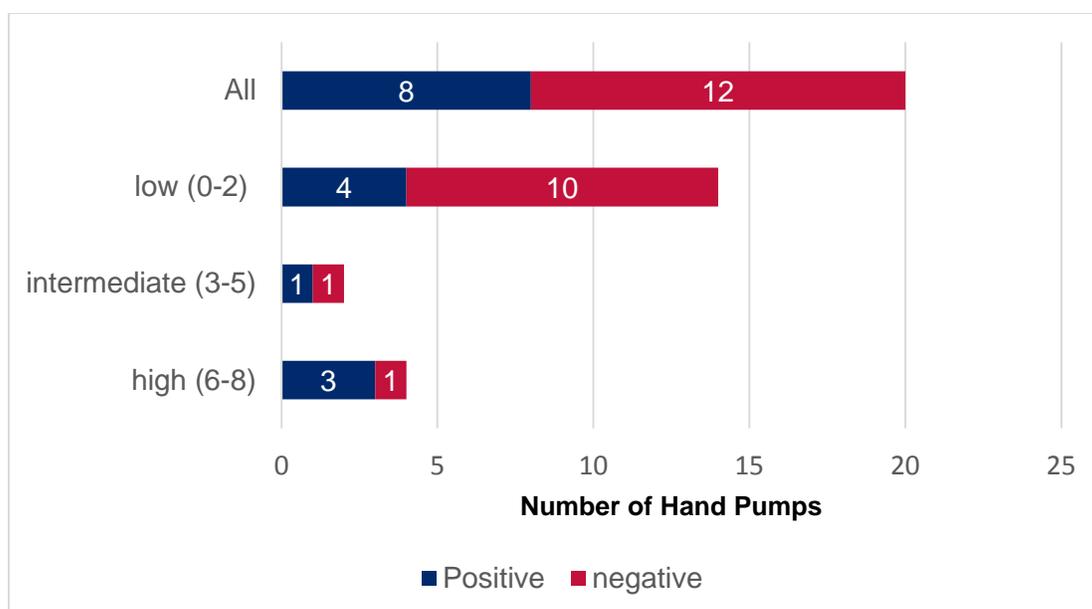


Figure 4-5. Contamination Risk Score and Fecal Coliform Tests



A higher contamination risk score indicates that a water point is at a higher risk of contamination from surface sources of contamination mainly due to damage of the apron and unsanitary conditions around the well. During the assessment, a large proportion (75%) of wells with a high contamination risk score tested positive for fecal coliforms while a much smaller proportion (28%) of wells with a low contamination risk score tested positive for fecal coliform.

4.1.4 DISCHARGE AND LEAKAGE TEST

A technical performance inspection was performed on all functional hand pumps. The test consisted of a leakage test and a discharge test (i.e., stroke test). Table 4-4 provides the details for how these tests are performed and interpretation of the results.

Table 4-4. Leakage and Discharge Test Details

	Leakage Test	Discharge Test⁵
Steps	1) Operate pump handle until water is flowing from the spout. 2) Stop operating the pump handle for approximately 30 minutes. 3) Then operate the handle and count exactly how many strokes are required until the water is starting to flow again.	1) Operate pump handle until a constant water flow is achieved. (Pump rate of 40 full handle strokes per minute). 2) Place a bucket in the continuous water flow for exactly one minute (i.e., 40 full hand pump strokes). 3) Take the bucket off the water flow and check the amount of water.
Measure	Number of strokes required to obtain water flow.	Time required to pump 15 liters at a steady pumping rate of 40 strokes per minute. ¹⁰
Result	If more than 5 handle strokes are required to make the water flow again, the foot valve in the rising main leaks and needs repair/replacement.	If the discharge is less than 15 liters (RWSN) or 16.5 (manufactures), there might be a problem with the bobbins or the cup seal.

Eleven pumps out of 19 (58%) filled the 15-liter bucket in less than 60 seconds, while eight pumps filled the bucket in more than 60 minutes. Out of the eight pumps, four were in intervention communities and four in non-intervention communities. This indicates that these eight pumps might require a replacement of the bobbins or cup seal.

In the leakage test, only one pump (St. Mary’s Catholic School at the Catholic Compound in Sanniquellie Mahn District) recorded more than five handle strokes to make the water flow again and, as such, might require the foot valve to be repaired or replaced (see Table 4-5).

Table 4-5. Hand Pump Leakage Test Results

No. of strokes	All hand pumps
1-5 strokes	18
5-10 strokes	1
Total*	19

*One of the functional pumps (Samay School) had its handle locked at the time of the inspection and as such the leakage and discharge test was not conducted. However, a water sample was collected at this source.

4.2 RESULTS: SIT FRAMEWORKS

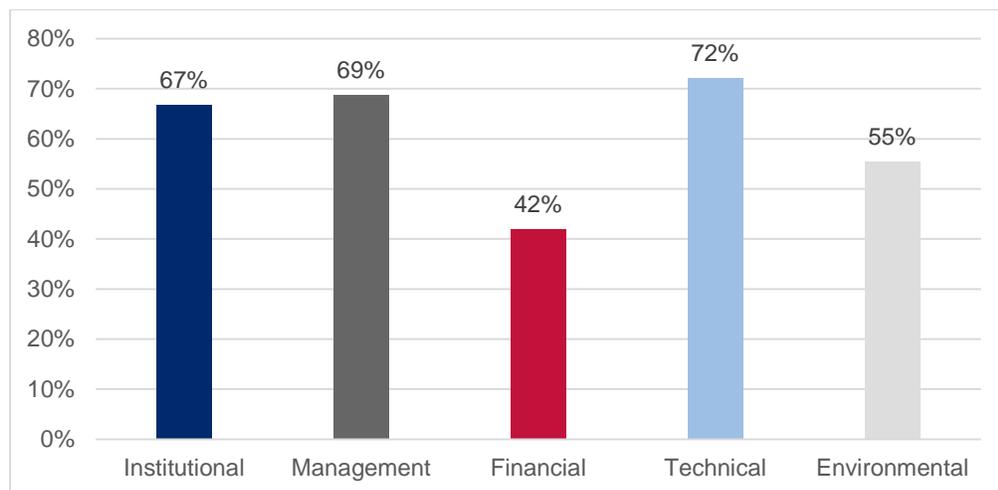
The following sub-sections present the sustainability assessment results for each intervention type by the five sustainability factors (institutional, management, financial, technical, and environment). Bar charts are used to present the overall factor score by intervention type (i.e., average scores across all communities), and bar charts and radar diagrams are used to show the factor scores disaggregated by county and community. For a complete list of the indicator scores by community along with a detailed commentary on the sustainability framework results see Annexes 4–6.

¹⁰ Typically the volume of water produced in one minute (i.e., 40 strokes) is measure, however this test was modified and the time required to fill a 15 liter jerry can at a steady pumping rate was used.

4.2.1 INTERVENTION: COMMUNITY HAND PUMP (CHP)

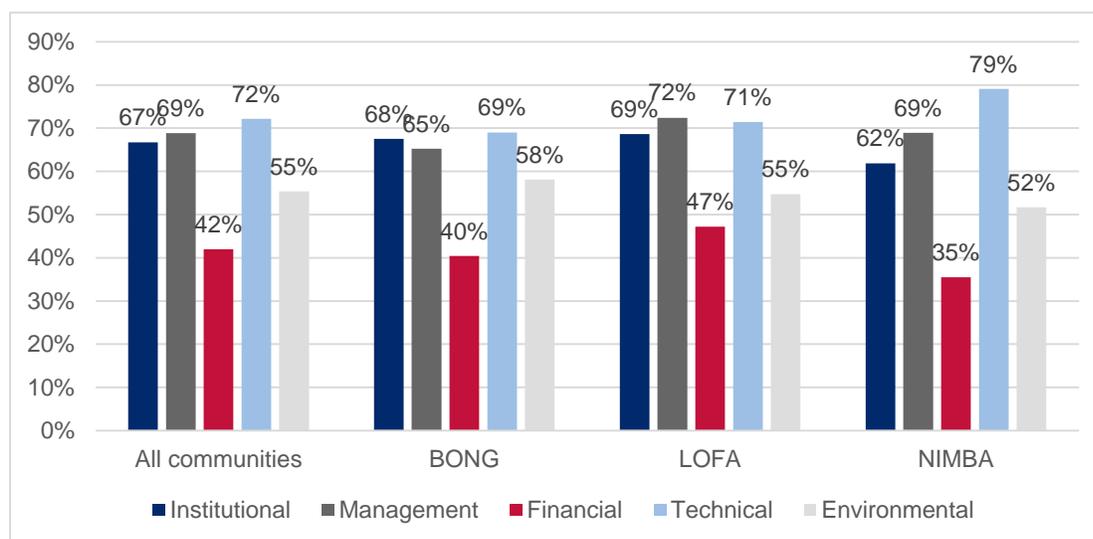
Overall results are presented below followed by a brief commentary that captures the qualitative information gathered during the survey. The results were also disaggregated per county to highlight the inter-county variation in the overall indicator and factor scores. The overall sustainability index score for CHP across all communities is 61%.¹¹ The overall factor scores are as shown in Figure 4-6.

Figure 4-6. Overall Sustainability Factor Scores for Community Hand Pumps



There were significant intra- and inter-county variations in factor scores. In general, Lofa recorded top scores for three out of the five factors (institutional, management, and financial, see Figure 4-7).

Figure 4-7. Sustainability Factor Scores by County for Community Hand Pumps



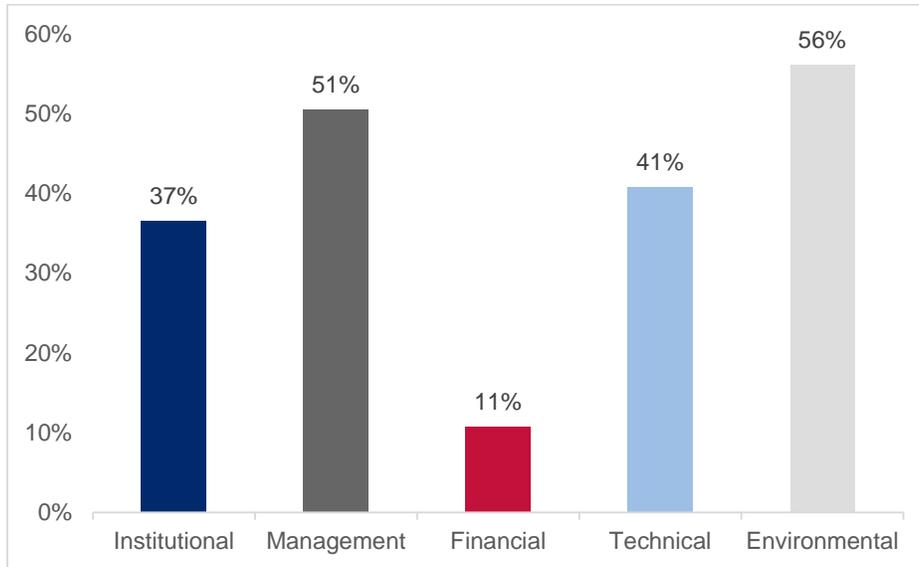
4.2.2 INTERVENTION: INSTITUTIONAL HAND PUMP (IHP)

The overall results are presented below followed by a brief commentary on the results that captures the qualitative information gathered during the survey. The results were also disaggregated per county to

¹¹ The sustainability index score is calculated by aggregating the overall factor scores for the specific intervention.

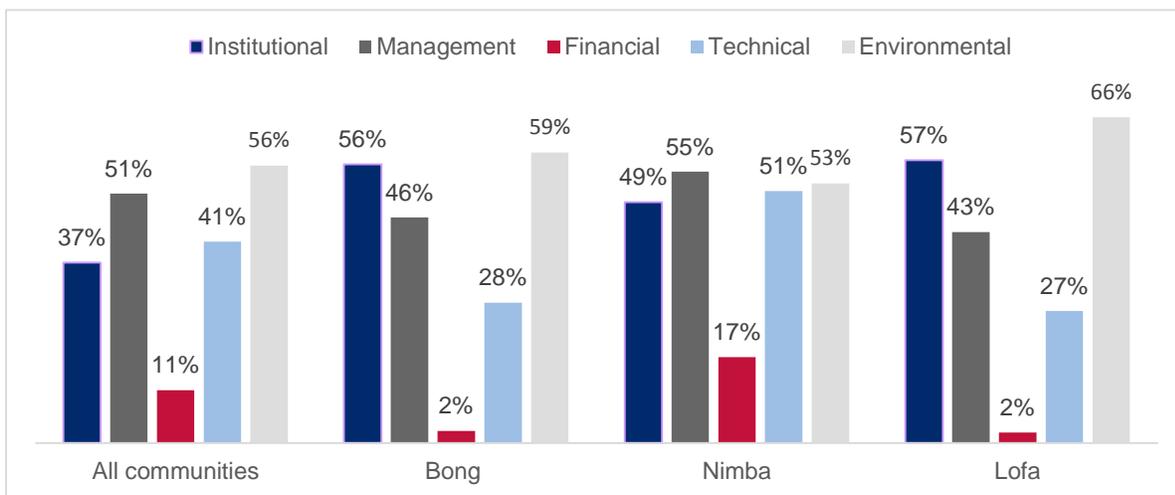
highlight the inter-county variation in the overall indicator and factor scores. The overall sustainability index score for IHP across all communities was low at 42% with only two factor scores above 50% (see Figure 4-8).

Figure 4-8. Overall Sustainability Factor Scores for Institutional Hand Pumps



Overall, IHP recorded lower factor scores than other interventions. There were significant intra- and inter-county variations in factor scores; however, the financial factor recorded the lowest scores across all counties and the environmental factor recorded the highest scores across all counties (see Figure 4-9).

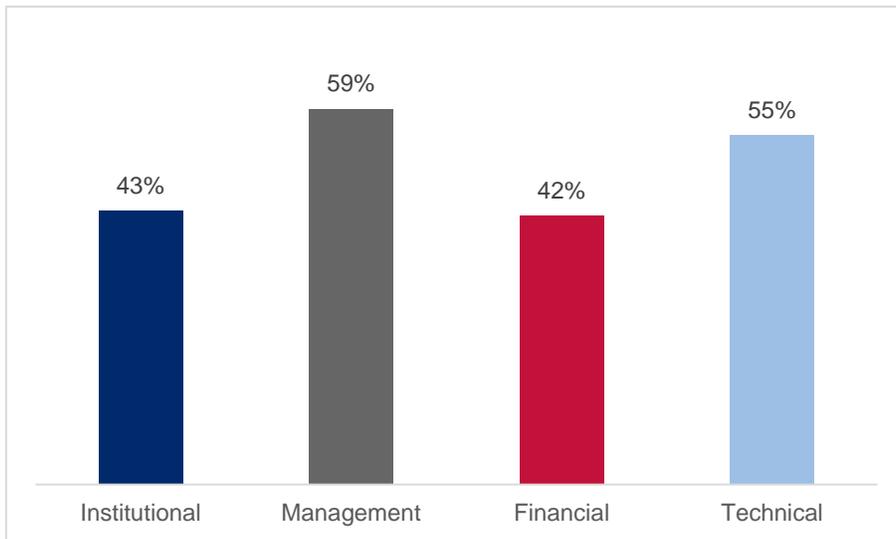
Figure 4-9. Sustainability Factor Scores by County for Institutional Hand Pumps



4.2.3 INTERVENTION: WASH ENTREPRENEURS (ENT)

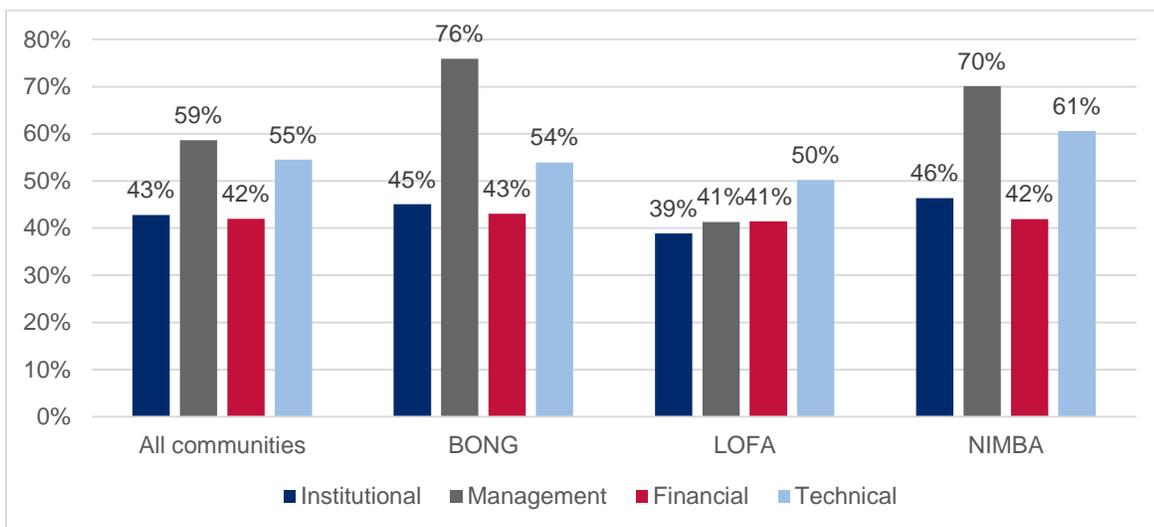
The overall results are presented below followed by a brief commentary on the results that captures the qualitative information gathered during the survey. It is important to note that environmental factor was not included in the WASH entrepreneur indicators framework since the intervention is not affected by changes in the environment. The results were also disaggregated per county to highlight the inter-county variation in the overall indicator and factor scores. The overall sustainability index score for ENT across all communities was low at 43% with only two of the factor scores above 50% (see Figure 4-10).

Figure 4-10. Overall Sustainability Factor Scores for ENTs



There were significant intra- and inter-county variations in factor scores; however, there was a similar pattern in the factor scores relative to the other factors (see Figure 4-11).

Figure 4-11. Sustainability Factor Scores by County for ENTs



5.0 KEY FINDINGS

Indicators with low scores tend to be risk factors to sustainability, while those indicators that have high scores may be considered drivers of sustainability. The following sections present the key findings that have emerged from an analysis of these risk factors and drivers of sustainability from both primary data collected through interviews and secondary data obtained through a review of relevant documents and policies in the Liberian WASH sector and the experiences of the national and international WASH experts involved in this assessment.

Due to the design of the SIT framework, with sustainability indicators organized by administrative levels, the key findings have been organized in a similar way. Below we present our findings organized by intervention type (community hand pump, institutional hand pump, and WASH entrepreneurs) and level (national, county and district, and service).

5.1 INTERVENTION: COMMUNITY HAND PUMPS

5.1.1 NATIONAL LEVEL

DRIVERS

Relevant policy legislation established

At the national level, there are implementable policies, legislation, and standards/guidelines for water supply and sanitation delineating the standards for water quality, water quantity, and accessibility of rural water services for populations across Liberia (sub-indicator score: 81%). The national policies also recognize community management of water supply facilities (sub-indicator score: 88%). In addition, the WASH Sector Strategic Plan delineates the strategic approaches for carrying out the priority interventions for rural, urban, and peri-urban settlements. The plan pays particular attention to the strengthening of the institutional structure in the WASH sector and the issues of financing of the sector. There are also policies and standards for the management and protection of the environment with regards to the development of water supply infrastructure.

The NWRSB envisioned to oversee the WASH sector has been established and held its first meeting in June 2015. The NWRSB is designed to be a policy, planning, financing, and monitoring group that will provide oversight to the coordination and operationalization of relevant sector policies. The NWRSB is expected to oversee the development of structures and mechanisms to reduce fragmentation of the WASH sector functions; however, it is not fully functional.

The entity responsible for WASH sector coordination at the national level is the NWSHPC. The NWSHPC is fully functional and has been effective in bringing together a wide range of stakeholders. The committee has been instrumental in facilitating the implementation of a number of key activities aimed at stimulating development and promoting coordination in the sector. This includes organizing and facilitating the annual joint sector review, which is an opportunity for stakeholders to discuss progress, establish goals and objectives, and identify the ideal steps for proceeding. In addition, the NWSHPC convenes regular sector coordination meetings for all actors and stakeholders at the national level.

RISKS

Fragmentation of functions across ministries

Although there are policies, legislation, and coordination mechanisms in place at the national level, the WASH sector in Liberia faces major challenges due to a general fragmentation of essential governmental functions across ministries, an inadequate number of staff in key positions within the WASH ministries, and insufficient financial resources invested in the sector. Considering the legislation, standards, norms, and guidelines that are in place, there is a disparity in knowledge and understanding of this enabling legislation and also a disparity in resources and capacities between the national and decentralized level. In general, representatives of the WASH ministries and government at the lower levels were less informed on the provisions of standards, norms, and guidelines except in regards to their roles and responsibilities. This disconnect is perceived as a risk factor to the sustainability of the rural water supply services as it is crucial that the WASH actors understand their respective roles and responsibilities.

Low capacity to implement strategic policy objectives

The institutional framework proposed by the WASH Sector Strategic Plan is aimed at reducing fragmentation and streamlining functions within the WASH sector; however, it has not been fully enacted mainly due to lack of funding resources. As a result, the planning and implementation of water service programs is still spread across a number of different ministries. One bottleneck is the fact that the WSSC¹², which should serve as the regulatory authority and policy setter (e.g., standards and norms for consumer services) has not yet been established. Similarly, the RWSSB whose primary role will be to assist in hardware procurement, provide technical support, and transfer knowledge and build capacity of county administration and village WASH committees has not yet been established.

Low capacity to undertake exiting mandates

In addition, the WASH agencies and institutions currently operating lack the human capacity and logistical resources to effectively carry out their mandate. Various national stakeholders interviewed during the assessment indicated that there was insufficient capacity at the central level (sub-indicator score 24%). For example, the Bureau of Community Services contains two divisions, the Rural Water Supply Division (RWSD) and the Community Services Bureau (CSB), each headed by a director. RWSD is responsible for rural WASH activities while the CSB is responsible for social mobilization and sensitization. The two directors, two assistant directors, a NWSHPC coordinator, and a CLTS Specialist constitute the key professionals for rural WASH at the national level. The WASH Sector Capacity Development Plan proposed an increase in staffing at the national level to improve ability for sub-national supervision. Specifically, the plan proposed the creation of three new positions for each department under the MPW, including the CSB, to be filled by young graduates. The plan also called for office managers and administrative assistants for each department to be filled (these positions have been approved).¹³

Low funding and insufficient logistical support

In addition to the deficit in human resources, there is a lack of sufficient logistical and financial resources. For example, 2014 AfDB Situation Analysis Report for the NRWASHP noted that “RWSD is not given the needed logistics and financial resources for supervision and regular monitoring visits to the counties,

¹² The WSSC will be comprised of experts drawn from various sectors including Water & Sanitation, Economics, Sociology, Law, Public Health, Environment, and Finance. The WSSC will act as the service regulator and developer and shall among other functions, establish measures and standards for water quality, serve as regulatory authority on water and sanitation activities and make policy decisions on water and sanitation within the framework of national legal institutions/instruments.

¹³ Liberia WASH Sector Capacity Development Plan (2012-2017).

districts, and communities.”¹⁴ This report remarked that the RWSD lacks both the means of transportation and the operational budget to fulfill its monitoring and support mandate. Financial constraints have also led to challenges in the implementation of the Capacity Development Plan.

Interviews with key informants from the MPW and MoHSW at national level showed that funding is the biggest challenge in the WASH sector (indicator score: 32%). Funding for the WASH sector in the GoL budget is low and spread across a number of ministries, departments, and agencies. There is no single national budgetary allocation for the WASH sector (sub-indicator score: 0%), and funding for the sector is disbursed through the municipal government, health (MoHSW), energy and environment, and infrastructure and basic service (MPW) sectors. In addition, in the budget of the MPW, the key ministry in WASH activity implementation, no clear objective is attached to rural water services.¹⁵ The key ministries supporting operation (MPW and MoHSW) receive only administrative budgets, and there is no distinct budget line in either ministry for programming related to water supply, sanitation, or hygiene.¹⁶ In FY 2013/14, WASH received only US\$2.5 million US \$(0.4% of the national budget), down from US\$7.8 million (1.25% of the national budget) in FY 2012/2013. In addition, WASH expenditures in FY 2012/13, including government and donor sources, accounted for 10% of the estimated annual funding requirements in the Sector Investment and Capacity Development plans.¹⁷ Total funding requirements are estimated at US\$3.4 billion to reach 2030 targets of access to water and sanitation services throughout the country. In addition to the sector wide financial resources constraints, only a small proportion of the available government funds are directed towards provision of rural water services.

There is an estimated funding gap of US\$450 million for the five year period from 2012–2017. In light of the funding gaps from the government, donor funding will continue to be important to the WASH financing portfolio in the foreseeable future. At the county level, the funds allocated for infrastructural development through the County Development Fund (CDF) goes mainly to primary and secondary roads, health facilities, and schools construction with little attention to rural water services.

5.1.2 COUNTY AND DISTRICT LEVELS

DRIVERS

Progress on decentralization

The MPW decentralized some of its functions to the counties as part of the overall decentralization process in Liberia. The WASH functions under the ministry are carried out by the CWTs, made up of a County WASH Coordinator, a Pump Technician, and a Social Worker. Data collected through key informant interviews with the County WASH staff indicated that the roles and responsibilities of the CWTs are clear (sub-indicator score: 87%) and understood by the staff involved in WASH activities management at the county level (sub-indicator score: 81%), as well as the service providers (sub-indicator score: 90%). The data also showed that effective coordination mechanisms are in place at the county level (sub-indicator score: 97%). These are crucial in ensuring effectiveness and efficacy in the county-based WASH activities.

¹⁴ African Development Bank (AfDB). (June 2014). National Rural Water Sanitation & Hygiene Program (NRWASHP) Development Study Briefer: Inception Report. Prepared by Egis Eau (France) in association with Trend Group (Ghana) and Cape Resources, Inc. (Liberia).

¹⁵ Liberia WASH Sector Investment Plan (2011-2017): Detailed Report – Volume 1.

¹⁶ WASH Sector Strategic Plan for Liberia (2011-2017).

¹⁷ Government of the Republic of Liberia. (2013). Water, Sanitation & Hygiene (WASH) Sector Performance Report.

RISKS

Low capacity to undertake exiting mandates (staff shortages)

The gains of sound national policies and clearly defined and understood roles of the county WASH staff are undermined by lack of sufficient capacity to execute their mandate. Interviews with the county WASH Team staff and district authority officials showed that there is insufficient capacity (sub-indicator score: 10%) for the management of water services activities in counties. There is a severe shortage of staff (F-D1a: 3%), with the three-person CWTs serving as the only WASH staff in six or more health districts. The staff are responsible for providing WASH services (both hardware and software) for populations of 333,481 people with 824 hand pumps in Bong County; 276,863 people with 829 hand pumps in Lofa County; and 462,026 people with 2,384 hand pumps in Nimba County. The lack of staff (especially pump technicians) at the county level negatively affect their ability to undertake monitoring and coaching visits to the districts and communities, unless an NGO subsidizes their visit.

Inability to support WASH committees

This inability to monitor and support WASH committees in turns affects the performance of these committees at the community level.¹⁸ At the district level, no WASH staff (hand pump mechanics) are deployed under the MPW, but health officers responsible for WASH software programs are deployed under the MoHSW. In addition, the CWTs suffer inadequate logistical resources and funds. The situation analysis of the sector conducted by the NRWASHP showed that all counties cited the lack of budget, inadequate/unserviceable motorbikes, lack of fuel allocations for field visits, and inadequate numbers of staff as their main challenges. Bong County was included in the situation analysis, and mobility constraints (lack of transport) were cited to explain why the CWT relied on NGOs for facilitation of field visits to communities.

Overextension of CWT Leaders

The WASH Capacity Development Plan proposed the increase in the number of CWT staff from three to six staff, to include a Water Engineer (Team Leader), Admin/Finance Officer, and a Procurement Officer. At the district level, the plan proposed the posting of a Pump Mechanic and Social Worker.¹⁹ Currently, the WASH Coordinators (CWT leaders) are of varied qualifications and experience, but they are expected to facilitate WASH planning, implementation support, and monitoring and evaluation (M&E) in their counties; provide technical support to community management; and serve as the link between the communities and the counties and between the counties and national MPW.²⁰ In light of the disparity in qualifications and experience, the Capacity Development Plan proposed standard training courses for the CWT staff, especially those without degree-level qualifications. The Capacity Development Plan also proposed the procurement of a logistics, equipment, and office package for the MPW team at county levels following an audit of existing facilities. The plan proposed a minimum of one double cab pick-up truck, two motorbikes, one laptop, two desktop computers, two printers, one photocopier, internet access, one full set of pump repair equipment, and GPS units and smartphones. For the district WASH team, the plan proposed two motor bikes, one set of pump mechanic tools, one smartphone with GPS, and sufficient supply of information, education and communication (IEC) materials for the district team.

¹⁸ African Development Bank (AfDB). (June 2014). National Rural Water Sanitation & Hygiene Program (NRWASHP) Development Study Briefer: Inception Report. Prepared by Egis Eau (France) in association with Trend Group (Ghana) and Cape Resources, Inc. (Liberia).

¹⁹ Liberia WASH Sector Capacity Development Plan (2012-2017).

²⁰ African Development Bank (AfDB). (June 2014). National Rural Water Sanitation & Hygiene Program (NRWASHP) Development Study Briefer: Inception Report. Prepared by Egis Eau (France) in association with Trend Group (Ghana) and Cape Resources, Inc. (Liberia).

Insufficient funding for training and support activities

Similar to the situation at the central level, funding of communal water supply services and activities in the counties is inadequate. Primary data collected during the assessment show that there is insufficient budget for staff training and facilitation (sub-indicator score F-N1d: 0%). In addition, there is no budgetary allocation for the construction and rehabilitation of water points under the CDF (sub-indicator score F-N1c:28%). This greatly hampers the ability of the CWT to deliver on its mandate.

Lack of Spare Parts Depots below County level and no remit for oversight or regulation

Although there are hand pump spare parts depots at all the county capitals of the Lofa, Bong, and Nimba counties, there are no hand pump spare parts stores at the district level except in Gbehley-Geh and Kolahun districts. As such, there is no reliable source of quality/durable spare parts for the hand pumps closer to the service providers. The Guidelines for Water and Sanitation Services in Liberia (2010) clearly stipulates the standards for the construction of water points (hand-dug wells, drilled wells, and boreholes) and the recommended hand pump brands for installation in Liberia (Afridev, Indian Marl II, and Kardia type K-65). However, Afridev is the most common hand pump in Liberia and is preferred for its affordability (in terms of installation, operation and maintenance costs) and the relatively higher availability of spare parts. In addition, Afridev pumps perform above average even when controlling for age and other relevant variables. The guidelines, however, places the responsibility of providing quick-moving spare parts on the agencies installing the pump rather than on state- or county-accredited suppliers, which could lead to sub-standard spare parts. The lack of spare parts leads to long pump down times, especially in the remote areas of the counties.

5.1.3 SERVICE LEVEL

DRIVERS

Basic community management structures established

At the service level, a majority of CHPs have a management structure, i.e., a WASH committee (sub-indicator score I-S1a: 83%), in place to provide general management and maintenance of the pump, as well as to ensure the proper use and care of the pump. This is reinforced by the presence of national policy that recognizes community management. The WASH Sector Strategic Plan acknowledges the government's limitations in regard to providing and servicing all water and sanitation facilities in rural areas, and recognizes the role of community ownership and management in ensuring ongoing sustainability.

The selection of the WASH committees in both intervention and non-intervention communities was mostly carried out in consultation with the local leaders. Town chiefs (sub-indicator score I-S1da: 83%) were also involved in the siting of the wells (sub-indicator score T-S1c: 91%). In addition, the management roles and responsibilities of the WASH committees (as set by the community or with help from the NGO that installed the hand pump) are clear (sub-indicator score M-S1a: 83%). The roles as described by the respondents varied greatly, but all of them indicated their responsibility for the daily running and care of the pump and general management duties such as calling and holding meetings, monitoring the pump for faults, and collecting tariffs.

Baseline standards and benchmarks for CHP and IHP met in majority of cases

Technically, the majority (77%) of hand pumps assessed met standards/norms in terms of water quantity (i.e. provide year-round water supply at sustainable yield of a least 264 gallons per hour), siting, and public health risk and water quality. Most communities visited also had access to a trained pump technician in the community or nearby (sub-indicator score T-S4b: 78%), e.g., in a neighboring community.

RISKS

Lack of clarity on WASH Committee Composition

Although the roles and responsibilities of community-based WASH committees are clearly defined, the national policies and guidelines are not prescriptive regarding the composition of the committees (e.g. the smallest management unit at which the committee may be formed such as per village or per water point; the minimum number of persons that would comprise the committee, gender representation, and basic principles for managing and selecting committee members). As a result, the composition and size of the “committees” encountered during the assessment varied greatly, with the number of members ranging from two to ten and a median of four. None of the committees interviewed had a constitution or any other formalized management mechanisms (written) to augment the generally agreed upon “rules.” Furthermore, the committees suffered from a lack of basic management skills.

Shortage of affordable spare parts of sufficient quality

There is a real problem accessing genuine hand pump spare parts at the service level, mainly because there are no spare parts depots in most districts, and transportation options are limited especially in the remote areas (sub-indicator score T-S4c: 38%). This forces communities to either use improvised spare parts or wait for long periods of time. Although tariffs for water supply services have been set in most communities and are collected regularly, they are not necessarily based on actual or projected costs but rather are set by consensus among the community members depending on what the majority perceive to be affordable. As a result the revenue generated by tariffs is not sufficient to cover O&M costs (sub-indicator score F-S2b: 13%). This coupled with the unavailability of genuine hand pump spare parts close to the communities result in community hand pumps that remain broken as the communities are unable to meet the costs for spare parts and labor.

Overreliance reliance on NGOs for routine maintenance

In addition, most of the communities are unwilling to pay for the maintenance and repair services and instead rely on NGOs or the government to carry out the repairs. In light of these challenges, the WASH Sector Strategic Plan proposes that the construction and/or rehabilitation of water supply facilities be conducted through cost-sharing wherein communities contributes at least 10% of total costs in cash or in kind. The plan places the responsibility for funding the ongoing O&M costs on the communities but emphasizes the need for the use of technologies that the communities would be able to effectively manage with limited outside support in terms of O&M costs and technical simplicity.

Lack of regular monitoring

The monitoring of water services and of the overall management by the community is irregular and generally very weak, with the lowest scores recorded from community level respondents (service level sub-indicator score M-D1b: 9%). Most communities indicated that they do not receive regular visits by district/county WASH staff for monitoring, with most visits by said staff occurring during the commissioning of the water point or sporadically for disinfection of the wells rather than on a regular schedule or when requested by communities. This is mainly due to lack of sufficient capacity at the county/district levels to provide extension services to the communities. This lack of regular monitoring makes it difficult to keep track of the service levels at the communal water points as well as to identify of faults in time for prompt repairs/maintenance.

5.2 INTERVENTION: INSTITUTIONAL HAND PUMP

5.2.1 NATIONAL LEVEL

DRIVERS

Relevant policy legislation established

At national level, there is policy that recognizes responsibilities for institutional-based water service providers (national level sub-indicator score I-N1a: 100%). Additionally, policies, legislation, and standards/guidelines for water supply and sanitation delineating the standards for water quality, water quantity, and accessibility of water supply services for institutions across Liberia are in place (sub-indicator score: 65%). The Physical Environment Unit of the Ministry of Education (MoE) has also created standardized designs for school infrastructure, including water supply and latrines.²¹

Presently, the Division of School Health, Physical Education, and Sports within the MoE is mandated to regulate, coordinate, and implement all school-based health related programs within Liberia, including the responsibility to make provisions for schools in its water supply interventions programs.²² In addition, the national WASH Sector Strategic Plan recognizes the need for water supply services at schools and proposes supporting the education sector to mainstream WASH into its budgets including infrastructure plans and inspection procedures; develop WASH guidelines for school; and modify routine monitoring of schools to include WASH.

RISKS

Lack of clarity regarding ownership of IHP facilities

Although the national policies recognize the need for water supply facilities at institutions (i.e., schools and health facilities), there are no clear provisions for school ownership of water supply facilities. Objective 8 of the WASH Sector Capacity Development Plan proposes that a distinction be made over ownership and responsibility for maintaining institutional water points such as schools, health facilities, and government buildings. In addition, roles and responsibilities for the monitoring and enforcing policies providing for water service levels in regard to schools are unclear (sub-indicator score T-N2d: 42%).

The national water supply and sanitation policy recognizes community ownership of water points but does not mention institutional ownership except in regards to sanitation facilities. However, this may change in the near future if the proposal to make WASH in schools the responsibility of the MoE and mainstreaming WASH in schools in the MoE budgeting and inspection procedures is approved.

Uneven knowledge of existing policies

In addition, the knowledge of the existence of these policies varies, with the district level recording much lower scores than other levels. This could indicate that the dissemination of the policy documents is a potential problem. Regarding the management structures for institutional water supply facilities, there are no guidelines for their formation and constitution. As a result, the management committees at the institutions are formed at the discretion of the school authorities rather than following a standard process/procedure.

²¹ Liberia WASH Sector Performance Report (2013).

²² Ibid.

Lack of national level funding for IHP life cycle costs

In general there are no mechanisms to provide financial resources to meet the hand pump life-cycle costs for school water points at national or county levels (indicator score F-N1: 0%). The MoE does not have a budget line for WASH in schools and mainly depends on NGOs for support.²³ The lack of a dedicated WASH budget within the MoE hampers the ability of the schools to meet the O&M costs, especially because few collect money from the parents or parent teacher associations (PTAs). As a result schools rely on NGOs to carry out the repair of faulty hand pumps. In addition, there are no national guidelines for tariff contribution by the water users or students at school water points, and as such, there is no legal basis for school authorities to collect money for O&M.

Lack of clarity on asset registration and monitoring

Although there is a central registry for facility water points, the Education Management Information System (EMIS), it is unclear whether the institutional data is sent to the county for relay to the central registry. All institutions included in this assessment indicated that they do not send any data to the county WASH office. Data is collected for the EMIS through questionnaires to a targeted number of schools, as opposed to required data submission for all schools. While this is useful in determining the trends in WASH coverage in schools and in identifying key areas of intervention, it may not be very useful in monitoring service levels at individual schools to take necessary and appropriate action.

5.2.2 COUNTY AND DISTRICT LEVELS

DRIVERS

Interviews with the county WASH Team staff and district authorities indicate that there are staff at the county level for supporting institutional water points management and maintenance (county sub-indicator score 1-D1c: 92%; district sub-indicator score 1-D1c: 71%).

RISKS

Capacity and remit of county level staff

Although there are staff at the county level (MPW and MoHSW) to support water supply services and activities in institutions, these are the same staff who are responsible for supporting communal WASH activities. As such, their roles and responsibilities regarding the maintenance of water supply facilities at schools is not clear/understood by the county and district staff (sub-indicator score I-D1a: 8%). In addition, county/district staff are unable to provide technical support for repairs and maintenance of institutional hand pumps on request (indicator score T-D1: 29%). This could be due to the general issues of understaffing and lack of adequate logistical and financial resources at the county and district level, as earlier described.

Insufficient funding for IHP at county level

As is the case with CHPs, funding of water supply services and activities in schools at the county level is inadequate. Primary data collected during the assessment show no budgetary allocation for WASH in schools through the CDF (sub-indicator score F-N1b: 0%). In addition, there is insufficient budget for staff facilitation (sub-indicator score F-D1b: 0%), which greatly hampers the ability of the WASH team staff to support schools in construction/rehabilitation of water points, as well as in the provision of pump maintenance/repair services.

²³ Ibid.

5.2.3 SERVICE LEVEL

DRIVERS

Basic management structures formed

All institutions visited by the assessment team had formalized structures for the management of the hand pumps (sub-indicator score I-D1b: 96%). The management committees are formed by the school administration in all of the schools visited; however, the committee constitution of members varies from school to school. For example, one school's committee was comprised of a teacher, the janitor, and two students; another's was comprised of a teacher and two PTA members; and yet another's was comprised of a teacher, the chief, and two community members.

RISKS

Low functionality of IHP services

The functionality of institutional hand pumps was generally low. At the time of assessment, more than half (63%) of the institutional hand pumps assessed were non-functional (see technical inspection results in Section 4.1) and only half of the institutional water pumps complied with norms/standards for siting, sanitary conditions, and drainage (T-S2: 50%). This may be attributed to several factors both at county and service levels. Limited technical support is available from the district/county WASH staff to the schools in terms of water points monitoring and repairs/maintenance (indicator T-D1: 29%). During the assessment, all institutions surveyed indicated that they have never received any technical support from district staff. In addition, the schools lack of O&M budget for the water supply facilities limits their ability to cover the O&M costs when needed (sub-indicator score F-D1a: 0%).

Lack of spare parts for IHP services

The unavailability of hand pump spare parts close to the institutions (sub-indicator score S3b: 11%) is also a contributing factor to the low rate of functionality of school hand pumps. Additionally, all but one school included in the survey could not afford spare parts. This was not due to prohibitive prices, but rather because schools had no budget for O&M and there was no financing mechanism for school water points O&M. This results in extended down times since the schools rely on NGOs or the government for installation or rehabilitation of water points. The WASH Sector Strategic Plan proposes availing subsidies to cover the cost of materials that are not available locally for institutional/communal sanitation projects initiated by community, but there is no mention of water supply projects.

5.3 INTERVENTION: WASH ENTREPRENEURS

5.3.1 NATIONAL LEVEL

RISKS

Lack of national-level legislation and guidelines

Although there is clear demand for the services of WASH entrepreneurs especially for pump repairs across the nation, there is no guideline or legislation in place at the national level to facilitate and enable the specific activities of WASH entrepreneurs (sub-indicator score I-N1a: 20%). While the WASH entrepreneur concept is fairly new in the country and has only been implemented in the iWASH program target counties (Bong, Lofa, and Nimba), many hand pump mechanics have been trained by NGOs as part of their WASH programs across the country to carry out repairs of water points. In spite of the large numbers of community pump technicians trained by NGOs over the years, there are no national guidelines to govern their training and set modalities for their service provision (e.g., certification and

accreditation process). In addition, there are no guidelines in place to help county WASH authorities to contract the entrepreneurs to conduct repairs on their behalf (sub-indicator score I-N1b: 8%).

Lack of regulated spare parts supply chain at national level

There is no clearly established supply chain for genuine hand pump spare parts in the country and no national registry for genuine suppliers/depots (sub-indicator score I-Nd: 6%). This is despite the majority of communal water points in the country being fitted with hand pumps. As such, spare parts supply is mainly through project-supported supply depots at the county level or established privately owned hardware stores that introduce hand pump spare parts in their stock. Objective 8 of the WASH Capacity Development Plan proposes that a national strategy for water point and hand pump maintenance be developed and include participation of the private sector.

5.3.2 COUNTY AND DISTRICT LEVEL

DRIVERS

High demand for services

From the areas visited in the assessment, the need for the WASH entrepreneurs is clear and there is sufficient demand for entrepreneurs to earn a livelihood from the WASH activities alone (sub-indicator score M-D2a: 89%). In addition, county WASH authorities are open to the possibility of contracting ENTs for repair or rehabilitation of hand pumps; however, this has not been realized yet.

RISKS

No registry of existing networks or certification

Despite large networks of WASH entrepreneurs in the counties carrying out repair and maintenance works on communal and institutional hand pumps, the county WASH authorities do not keep a registry of entrepreneurs/mechanics. There is limited contact between the entrepreneurs and CWTs and district authorities, as the entrepreneurs are mainly contracted by the communities. Therefore, there is no clear system in place to monitor/coordinate their activities or ensure quality control for their services. There is also no clear or standardized process of certifying or accrediting the WASH entrepreneurs other than the training certificates issued by the training organization.

Low level of coordination and interaction with CWTs

In addition, it is unclear how involved CWTs are in the training of ENTs. Interviews with the county CWT staff during the assessment showed that while they were aware of the trainings, they had limited knowledge of the materials used, which could indicate that they were not involved in the development of the materials. The training of the entrepreneurs under the iWASH program was conducted over 11 days and covered two main areas, pump repair/maintenance and basic entrepreneur skills. The pump repair training was carried out using a combination of teaching methods: lecture, demonstration, and field/practical sessions. The key topical areas covered included: an introduction to Afridev hand pump and hand-dug wells; the assembly/disassembly of the hand pump and general care of the pump parts; similarities and difference between various pump types common in Liberia; and demonstrations on the construction of key components of the hand-dug wells. The entrepreneurship training covered basic business principles, marketing, costing and pricing, record keeping, and business planning. However, it is unclear if this process of training is standardized or was unique to the iWASH program.

No integration into monitoring activities

Although the entrepreneurs are ideally placed to provide information on communal water supply facilities due to their numbers and proximity to the communities, county authorities do not utilize the WASH

entrepreneurs network for collection of M&E data (sub-indicator score M-D1c: 30%). This could be because there are no provisions or guidelines for the county authorities for contracting entrepreneurs, and as such entrepreneurs are not contracted by county authorities (sub-indicator score F-D1d: 13%) to carry out repairs/maintenance of pumps or collect data. This is seen as a major lost opportunity.

Low level of support for ENTs

The WASH entrepreneurs do not receive technical support from the county WASH authorities. However, the majority of entrepreneurs interviewed indicated that they did receive technical support from NGOs (mainly Global Communities), albeit not with sufficient frequency (sub-indicator score I-D2d: 21%). The lack of technical support from county authorities may be due to lack of guidelines for county government to engage the entrepreneurs coupled with the limited contact between the two parties. In addition, access to spare parts is a problem in most areas surveyed (sub-indicator score T-D1a: 43%) and mainly dependent on proximity to the county capital cities. In other countries, the acceptable radius of access to spare parts is considered to be about 50 kilometers. For Liberia, the assessment team used a radius of 40 kilometers (similar to the categories used in the sampling protocol); following this, 91%, 59%, and 49% of hand pumps in Bong, Lofa and Nimba counties, respectively, would be within the acceptable radius.

5.3.3 SERVICE LEVEL

DRIVERS

At the service level, there is sufficient demand for water services for entrepreneurs to make a living (sub-indicator score M-D2a: 83%). All entrepreneurs interviewed during the assessment indicated that the earnings they make from providing WASH services (mainly pump repairs) contributed significantly to their personal and household incomes (between 20% and 70% of income, with a median of 40%). This may be a source of motivation for the entrepreneurs to keep offering the services. In addition, all entrepreneurs interviewed possessed appropriate technical training and skills/competences to perform routine repair on common hand pumps in Liberia (sub-indicator score I-S1a: 73%). They also possess appropriate tools for minor repairs.

RISKS

Availability of spare parts

The greatest challenge for the entrepreneurs at the service level was the unavailability of quality hand pump spare parts, especially in areas outside the county capitals (sub-indicator score T-D1a: 43%). This is compounded by limited transport options from the remote areas to the capitals. In addition, interviews with the entrepreneurs revealed that few of them buy and stock quick-moving spare parts for repairs.

Willingness and ability to pay in spite of demand

The entrepreneurs are not contracted by the county and district authorities to carry out repairs (sub-indicator score F-D1d: 13%) and have to rely on contracts given by the communities. While the demand for services by the communities is high, most are either unwilling or unable to meet the costs for spare parts and entrepreneurs' service fees. At times the entrepreneurs have to resort to taking payment in kind or waiting until the communities can afford to pay him. As such, the demand for their services do not guarantee that the entrepreneurs will be able to make a living wage. This could discourage the entrepreneurs from offering WASH services as their main occupation. It was observed during the assessment that all but one of the entrepreneurs interviewed offered WASH services as a side business/job, and only in a third of the cases was earning potential as a WASH entrepreneur higher than the individual's other earnings (sub-indicator score M-S1b: 33%).

Low financial administration capacity

Although the training of WASH entrepreneurs under the iWASH program included basic training in entrepreneurship and business management (e.g., business planning, marketing, and financial management), most of them lack adequate marketing and financial management skills. In addition, only about a third of the entrepreneurs interviewed had a plan for new business development (sub-indicator score M-S1d: 33%). Regarding financial management, just over half had financial records and fewer based the price of their services on the actual costs they had incurred. The apparent lack of adequate skills and competence to effectively run the WASH services provision as a business means that the entrepreneurs are unable to make profits or savings from their services, which could result in some abandoning the endeavor. It was also observed during the assessment that the majority of the trained WASH entrepreneurs were young people from the selected communities, and some had moved to other areas in search of better opportunities, leaving their communities without a pump repair mechanic.

5.4 SPARE PARTS SUPPLY CHAIN ANALYSIS

Spare parts management is crucial to proper maintenance and sustainability of water supply systems. The WASH SIT assessment in Liberia revealed major challenges in spare parts management across all the counties and all the three interventions at all levels.

Quality and availability

The two top issues are the availability and quality of spare parts. Other issues include the limited transportation/mobility options in rural Liberia, which make it difficult for the WASH entrepreneurs to access spare parts depots that are currently located in the county capitals. The limited transportation options also increases the amount of money that communities have to spend to obtain spare parts. Increased cost of spare parts can impact the affordability of spare parts and could drive communities to buy lower-cost spare parts that are of lower quality, which could result in less willingness to pay by the community if the parts prematurely fail. Therefore, it is recommended that efforts be taken to improve the spare parts supply chain.

The goal of any spare parts supply chain development activities should be to ensure that four characteristics are met: availability, accessibility, appropriateness, and affordability. All these characteristics are either directly or indirectly related to the market for spare parts. This market is defined by the number and type of hand pumps in the geographic area where the spare parts are being sold. One way to analyze the market for spare parts is to look at the commercial viability of a spare parts supply shop.

Commercial viability analysis

In light of the WASH SIT findings, additional analysis was conducted to shed further light on the challenge of spare parts supply and the viability of establishing hand pump spare parts depot at district level, as is proposed by the WASH Sector Strategic Plan 2012–2017. One methodology to analyze the commercial viability of spare parts supply at the user level is to consider the required density of hand pumps to produce sufficient demand to generate an income that would be acceptable for a potential retailer. The minimum density required to fulfill this is defined as the Hand Pump Density Breakpoint (HDB). The methodology used to analyze the HDB is similar to the analysis used in Ethiopia.²⁴

²⁴ Ministry of Water, Irrigation and Energy of Ethiopia and Ministry of Foreign Affairs Finland (FINIDA) have developed materials under the CoWASH Project. See MoWIE (2013) for more information. (full citation in Annex 7).

Using the methodology (see Annex 7 for details), the HDB for Liberia is 0.221 pumps/km². In other words, there needs to be a hand pump every 5.14 square kilometers in Ethiopia and every 4.52 square kilometers in Liberia. These figures for HDB were compared against the actual hand pump density to determine whether there is sufficient density of hand pumps to support a spare parts supply business. Using data from the 2011 Water Atlas census, the team calculated the hand pump densities for the counties and districts surveyed during the assessment. Assuming the minimum required profit is representative, then the low hand pump density in the areas surveyed would indicate that it would be commercially unviable and therefore unsustainable to establish a spare parts supply store in these districts unless subsidies or incentives were introduced.

See Annex 7 for more details on the spare parts supply chain and hand pump mechanics analysis and results.

6.0 RECOMMENDATIONS/ PRIORITY AREAS FOR ACTION AND INVESTMENT

6.1 NATIONAL LEVEL

There are a number of critical issues affecting sustainability at the national level that need to be addressed. The issues as brought out by the SIT assessment reflect those previously identified and acknowledged by key GoL WASH sector planning documents (WASH Sector Strategic Plan and WASH Sector Capacity Development Plan) and other reports on the sector (e.g., African Development Bank’s Situation Analysis Report (2014) for the NRWASHP and the WASH Sector Performance Report, 2013). Below are recommendations from the assessment team.

FACILITATE IMPROVED SECTOR FINANCING

The WASH sector financing in Liberia is low and spread across several ministries and agencies. To meet the sector’s needs, increased funds need to be allocated to the sector and WASH services need to be introduced in the national budget. In the interim, the budget sectors through which funds for WASH are released should have clearly disaggregated budget lines for WASH activities according to sector needs.

The GoL, by signing the eThekwini Declaration,²⁵ committed to allocating 0.5% of its gross domestic product (GDP) to sanitation. At the first high-level Sanitation and Water for All (SWA) meeting in 2010, the government also committed to providing 7.3% of its Poverty Reduction Strategy (PRS) budget to WASH. To deliver on this commitment, the Sector Strategic Plan proposed that the GoL commit to spending 0.5% of GDP on sanitation and hygiene and increasing the amount of its total budget—by 1.5% in the first year and an additional increment of 1% per year to a total of 5.5% in the fifth year—on WASH.²⁶ The government and development partners should focus on facilitating the realization of these commitments.

STRENGTHEN INSTITUTIONAL FRAMEWORK AND CAPACITY DEVELOPMENT OF NATIONAL AGENCIES

The Liberia WASH sector has made great strides toward reducing fragmentation of functions in the sector, as well as in strengthening institutional capacity to deliver on its mandate. However, there are still capacity challenges at national-level institutional instruments/agencies, and not all institutional instruments proposed for the WASH sector reform have been established. To overcome these challenges,

²⁵ This is a declaration made by the Ministers and Heads of Delegations responsible for sanitation and hygiene from 32 African countries at the Second African Conference on Hygiene and Sanitation in Durban, South Africa, February 18–20, 2008. Under the declaration, the signatories committed to the following, among other pledges: to establish, review, update and adopt national sanitation and hygiene policies within 12 months of AfricaSan 2008; to increase the profile of sanitation and hygiene in Poverty Reduction Strategy Papers and other relevant strategy related processes; To ensure that one, principal, accountable institution takes clear leadership of the national sanitation portfolio; and to establish specific public sector budget allocations for sanitation and hygiene programs. Our aspiration is that these allocations should be a minimum of 0.5% of GDP for sanitation and hygiene.

²⁶ Liberia WASH Sector Strategic Plan (2011-2017).

the government should focus on funding the implementation of the priority elements of the national-level 2012 Capacity Development Plan and the WASH Sector Strategic Plan (2011–2017). Regarding strengthening of the institutional frameworks, focus should be put on facilitating the continued development of the NWRSB to fully undertake its roles/responsibility. Efforts should be made to hasten the establishment and operationalization of the RWSSB and the WSSC to achieve the coordination and management of WASH activities under one body. Capacity development, on the other hand, should focus on increasing professional staff and supportive staff for MPW to improve their capacity to supervise sub-national-level staff. In addition, funds should be availed to provide logistical resources.

IMPROVE NATIONAL WASH INFORMATION MANAGEMENT

Some achievements have been made in the development of comprehensive WASH data such as the Waterpoint Atlas and establishment of the AKVO FLOW dashboard for reporting. However, M&E systems are still faced with challenges of irregular data submission and updating of the system. There is therefore a need to establish a National Information System for WASH and to update the WASH inventory regularly (including both CHP and IHP assets). In addition, it is necessary to support the development and dissemination of M&E tools and to link data with actions/activities.

DISSEMINATE WASH POLICIES/LEGISLATION, GUIDELINES, AND STANDARDS

During the assessment it was observed that approximately 25% of the staff at the district level and the service providers were unfamiliar with the provisions of key WASH policies documents. This appears to be attributable to generally poor dissemination of the documents at these levels and in many cases a failure of communication. It is necessary to support the translation of national documents into “simple English” and facilitate wide dissemination of the policies to improve accessibility for the service-level stakeholders.

ESTABLISH WASH POLICIES/LEGISLATION, GUIDELINES, AND STANDARDS FOR WASH ENTREPRENEURS

No guideline or legislation currently exists at the national level to facilitate and enable the specific activities of WASH entrepreneurs (sub-indicator score I-N1a: 20%). A key priority therefore is to facilitate dialogue leading to the establishment of the required policies at national level. This could be achieved in the first instance by a MoU between the relevant stakeholders and a timeline for adoption and integration of basic strategies into existing guidelines.

6.2 COUNTY AND DISTRICT LEVELS

DEVELOP COUNTY WASH TEAM CAPACITY

The greatest challenge at the county and district levels is the lack of sufficient human resource capacity and logistical resources. Similar to the national level, the issues of capacity at the county level are identified in the WASH Sector Strategic and Capacity Development plans. To overcome the capacity challenge, the government should focus on funding implementation of the priority elements of the 2012 Capacity Development Plan for the sub-national level, namely increasing of number of personnel making up the CWTs; providing CWTs with logistical support (e.g., a vehicle, motorcycles, laptops/computers, internet access); setting up a county WASH office; deploying WASH staff to the district level and providing them with logistical resources (e.g., motorcycles, laptops, internet access, water quality kits, and pump repair tools); and supporting training of existing staff.

FINANCING COUNTY WASH ACTIVITIES

As at the national level, funding for WASH activities at the county level is low, and financing mechanisms are unclear. There is no budgetary allocation for the construction and rehabilitation of waterpoints under the CDF. To improve services, there is a need to establish a budget line within the CDF and Social Development Fund for county-level WASH activities to complement funding allocated through national programs.

ENHANCE EXTENSION SERVICES AND DIRECT SUPPORT TO THE SERVICE LEVEL (CHP, IHP and ENT)

Extension services for water supply to the communities are hampered by the lack of capacity at the county and district levels. Increasing county staff and deploying water service staff at district level may take time to be realized as these are contingent on availability of funds and government procedures. As such, facilitating the contracting of WASH entrepreneurs by the county and the use of their network to collect monitoring data/information would help ease the load on the available staff while ensuring that the communities receive needed services.

6.3 SERVICE LEVEL

ESTABLISH A SUPPLY CHAIN FOR PUMP SPARE PARTS (CHP and IHP and ENT)

At the service level, the greatest risk to sustainability of rural water supply interventions is the unavailability of quality hand pump spare parts close to the communities. It is crucial for the government, in collaboration with WASH stakeholders, to develop a workable system to provide quality spare parts closer to communities. Options include: i) establishing spare parts depot at the county and district levels; ii) establishing a supply system through the county and district WASH offices; and iii) engaging private business owners to stock spare parts in their already established stores.

The first option may be too expensive while the second would be contingent on the establishment of district WASH office, which may take too long. Based on interviews with the county WASH staff and district authorities and the situation observed on the ground, the most practical system would be to engage private business owners with established hardware stores within the counties to stock hand pump spare parts, especially the quick-moving parts. However, the private business option would work best if combined with the establishment of county-level depots through a government initiative, private sector investment, or a public-private partnership arrangement, from where even small businesses could buy the parts for retail in smaller cities and towns closer to the communities.

ENHANCE EXTENSION SERVICES AND DIRECT SUPPORT TO THE COMMUNITIES AND SCHOOLS

Another risk factor to sustainability of the water services at the community level is limited support from the district and county WASH team staff for monitoring water quality and providing technical support for maintenance and repairs of hand pumps (both CHP and IHP). It is necessary to expand and enhance extension services to the communities/institutions on a more regular basis. This could be tied to the engagement and contracting of ENTs by the county/district authorities, since the entrepreneurs are closer to the communities and are greater in numbers than what the government is able to deploy at the district level. In addition, there is a need to educate the community on the roles of institutional instruments that are responsible for rural water supply services activities so that those communities without a ENT or another pump mechanic know where to report any issues with their water points.

IMPROVE MONITORING OF CHP AND IHP SERVICES

The monitoring of water supply services at the community level and via schools is weak and irregular (as is asset registration of IHP facilities at national level). This may be due to lack of capacity at the district and county levels. Capacity must be increased at the county and district levels to enable staff to effectively conduct regular monitoring of service levels at communal waterpoints. Facilitating the

counties' ability to contract WASH entrepreneurs and use their network to collect water supply services data could also play a crucial role in ensuring that the service levels at communal and institutional hand pumps are closely monitored for prompt action. This may require additional training of the entrepreneurs to enable them to collect and relay data/information effectively to district and county levels

INCREASE COMMUNITY WASH COMMITTEE CAPACITY FOR MANAGEMENT

In addition to the unstandardized composition and size of WASH committees, it was observed during this assessment that the committees charged with management of the water points have limited capacity to do so. It is necessary to build the capacity of community WASH committees to include comprehensive management skills and coach them on setting tariffs based on life cycle costs to improve the water point management. In other words, professionalize the WASH committees to the extent possible.

ESTABLISH GUIDELINES FOR COMPOSITION OF WASH COMMITTEES

In addition, in collaboration with stakeholders and WASH actors in the counties, CWTs could develop guidelines for the formation of WASH committees that clearly delineate the smallest/largest units of management, minimum/maximum number of members, criteria for appointment/election into committees, the roles of the committee, and the development of local (community-based) norms such as pump use by-laws. This may help in establishing more structured management processes/procedures that could improve the overall management of water points.

6.4 RECOMMENDATIONS BY INTERVENTION TYPE

INTERVENTION: COMMUNITY HAND PUMPS

NATIONAL LEVEL

Facilitate the strengthening the capacity of institutions and agencies responsible for rural water services (CHPs)

The WASH existing agencies/institutions for rural water services lack the human capacity and logistical resources to effectively carry out their mandate. For example, Rural Water Supply Division (RWSD) under the Bureau of Community Services only has a director, an assistant director and the NWSHPC coordinator as the key professionals for rural water services at the national level. The WASH Sector Capacity Development Plan has proposed an increase in staffing at the national level to improve ability for sub-national supervision.

Facilitate establishment of RWSSD

The WASH Sector Strategic Plan has also proposed the establishment of RWSSB to help streamline rural water services. Specifically the RWSSD would be responsible for hardware delivery, provision of technical expertise and knowledge and building capacity in the sector. However, the bureau has not been established yet and as such, efforts should be made to hasten the establishment of the RWSSB to improve direct and supportive service delivery for communal water supply. In the interim, the human resource capacity for RWSD should be increased to help them carryout their mandates more effectively.

Facilitate improved financing for rural water supply services and institutions at national level

The RWSD, which is responsible for rural WASH activities, (including communal water supply facilities) is not currently provided with adequate financial resources and logistical support to enable it to effectively carry out its mandate. The division suffers lack of means of transport and the necessary operational budget to fulfill its monitoring and support mandates for the rural water supply facilities. It is crucial that while the overall financing needs of the sector are addressed, that particular attention be

accorded to institutions charged with providing direct or supportive services to communal water supply facilities (CHPs).

COUNTY AND DISTRICT LEVELS

Increase capacity of county WASH team and deploying water services staff at district level

Interviews with the county WASH team staff and district authority officials indicated that there is insufficient capacity for the management of water services activities in counties. There is a severe shortage of staff with the three-person CWTs serving as the only WASH staff responsible for providing WASH services (including providing direct and supportive services for rural water supply facilities—CHPs). The lack of staff (especially pump technicians) at the county level negatively affects their ability to undertake monitoring and coaching visits to the districts and communities, unless an NGO subsidizes their visit.

Facilitate deployment of pump mechanics under MWP and prioritize 2012 Capacity Development Plan

There are currently no district-level staff (pump mechanics) deployed under MPW to support rural water services. To overcome the capacity challenge, relevant stakeholders, including GoL and development partners, should focus on funding the implementation of the priority elements of the 2012 Capacity Development Plan for the sub-national level. This should include increasing of number of personnel making up the CWTs; providing CWTs with logistical support (e.g., a vehicle, motorcycles, laptops/computers, internet access); setting up a county WASH office; deploying WASH staff to the district level and providing them with logistical resources (e.g., motorcycles, laptops, internet access, water quality kits, and pump repair tools).

Enhance extension services and direct support to the service level (CHP)

Due to the capacity challenges described earlier, the CWTs are unable to provide comprehensive support to the communities (monitoring water supply facilities for water quality and providing technical support). CWTs are currently overextended and increasing county staff and deploying water service staff at district level (as proposed by the CDP) may take time to be realized, and is contingent on availability of funds and government procedures. As such, other more immediate solutions should be sought in the interim to ensure that communal water supply facilities receive the extension services and support they need to effectively manage their facilities. Facilitating the contracting of WASH entrepreneurs by the county which would help ease the load on the available staff while ensuring that communities receive needed services.

Improve financing for county WASH activities

Similar to the situation at the national level, funding of communal water supply services and activities in the counties is inadequate. There is no budgetary allocation for the construction and rehabilitation of water points under the CDF. To improve services, there is a need to introduce budgetary allocations within the CDF and Social Development Fund for financing community water supply facilities and related supportive services.

SERVICE LEVEL

Establish a supply chain for pump spare parts

At the service level, the greatest risk to sustainability of rural water supply interventions is the unavailability of quality hand pump spare parts close to the communities. It is crucial that the government, in collaboration with WASH stakeholders, develop a workable system to provide quality spare parts closer to communities. Options include i) establishing spare parts depot at the county and

district levels, ii) establishing a supply system through the county and district WASH offices, and iii) engaging private business owners to stock spare parts in their established stores.

The first option may be too expensive while the second would be contingent on the establishment of district WASH office, which may take long. Based on interviews with the county WASH staff and district authorities and the situation observed on the ground, the most practical system would be to engage private business owners with established hardware stores within the counties to stock hand pump spare parts, especially the quick-moving parts. However, the private business option would work best if combined with the establishment of county-level depots through a government initiative, private sector investment, or a public-private partnership arrangement, from where even small businesses could buy the parts for retail in smaller cities and towns closer to the communities

Facilitate the dissemination of WASH policies to the sub-national and service provider levels

Although there are policies, legislation, and coordination mechanisms in place at the national level, there is a disparity in knowledge and understanding of this enabling legislation between the national and decentralized levels. In general, representatives of the WASH ministries and government at the lower levels were less informed on the provisions of standards, norms, and guidelines except in regards to their roles and responsibilities. Efforts should therefore be made to disseminate the legislation and policy documents down to the service provider level especially those that regard community ownership and management of water supply facilities (CHPs) and the roles of subnational agencies/institution in monitoring rural water supply facilities and provision of direct or supportive services.

Enhance extension services and direct support to the communities

Another risk factor to sustainability of the water services at the community level is limited support from the district and county WASH team staff for monitoring water quality and providing technical support for maintenance and repairs of community hand pumps. It is necessary to expand and enhance extension services to the communities/institutions on a more regular basis. This could be tied to the engagement and contracting of WASH entrepreneurs by the county/district authorities, since the entrepreneurs are closer to the communities and are greater in numbers than what the government is able to deploy at the district level. In addition, there is a need to educate the community on the roles of institutional instruments that are responsible for rural water supply services activities so that those communities without a WASH entrepreneur or another pump mechanic know where to report any issues with their waterpoints.

Improve monitoring of CHP services

The monitoring of water supply services at the community level is weak and irregular, predominantly due to lack of capacity at the district and county levels. Capacity should be increased at the county and district levels to enable staff to effectively conduct regular monitoring of service levels at communal water points. Facilitating the counties' ability to contract ENT and use their network to collect water supply services data could also play a crucial role in ensuring that the service levels at communal and institutional hand pumps are closely monitored for prompt action. This may require additional training of the entrepreneurs to enable them to collect and relay data/information effectively to district and county levels

Increase community WASHCo capacity for management

In addition to the irregular composition and size of WASH committees, it was observed during the assessment that the committees charged with management of the water points have limited capacity to do so. It is necessary to build the capacity of community WASH committees to include comprehensive management skills and coach them on setting tariffs based on life cycle costs (where affordable and with O&M responsibilities clearly defined) to improve the waterpoint management. In other words, professionalize the WASH committees to the extent possible.

Establish guidelines for composition of wash committees

In addition, in collaboration with stakeholders and WASH actors in the counties, CWTs could develop guidelines for the formation of WASH committees that clearly delineate the smallest/largest units of management, minimum/maximum number of members, criteria for appointment/election into committees, the roles of the committee, and the development of local (community based) norms such as pump use by-laws. This may help in establishing more structured management processes/procedures that could improve the overall management of water points.

INTERVENTION: INSTITUTIONAL HAND PUMP

NATIONAL LEVEL

Facilitate the recognition of institutional ownership of water point (IHPs) via existing national policies

Although the national policies recognize the need for water supply facilities at institutions (i.e., schools and health facilities), there are no clear provisions for school ownership of water supply facilities. Objective 8 of the WASH Sector Capacity Development Plan proposes that a distinction be made over ownership and responsibility for maintaining institutional water points such as schools, health facilities, and government buildings. The national water supply and sanitation policy recognizes community ownership of water points but does not mention institutional ownership except with regard to sanitation facilities. However, this may change in the near future if the proposal to make WASH in schools the responsibility of the MoE and mainstreaming WASH in schools in the MoE budgeting and inspection procedures is approved. Therefore efforts should be made to facilitate the recognition of water point ownership by institutions in existing policy and legislation documents. The mainstreaming of WASH in schools within the MoE should be hastened to improve service provision and management of water supply services in institutions.

Facilitate the dissemination of relevant policies and legislation on water services in institutions

In addition, the knowledge of the existence of these policies regarding water supply services in schools varies greatly between levels with the district level recording much lower scores than other levels. This could indicate that the dissemination of the policy documents is a potential problem. Efforts should be made to widely disseminate the existing policies down to the institutions.

Facilitate provision of national level funding for IHP life cycle costs

In general there are no mechanisms to provide financial resources to meet the hand pump life-cycle costs for school water points at national or county levels. The MoE does not have a budget line for WASH in schools and mainly depends on NGOs for support.²⁷ The lack of a dedicated WASH budget within the MoE hampers the ability of the schools to meet the O&M costs, especially because few collect money from the parents or parent teacher associations (PTAs). As a result schools rely on NGOs to carry out the repair of faulty hand pumps. In addition, there are no national guidelines for tariff contribution by the water users or students at school water points, and as such, there is no legal basis for school authorities to collect money for O&M. Efforts should therefore be made to hasten the implementation of the WASH Strategic Plan's proposal to mainstream WASH for schools in the MoE budgeting to finance water supply services at institutions among other WASH services.

²⁷ Liberia WASH Sector Performance Report. (2013).

COUNTY AND DISTRICT LEVELS

Facilitate the deployment of water services staff at County and district level to support IHPs

Although there are staff at the county level (MPW and MoHSW) to support water supply services and activities in institutions, these are the same staff who are responsible for supporting communal WASH activities. As such, their roles and responsibilities regarding the maintenance of water supply facilities (IHPs) at schools is not clear/understood by the county and district staff. In addition, county/district staff are unable to provide technical support for repairs and maintenance of institutional hand pumps on request due to the general understaffing and lack of adequate logistical and financial resources at the county and district level, as earlier described. To ensure institutions receive comprehensive support any proposed increase in human resource capacity for WASH teams and the deployment of pump technicians at district level, as well as the streamlining WASH for schools within the MoE, should include deployment of staff specifically for supporting IHPs.

Improve financing for institutional water supply services at county level

As is the case with CHPs, funding of water supply services and activities in schools at the county level is inadequate. Primary data collected during the assessment shows no additional budgetary allocation for WASH in schools, including IHP. There is insufficient budget for staff facilitation, which greatly hampers the ability of the WASH team staff to support schools in construction/rehabilitation of water points, as well as in the provision of pump maintenance/repair services. To improve services, there is a need to introduce budgetary allocations within the CDF and Social Development Fund for financing institutional water supply facilities and related supportive services.

SERVICE LEVEL

Improve the provision of extension services and direct support for institutional water facilities (IHPs)

The functionality of institutional hand pumps was generally low. At the time of assessment, more than half (63%) of the institutional hand pumps assessed were non-functional and only half of the institutional water pumps complied with norms/standards for siting, sanitary conditions, and drainage. This may be attributed to several factors both at county and service levels. Limited technical support is available from the district/county WASH staff to the schools in terms of water point monitoring, repair and maintenance. During the assessment, all institutions surveyed indicated that they have never received any technical support from district staff. Efforts should be made to facilitate the existing County WASH staff to provide support services including repairs and maintenance, water quality monitoring and technical support to institutions pending the deployment of more staff at county and district levels

Establish a supply chain for pump spare parts

The unavailability of hand pump spare parts close to the institutions is also a contributing factor to the low rate of functionality of school hand pumps. It is therefore crucial for the government, in collaboration with WASH stakeholders, to develop a workable system to provide quality spare parts closer to the institutions (see recommendation on supply chain options under CHPs).

INTERVENTION: WASH ENTREPRENEURS

NATIONAL LEVEL

Establish wash policies/legislation, guidelines, and standards for wash entrepreneurs

No guideline or legislation currently exists at the national level to facilitate and enable the specific activities of WASH entrepreneurs (sub-indicator score I-N1a: 20%). A key priority therefore is to facilitate dialogue leading to the establishment of the required policies at national level. This could be

achieved in the first instance by a MoU between the relevant stakeholders and a timeline for adoption and integration of basic strategies into existing guidelines.

Facilitate the regulation of spare parts supply chain at national level

There is no clearly established supply chain for genuine hand pump spare parts in the country and no national registry for genuine suppliers/depots. This is despite the majority of communal water points in the country being fitted with hand pumps. As such, spare parts supply is mainly through project-supported supply depots at the county level or established privately owned hardware stores that introduce hand pump spare parts in their stock. Objective 8 of the WASH Capacity Development Plan proposes that a national strategy for water point and hand pump maintenance be developed and include participation of the private sector. It is crucial that a regulated spare parts supply chain be established at the national level to ensure that genuine spare parts are available for the service providers.

COUNTY AND DISTRICT LEVEL

Develop a registry of existing WASH entrepreneurs/pump mechanics

Despite large networks of WASH entrepreneurs in the counties carrying out repair and maintenance works on communal and institutional hand pumps, the county WASH authorities do not keep a registry of entrepreneurs/mechanics. There is also no clear system in place to monitor/coordinate their activities or ensure quality control for their services or a clear/ standardized process of certifying or accrediting the WASH entrepreneurs other than the training certificates issued by the training organization. Efforts should be made establish a registry of trained pump mechanics in counties to aid in monitoring and coordinate their activities. In addition efforts should be made to facilitate a more formalized/standardized process of training and certification of pump mechanics.

Facilitate the integration of ENTs into the county/district water services monitoring and maintenance/repair activities

Although the entrepreneurs are ideally placed to provide information on communal water supply facilities due to their numbers and proximity to the communities, county authorities do not utilize the WASH entrepreneurs network for collection of M&E data. In addition the WASH entrepreneurs/pump mechanics are not contracted by the CWTs to carry out maintenance and repair works. This could be because there are no provisions or guidelines for the county authorities for contracting entrepreneurs, and as such entrepreneurs are not contracted by county authorities. This is seen as a major lost opportunity. Facilitating the contracting of WASH entrepreneurs by the county and the use of their network to collect monitoring data/information would help ease the load on the available staff while ensuring that the communities receive needed services.

Improve provision of support for ENTs

The WASH entrepreneurs do not receive technical support from the county WASH authorities and rely on NGOs whenever they require technical support. The lack of technical support from county authorities may be due to lack of guidelines for county government to engage the entrepreneurs coupled with the limited contact between the two parties. Efforts should be made to improve interaction between the mechanics and the County WASH teams to provide technical support the WASH entrepreneurs/pump mechanics. This would in turn improve the service delivery to the communities.

SERVICE LEVEL

Establish a supply chain for pump spare parts

The unavailability of hand pump spare parts close to the institutions is also a contributing factor to the low rate of functionality of school hand pumps. It is therefore crucial for the government, in collaboration

with WASH stakeholders, to develop a workable system to provide quality spare parts closer to the institutions (see recommendation on supply chain options under CHPs).

Community sensitization to promote willingness to pay for ENT services

The entrepreneurs are not contracted by the county and district authorities to carry out repairs and have to rely on contracts given by the communities. While the demand for their services by the communities is high, most are either unwilling or unable to meet the costs for spare parts and entrepreneurs' service fees. At times the entrepreneurs have to resort to taking payment in kind or waiting until the communities can afford to pay him. As such, the demand for their services do not guarantee that the entrepreneurs will be able to make a living wage. This could discourage the entrepreneurs from offering WASH services as their main occupation. It is therefore important to conduct community sensitization to promote willingness to pay for WASH entrepreneurs services and in turn help the entrepreneurs stay in business.

Facilitate capacity building in business management for ENTs

Although the training of WASH entrepreneurs under the iWASH program included basic training in entrepreneurship and business management (e.g., business planning, marketing, and financial management), most of them lack adequate marketing and financial management skills. In addition, only about a third of the entrepreneurs interviewed had a plan for new business. The apparent lack of adequate skills and competence to effectively run the WASH services provision as a business means that the entrepreneurs are unable to make profits or savings from their services, which could result in some abandoning the endeavor. It is therefore important to provide follow up training in business management for the entrepreneurs to boost their businesses and consequently their profits and in turn motivate them to keep offering their services to communities and institutions.

ANNEX 1: KEY INFORMANTS AND COMMUNITIES SURVEYED

Table A1-1. List of Key Informants at National, County, and District Levels

Name of agency	Designation	Respondent's name	Survey packs administered		
			CHP	IHP	ENT
National Level Informants					
MPW	Assistant Minister, Bureau of Community services	George K. Yarngo	x	x	x
MoHSW	Director, Division of Environmental and Occupational Health	Dehwehn Yeabah	x	x	x
MoE	Director of School Health	Mrs. Olivia Mesh		x	
County Level Informants					
MoE	Nimba County	Wleh T. Sailah		x	
MPW	Pump Technician/Acting Coordinator	Francis Saysay	x	x	x
NCHT/MoHSW	Community Health Division Director	C. Paul Nyanyee	x	x	x
MoHSW	Environmental Health Technician Coordinator	Nelson D. Kartee	x	x	x
EPA	Environment Coordination office	Henry S. Carson	x	x	x
MoHSW	Environmental Health Technician Coordinator	James V. Juman	x	x	x
EPA	Head of County Office	R. Baiyezenah W. Brown	x	x	x
MPW	County WASH Technician	P. Aleson Guwor	x	x	x
MPW-Community	County WASH Technician	Flomo Y. Zaza	x	x	x
MPW-Community	County Coordinator-WASH	T. Maxwell Ricks	x	x	x
MoE	County Education Officer	Nya D. Twayen, Sr.		x	
MoHSW	Leader County Health Team	William K. Sherman	x	x	x
District Level Informants					
MoE	Administrative Assistant	David B. Joe		x	
MoHSW	District Health Officer	Aaron S. Glay	x	x	x
MIA	Statutory District Superintendent	D. Bartoa Bartuah, Sr	x	x	x

Name of agency	Designation	Respondent's name	Survey packs administered		
			CHP	IHP	ENT
MoHSW	District Health Officer	Mac S. Kpoito	x	x	x
MoE	District Education Officer	Thrasymachus T. Tarpeh		x	
MoE	District Education Officer	Thomas T. Yeامية		x	
MIA	Acting District Commissioner	George Kimba	x	x	x
MoHSW	District Health Officer	Augustine Y. Ballah	x	x	x
MoHSW	District Health Officer	Prince Togbah		x	
MIA	District Commissioner	Edward T. Yarkpawolo	x	x	x
MIA	District Commissioner	Samuel Boimah	x		
MIA	District Commissioner	David C. Charchue Sr.			x
MIA	Gbarnga Bong county	Edwarn Flomo			x

Table A1-2. Intervention Communities Included in the Survey

COUNTY	HEALTH DISTRICT	COMMUNITY	SPECIFIC SITE NAME	INTERVENTION TYPE		
				CHP	IHP	ENT
BONG	Jorquelleh	Gbanyanyea	Gbanyanyea	x		x
BONG	Jorquelleh	Gbarnga	Bassa Community-Gbarnga	x		
BONG	Kokoyah	Gargar Town	Gargar town	x		
BONG	Kokoyah	Gbechon	Gbechon	x	x	x
BONG	Kokoyah	Tukpah	Tukpah Public School		x	
LOFA	Kolahun	Ngolavolu*	Ngolavolu*	x		
LOFA	Kolahun	Moigulahun	Mowulahun #1	x		x
LOFA	Voinjama	Fafenedu	Fafenedu	x		x
LOFA	Voinjama	Karmodu	Karmodu public school		x	
LOFA	Voinjama	Mumusu*	Mumusu*	x		
NIMBA	Gbehley- Geh	Lowley	Lowley Pub School		x	
NIMBA	Gbehley- Geh	Zortapa	Zortapa Elem. School		x	
NIMBA	Sanniquellie Mahn	Laindin	Laindin	x		x
NIMBA	Sanniquellie Mahn	Frog Island Community	Frog Island Community	x		
NIMBA	Sanniquellie Mahn	Catholic Compound	St. Mary's catholic school		x	x
NIMBA	Gbehley- Geh	Kpairplay	Kpairplay**			x
LOFA	Kolahun	Mawalahun #2	Mawalahun #2**			x
LOFA	Kolahun	Bazagizia	Bazagizia**			x
			TOTAL	10	6	9

*Replacements for communities that could not be accessed

**Entrepreneurs initially from intervention communities but now serving in non-intervention communities

Table A1-3. List of Non-Intervention Communities Included in the Survey

COUNTY	DISTRICT	TOWN	INTERVENTION TYPE	
			CHP	IHP
Nimba	Sanniquellie Mahn	Bona Suah	x	
Lofa	Voinjama	David Selma town	x	
Bong	Jorquelleh	Bella	x	
Bong	Jorquelleh	Samay	x	
Bong	Kokoyah	John Koko	x	
Nimba	Sanniquellie Mahn	Mongbain	x	
Lofa	Voinjama	Jarmulor	x	
Lofa	Kolahun	Karmolahun	x	
Lofa	Voinjama	Bargazia Junction	x	
Bong	Kokoyah	Boiyu	x	
Nimba	Gbehley- Geh	Zorgorwee		x
Nimba	Gbehley- Geh	Kpairplay		x
Bong	Jorquelleh	Samay		x

ANNEX 2: DETAILS OF WASH SIT METHODOLOGY

CONTEXTUALIZATION, PRETESTING, AND PILOT TESTING

A unique sustainability framework exists for each intervention type considered in this assessment (see Annex 8). Each framework is composed of indicators and sub-indicators. It is from the sub-indicators that the data collection tools were derived. The process of creating the final data collection tools involved separating the sub-indicators, for each intervention type, into “survey packs.” This separation was done on the basis of the unit of analysis for each sub-indicator, and resulted in survey packs for each stakeholder (e.g. service provider, district/county stakeholder, national stakeholder). The sub-indicators in these survey packs were then contextualized following a three-step process.

During the first step of contextualization, the sub-indicators were separated into discrete questions which elicit a yes/no answer or can easily be coded as such. This is necessary as some of the sub-indicators have multiple parts that need to be disaggregated. The second step of contextualization involves identifying the appropriate benchmark and threshold values that will be used when coding the questions. For example, the framework sub-indicator question CHP-T-S3d asks if repairs are made within the national norm for repair times. To code this question, it is necessary to identify the national norm for repair time (e.g., number of days). The final step is modifying the order of the questions to ensure appropriate flow.

Once contextualization is complete, it is necessary to pre-test the questionnaires. The field data collection team pre-tested each survey that was used in the assessments. All data was collected in paper format.

The pilot test was conducted 20 May 2015 in Monrovia for CHP and IHP intervention. No pilot test was conducted for WASH entrepreneurs since all entrepreneurs are based in communities in the intervention counties. Details on the locations of the pilot tests in each country are shown in Table A2-1 below

Table A2-1. Communities Where Piloting of Tools Was Conducted

Intervention	County	District	Community
Community Hand Pump	Monsterrado	Brewerville	Plumker
Institutional Hand Pump	Monsterrado	Brewerville	Plumker

After completing the pilot test of the data collection tools, appropriate modifications were made and data collection began in the communities on 21 May, 2015 in Kokoyah District of Bong County and proceeded through 29 May, 2015.

QUALITY ASSURANCE AND QUALITY CONTROL

Steps to assure the quality of the collected data began during the contextualization process. The data collection instrument was pre-tested, pilot tested, and modified at each step to ensure the maximum objectivity of the data collected. Qualitative information was collected along with the binary (yes/no) data to assure the accuracy of the data.

To control the quality of the data once collected, the contractor developed a data management plan following their internal guidelines and informed by their extensive field data collection experience. These management plans included a protocol for the digitizations of data collected on paper, verification, and cleaning. The majority of the data was collected in binary (yes/no) form, and therefore the process of

cleaning the data was significantly easier. All surveys were collected on paper and subsequently manually digitized. All responses that were not coded in the field (i.e., assigned a “yes” or “no” response by the interviewer in the field) were subsequently coded in Excel afterward.

In addition to the quality control procedures implemented by the contractor, Aguaconsult audited each data file checking that the data were cleaned and requested verification between electronic entries and paper copies. This cross checking occurred for randomly selected entries for at least one respondent per survey instrument. All discrepancies between the entries were checked and corrected if possible. If correction was not possible, then the response was omitted.

SAMPLE SIZE AND SELECTION OF VILLAGES/COMMUNITIES

The sampling protocol used in the SIT is based upon accepted guidelines and incorporates best practice methods from relevant monitoring and assessment literature in the WASH sector. This protocol, summarized in Annex 9, is composed of multistate sampling that utilizes stratified sampling to identify the sample frame (e.g., village or sub-village).

Each uniquely coded question had a specific primary unit of analysis and in some cases a secondary unit of analysis. The secondary unit of analysis was a source for verifying data provided by the primary unit of analysis (i.e., triangulation).

SCORING AND AGGREGATION

The SIT is made up of sub-indicators that have a binary scoring (yes/no). In cases where multiple individuals are asked the same question, an average number of “yes” scores were utilized. For example, if 10 respondent at the district level were asked a question and 5 responses were coded as “yes” then the response for that sub-indicator at that level was 50%. If the sub-indicator had a secondary unit of analysis or second source of data (e.g., service provider), then scores at the district level are averaged and this value is then averaged with the score from the secondary source. In the example provided, if the service provider sub-indicator score was “yes” (i.e., 100%) then the 50% district score was averaged for a final score of 75%.

For a limited number of sub-indicators, quantitative data were collected. For example, service providers were asked to estimate the length of time it took to repair the hand pump the last time it was broken, or the percentage of households that pay water tariff. In some cases this information was subsequently coded into binary (yes/no) responses after digitization and in other cases it was used for complimentary analyses (e.g., service level characterization, cost calculations).

Scores are presented to two levels, by community and general. For the community scores, sub-indicators were averaged to obtain an indicator scores for each community (by intervention). These indicator scores were subsequently averaged to the factor level (by intervention for each community). These factor scores for each community were plotted, using radar diagrams when five or more communities were presented, and bar charts if less than five communities were presented. The average and median indicator scores across all communities were also presented in results description in Section 5 and 6.

The general scores include the factor scores for each intervention type and the overall score which is the composite of the factor scores for a given intervention. So for example there is an overall score for CHP, IHP and ENT but within each intervention there are 5 factor scores. The general factor scores are calculated by aggregating (i.e., taking the average) of the average indicator scores across communities.

The intervention factor scores were presented using bar charts. The following section provides insight into how the results should be interpreted.

INTERPRETATION OF THE RESULTS

In the context of this assessment, a higher Sustainability Index Score for any given factor signifies a larger contribution to the sustainability of the intervention than a lower score for the same factor.

Similarly a lower indicator score means a lower contribution to the sustainability for that indicator. However, all factors and indicators may not have equal influence on sustainability for any given intervention. In addition, these indicators and factors do not exist in isolation, so scores for one factor are related to and may influence scores for another factor or indicator. It is important to understand the context in which each intervention type is implemented to derive the maximum understanding from the Sustainability Index Scores as they are presented. The subsequent sections present the results and discuss implications for the sustainability of the services provided by each intervention type.

ANNEX 3: SANITARY INSPECTION SCORE CARD

The sanitary inspection score card was adapted from the World Health Organization’s (WHO) score card so that it is appropriate to the Liberian context. It is based on the *Guidelines for Water and Sanitation Services in Liberia* which were developed by the MPW, the Liberia WASH Consortium and UNICEF (GoL, 2010). A final score is obtained by counting the number of “Yes” responses for each of the numbered questions in the score card. This score is called the “contamination risk score” and the following scores are considered very high (9-11), high (6-8), intermediate (3-5), and low (0-2). As per the guidelines developed by WHO, this score would then be compared to results from microbial analysis of samples taken from each water point to determine an overall risk of contamination score.

In addition, water samples were collected from all functional water points and analyzed for fecal coliforms using the membrane filtration method (incubation at 44°C for 18 hours).

Table A3-1. Sanitary Inspection Scorecard Adapted for Liberia.

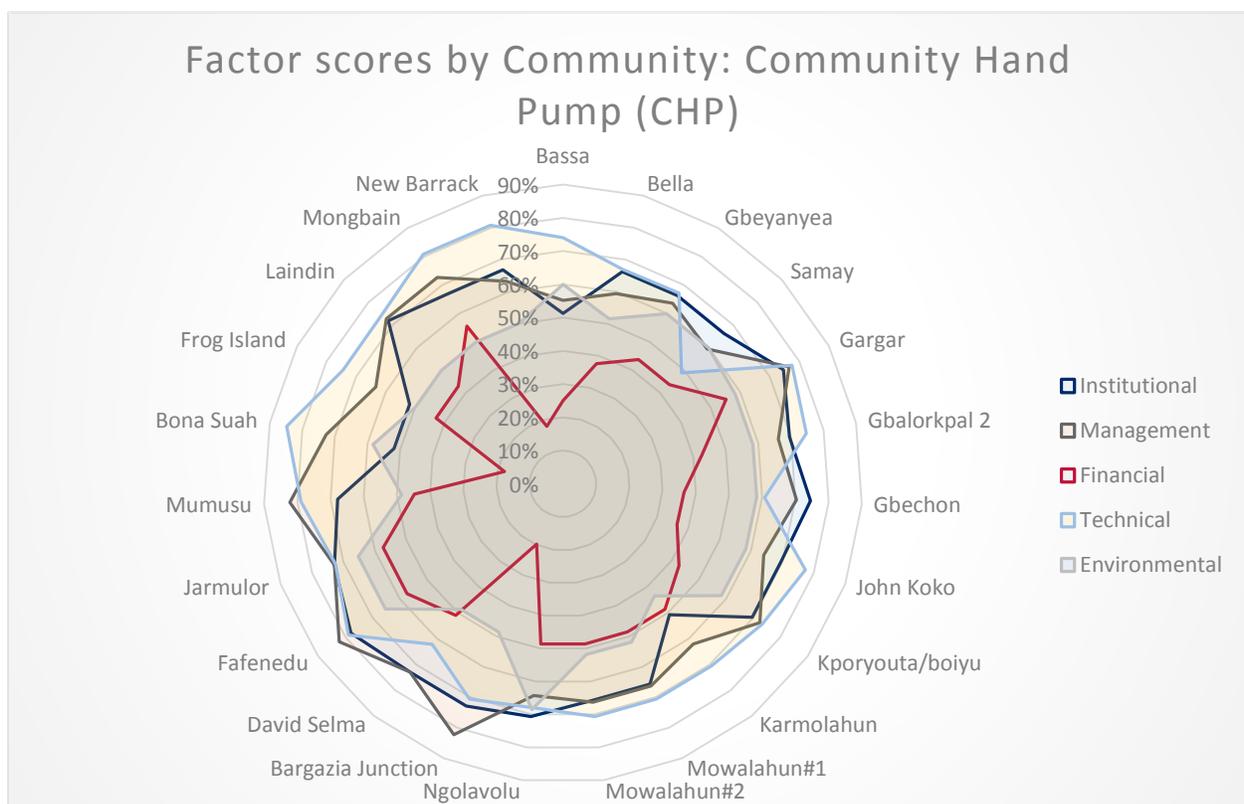
Sanitary Inspection Scorecard		
1	Is there a latrine within 10 meters of the well?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2	Is the nearest latrine on higher ground than the well?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3	Is there any other source of <i>pollution (e.g. animal excreta, rubbish, animal breeding, cultivation, roads, industry etc.) within 10 m of the well?</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
4	Is the fence missing or faulty? And can domestic animals approach the well?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5	Is the drainage channel cracked, broken or need cleaning? And does it causing stagnant water within 2m of the well?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6	Is the wall (parapet) around the well inadequate, allowing surface water to enter the well? (<i>Is the well parapet (wall) missing, damaged or less than 0.75m above ground level?</i>)	<input type="checkbox"/> Yes <input type="checkbox"/> No
7	Are the walls of the well inadequately sealed at any point for 3m below ground? (<i>Does the inner seal (i.e. lining) around the top of the well extend less than 3 meter below ground level (standard is 1 meters)</i>)	<input type="checkbox"/> Yes <input type="checkbox"/> No
8	Is the concrete floor less than 1m wide around the well? (<i>Is the apron around the parapet missing, damaged, or less than 1.0 meters wide</i>)	<input type="checkbox"/> Yes <input type="checkbox"/> No
9	Is the drainage channel missing, damaged or blocked with debris? Does spilt water collect in the apron area?	<input type="checkbox"/> Yes <input type="checkbox"/> No
10	Are there any cracks in the concrete floor around the well which could permit water to enter the well	<input type="checkbox"/> Yes <input type="checkbox"/> No
11	Is the hand pump loose at the point of attachment to well head?	<input type="checkbox"/> Yes <input type="checkbox"/> No
12	Are the rope and bucket left in such a position that they may become contaminated?	<input type="checkbox"/> Yes <input type="checkbox"/> No
13	Can waste water or rain water collect within 3 meters of the well?	

ANNEX 4: DETAILED SIT FRAMEWORK RESULTS – COMMUNITY HAND PUMP

This section presents the detailed SIT framework results for the community hand pumps. Specifically it presents the overall factor scores disaggregated by community (Figure A4-1); the indicator scores by county (Table A4-1) and a detailed commentary for each sustainability factor, i.e., institutional, management, financial, technical and environmental.

The factor scores by community for community hand pumps are shown graphically in the figure below.

Figure A4-1. Sustainability Factor Scores by Community for Community Hand Pumps



The indicator scores for CHP are as shown in Table A4-1. Overall, the sustainability index score for Lofa County was higher than those for Bong and Nimba Counties.

Table A4-1. Community Hand Pump Indicator Scores

WEIGHTING	SUSTAINABILITY FACTOR	BONG	LOFA	NIMBA	Overall
20%	Institutional	68%	69%	62%	67%
20%	Management	65%	72%	69%	69%
20%	Financial	40%	47%	35%	42%
20%	Technical	69%	71%	79%	72%
20%	Environmental	58%	55%	52%	55%
100%	Overall Sustainability Index Score	60%	63%	59%	61%

REFERENCE	COMMUNITY HAND PUMP(CHP) INDICATORS	BONG	LOFA	NIMBA	Overall
WT-CHP-I-N1	National policy, norms and guidelines for community- managed water supply and enabling legislation is in place	66%	59%	53%	60%
WT-CHP-I-D1	Roles and responsibilities of County WASH Team and ownership arrangements are clearly defined	68%	84%	75%	76%
WT-CHP-I-S1	There is a WASH Committee which has been constituted in line with national norms and standards	72%	69%	50%	66%
WT-CHP-I-N2	Institutional framework and governance of sector is established and functioning	96%	96%	100%	97%
WT-CHP-I-N3	Capacity is sufficient at central and county level and capacity development initiatives underway	36%	34%	31%	34%
WT-CHP-M-N1	There is an updated national monitoring system or database available	69%	82%	91%	79%
WT-CHP-M-N2	National support to County WASH Team is provided, including refresher training	68%	84%	81%	77%
WT-CHP-M-D1	There is regular monitoring of water services and community management service provider and follow-up support	61%	64%	51%	60%
WT-CHP-M-S1	Representative WASH Committee actively manages water point and keeps records	86%	78%	50%	75%
WT-CHP-M-S2	There was initial water quality testing and reporting conducted	63%	60%	53%	60%
WT-CHP-F-N1	There is a national budget to support rural water supply, construction and rehabilitation	34%	30%	31%	32%
WT-CHP-F-D1	Resources available for County WASH Team to fulfill functions	39%	45%	41%	41%
WT-CHP-F-S1	Funds collected O&M or Repair are sufficient	61%	64%	40%	58%
WT-CHP-F-S2	Tariff collection is regular and sufficient	28%	50%	30%	37%
WT-CHP-T-N1	There are national/local norms that define acceptable service levels with explicit indicators and thresholds (e.g. water quality, quantity, accessibility, affordability, etc.)	72%	85%	88%	81%
WT-CHP-T-N2	There are national/local norms that define equipment standardization and arrangements for providing spare parts	50%	60%	69%	58%
WT-CHP-T-D1	The county water staff is able to provide support for maintenance and	68%	71%	84%	73%

REFERENCE	COMMUNITY HAND PUMP(CHP) INDICATORS	BONG	LOFA	NIMBA	Overall
	repairs on request				
WT-CHP-T-S1	Hand pumps are functional and provide basic level of service according to national policy	81%	78%	70%	77%
WT-CHP-T-S2	Hand pump complies with standards and norms in terms of siting and public health risk	72%	81%	80%	77%
WT-CHP-T-S3	Hand pump complies with water quality standards and norms	63%	64%	83%	68%
WT-CHP-T-S4	The knowledge and spare parts are available to conduct maintenance and repairs in a timely manner	58%	50%	70%	57%
WT-CHP-E-N1	National environmental protection standards are established and applied to WASH services	59%	68%	50%	60%
WT-CHP-E-N2	National integrated water resources management plan is in place, updated regularly, and applied to WASH services planning	56%	59%	63%	58%
WT-CHP-E-S1	Susceptibility of Water Supply Infrastructure to Environmental Changes is accounted for	60%	38%	43%	47%

RESULTS COMMENTARY

INSTITUTIONAL INDICATORS

Institutional indicator scores range from 0-100%, with a median of 83% and an overall factor score of 67%. Average indicator scores are as follows I-N1: 60%, I-D1: 76%, I-S1: 66%, I-N2: 97%, I-N3: 34% (see Table A4-1). National legislation supporting community management is in place, however there no guidelines/standards that govern the constitution and governance of the community based water service providers or give the service providers a legal standing. As such the committees that manage the community hand pumps are formed and their roles defined at the discretion of the community members.

The roles and responsibilities of County WASH Team are clearly defined, however, at district level 6 out of the 7 respondent interviewed had no knowledge of the existence or accessibility of a document that describe these roles/responsibilities. At the county level all but one respondent said there were formalized roles/responsibility for the county WASH team, however, only 5 out the 11 respondents indicated that these roles/responsibilities were written down and accessible. This could indicate that the documents that spell out the roles and responsibilities of the County WASH team are not widely disseminated which may also affect the staff and service providers' familiarity and understanding of these roles.

In regards to capacity, all respondents at National and County level indicated there was insufficient capacity in terms of human resource as well as funds for the management and/or expansion of WASH services (I-N3: 34%). At the county level all the 11 respondents interviewed said there was insufficient capacity at county level and 8 out of the 11 respondents said there was insufficient capacity at central level (national) for the management and expansion of WASH services. The responses at the district level were similar with 4 out of 7 respondents interviewed indicating that they were unaware of capacity situation at central level and 2 said there was insufficient capacity while 6 out the 8 respondents said there was insufficient capacity at county level. Presently, there are only 2 staff members in office of WASH Team per county (WASH Coordinator, Hand pump Technician) which has made supervision and community support weak. In addition, the staff lacks logistics to follow up on construction activities and provide supervision of hand-pump works as well provide refresher training for the community members.

A recent situation analysis Report for the Liberian National Rural WASH Programme²⁸ showed that the Rural Water supply Division (RWSD) at the national level is not given the needed logistics and financial resources for supervision and regular monitoring visits to the counties, districts and communities. It also highlighted the understaffing of the WASH teams at county level and varied qualifications and experience of the WASH Coordinators, who head the County WASH Teams with most having just high school education. Bong County was one of the counties included in the situation analysis and cited mobility constraints (lack of a means of transport – vehicles/motorbikes) that forced the WASH Team to rely on NGOs for facilitation of field visits to communities.

There has been recent development to improve the management of WASH services at sub- national level (county). The Ministry of Public Works has recommended the formation of a County WASH Team comprising of five ministries (Public Works, Education, Health, Gender and Social Protection and Internal Affairs). To this effect, a template model for the new WASH team is under development and will show the roles of each team member in relation to the county WASH needs including working station with power and a mini-budget for essential daily operations of the county team.

MANAGEMENT INDICATOR

Management indicator scores range from 0-100%, with a median of 72% and an overall factor score of 69%. The average indicator scores are as follows; M-N1: 79%, M-N2: 77%, M-D1: 60%, M-S1: 75%, M-S2: 60% (see Table 1-1). There is a national water system database to which the County level relays data. According to the WASH sector Report (2013), the reporting mechanisms are mainly through quarterly reports and AKVO FLOW dashboard. The quarterly reports focus on information on progress in annual plans, activities, outputs and expenditure while AKVO FLOW focus on inventorying information on WASH infrastructure (including rural water supply facilities) construction/rehabilitation and CLTS. There, however, have been issues with compliance with the quarterly reports and the AKVO FLOW system is still in its infancy with no system for updating data.

The monitoring of water services and community management service provider is irregular and weakest at the community level (M-D1b-9%) with only 7 out of the 23 communities visited indicating they had been visited by county WASH staff (M-D1a -30%). 5 out of the 7 communities visited by County WASH staff indicated that the visits occurred during the commissioning of the water point or sporadically for disinfection of the wells rather than on a regular schedule. Only one community (Bona Suah in Sanniquelleh Mahn district) indicated that the visits by the pump technician were annual for the chlorination of the well.

Training of and follow-up to the County WASH Team, is provided, but mainly on an ad-hoc basis. At the service level, the management roles and responsibilities of the WASH committees (as set by the community or with help from the NGO who installed the hand pump) are clear (M-S1a: 83%). The roles as described by the respondents varied greatly but all of them indicated their responsibility for the daily running and care of the pump and general management duties such calling and holding meetings, monitoring the pump for faults and collecting tariffs. However it was observed that 14 out of the 17 committees that kept records only kept financial records, 3 kept financial record and meeting minutes, while none kept any kind of technical records. Keeping technical records on the type of repairs, materials used, time required, as well as an inventory of spares is an important part of asset management. This information can be used to understand the likely operation and maintenance costs of the system into the future which can be helpful in establishing tariffs.

²⁸ African Development Bank (AfDB). (June 2014.. National Rural Water Sanitation & Hygiene Program (NRWASHP) Development Study Briefer: Inception Report. Prepared by Egis Eau (France) in association with Trend Group (Ghana) and Cape Resources, Inc. (Liberia).

FINANCIAL INDICATOR

Financial indicator scores range from 0-75%, with a median of 40% and an overall factor score of 42%. The average indicator scores are as follows; F-N1:32%, F-D1:41%, F-S1:58%, F-S2:37%.

Financial resources for the construction and rehabilitation of rural water supply are inadequate both at the national and county levels. The situation analysis Report for the Liberian National Rural WASH Programme²⁹ noted that “*Funding for WASH particularly rural WASH is low and spread thin across a number of ministries, departments and agencies due mainly to low priority for WASH and the fragmentation of the sector as well as the non-specific GoL budget allocation*”. In FY 2013/14 WASH received only 0.4% of the national government budget dropping from 1.25 in FY 2012/2013. In addition, WASH expenditure in FY 2012/13 including government and donor sources accounted for 10% of the estimated annual funding requirements in the Sector Investment and Capacity Development plans.³⁰ In addition, only a small proportion of the funds allocated for WASH services go to improving rural water supply services.

Total funding requirements are estimated at USD\$ 3.4 billion to reach 2030 targets of access to water and sanitation services throughout the country. There is an estimated funding gap of USD\$ 450 million for the first five years (2012-2017). In light of the funding gaps from the government, the role of donor funding will continue to be an important contribution to the WASH financing portfolio in the foreseeable future. At the county level the funds allocated for infrastructural development through the county development fund (CDF) goes mainly to primary and secondary roads, health facilities and schools construction with little attention to WASH₃.

The job description for the county WASH staff clearly reflects the required skills for the various positions however not all personnel have the required skills. 4 out of the 11 respondents at county level and 3 out of 7 at district level indicated that staff did not have adequate qualifications and skills for their positions (F-D1c: 55%). The respondents cited inadequate staffing (F-D1a: 3%) and an insufficient budget for the county staff to support communities and service provision (F-N1d: 0%). Presently, there are only 2 staff members in office of WASH Team per county (WASH Coordinator, Hand Pump Technician) covering an average of 6 health districts.

This is reinforced by the general perception in the communities that they are not supported after the installation of hardware. In most communities, tariffs have been set (F-S1a: 87%), and are regularly collected (F-S2a: 70%). However, the tariffs are not necessarily based on actual or projected costs but rather are set by consensus among the community members depending on what the majority can afford. The tariff paid for O&M ranged from 5LD to 150 LD with a median of 20LD. The proportion of community members (households) paying the tariff ranged from 45% to 100% with an average of 77%. There was only a slight variation in compliance with payment of water tariffs among the counties (Bong-75%, Lofa-77% and Nimba-78%). However, the money collected through the set tariff is not sufficient to cover operations and maintenance costs for most communities (F-S1b: 13%).

TECHNICAL INDICATOR

Technical indicator scores range from 0-100%, with a median of 71% and an overall factor score of 72%. The average indicator scores are as follows; T-N1: 81%, T-N2: 58%, T-D1: 73%, T-S1: 77%, T-S2: 77%, T-S3: 68%, T-S4: 57%. The technical indicator score were relatively higher than other factors. There are

²⁹ African Development Bank (AfDB). (June 2014.. National Rural Water Sanitation & Hygiene Program (NRWASHP) Development Study Briefer: Inception Report. Prepared by Egis Eau (France) in association with Trend Group (Ghana) and Cape Resources, Inc. (Liberia).

³⁰ Government of the Republic of Liberia. (2013). Water, Sanitation & Hygiene (WASH) Sector Performance Report.

clear standards and norms for water service in regards to water quality, quantity and infrastructure construction (T-N1 and N2b, N2c). However, there are no clear norms/standards for water service equipment (T-N2a: 23%). The Guidelines for Water and Sanitation Services in Liberia (2010) clearly stipulates the standards for the construction of water points (hand-dug wells, drilled wells and boreholes) and the recommended hand pump brands for installation in Liberia (Afridev, Indian Marl II and Kardia type K-65). However, it places the responsibility of providing quick moving spare parts on the agencies installing the pump rather than state or county accredited suppliers which could lead to sub-standard spare parts.

The roles and responsibilities with regard to monitoring and enforcement are not clear and the knowledge of their existence varied greatly between levels (District T-N2d: 15.38%, County T-N2d: 67.39%, National T-N2d: 50.00%). The County staff (pump technicians) and WASH entrepreneurs are able to provide technical support for maintenance and repairs when requested, however, most communities indicated that the services are provided if the community is able to cover the cost and spare parts are available. As a result, it is common for community hand pumps to stay broken over long periods as the communities are unable to meet the costs for spare parts and labor (tariff collected is not sufficient). In addition, the communities are unwilling to pay for the maintenance and repair services and instead rely on NGOs to carry out the repairs.

The majority (77%) of hand pumps assessed meet standards/norms in terms of basic level of service, siting and public health risk and water quality (T-S1, T-S2, and T-S3). 16 out of the 23 communities visited a trained pump technicians in the community or nearby (T-S4b: 78%) e.g. in a neighboring community, however, there is a real problem in accessing genuine spare parts (T-S4c: 38%) forcing the communities to either use improvised spare parts or wait for long periods to repair faulty pumps with the appropriate parts. There is no standard/norms in regards to pump repair/down time. The average down time for broken pumps in the communities surveyed is 30days and only about 60% of communities are able to repair their pumps within 30days with some pumps staying down for up to 2 years. This is reinforced by the communities' general feeling that the government or NGOs should facilitate the repair of pumps.

ENVIRONMENTAL INDICATORS

The environmental indicator scores range from 0-88%, with a median of 60% and an overall factor score of 55%. The average indicator scores are as follows; E-N1:60%, E-N2:58%, E-S1:47%. Although, national environmental protection standards exist (E-N1: 60%) they are not widely disseminated/publically available and enforced (E-N1d:37%). It is clear that there is a national IWRM policy (EN2a:100%), however only one respondent at the county level indicated his county (Lofa) had a water supply plan that links to the national policy while the remaining respondents were unaware of the existence or lack thereof of a county water supply plan in their county (E-N2b: 33%). In addition, there is limited efforts to educate district water offices and WASH service providers and water users about the national water resources management plan (E-Nd: 35%).

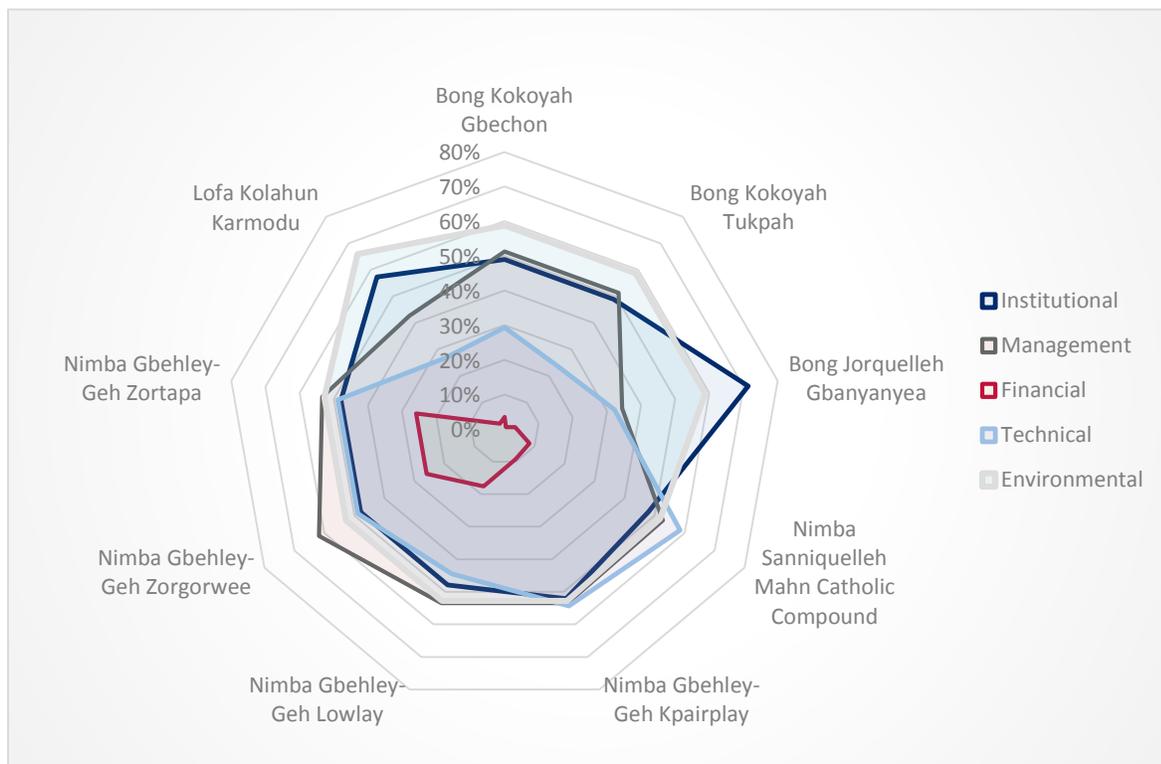
At service level, the susceptibility of water supply infrastructure to environmental changes is only partially accounted for (E-S1:47%), however there has been significant change in the characteristics of traditional water sources -mainly rivers and creeks (E-S1c:65%). Due to the triggering of CLTS surface water contamination by fecal matter has reduced as more communities adopt improved sanitation. Most communities also indicated that they have shifted to the use of water from protected sources i.e. wells with hand pumps.

ANNEX 5: DETAILED SIT FRAMEWORK RESULTS – INSTITUTIONAL HAND PUMP

This section presents the detailed SIT framework results for the institutional hand pumps. Specifically it presents the overall factor scores disaggregated by community (Figure A5-1); the indicator scores by county (Table A5-1) and a detailed commentary for each sustainability factor i.e. institutional, management, financial, technical and environmental.

The factor scores by community for institutional hand pumps are shown in Figure A5-1. Table A5-1 shows the sub-indicator scores by county.

Figure A5-1. Sustainability Factor Scores by Community for Institutional Hand Pumps



The indicator scores for IHP are presented in Table 0-7 showing the average scores for each county and the overall score. In general the scores were low for all indicators with the exception of environmental indicators.

Table A5-1. Institutional Hand Pump Indicator Scores

Weighting	Factor	Bong	Nimba	Lofa	Overall
20%	Institutional	56%	49%	57%	37%
20%	Management	46%	55%	43%	51%
20%	Financial	2%	17%	2%	11%
20%	Technical	28%	51%	27%	41%
20%	Environmental	59%	53%	66%	56%
100%	Overall Sustainability Index Score	38%	45%	39%	42%

REFERENCE	Water -Institutional Hand Pump Indicators	Bong	Nimba	Lofa	Overall
WT-IHP-I-N1	National policy, norms and guidelines for community-managed water supply and enabling legislation is in place	58%	46%	83%	54%
WT-IHP-I-D1	Roles and responsibilities of county (service authority) and ownership arrangements are clearly defined	55%	52%	31%	15%
WT-IHP-M-N1	There is an updated national monitoring system or database available	49%	40%	66%	46%
WT-IHP-M-N2	National support to district/service authority is provided, including refresher training	55%	45%	62%	50%
WT-IHP-M-D1	There is regular monitoring of water services and service provider and follow-up support	33%	80%	0%	56%
WT-IHP-F-N1	There are national/local mechanisms beyond community contributions and tariffs, to meet life- cycle costs, while ensuring affordability, equity, and non-discrimination	0%	0%	0%	0%
WT-IHP-F-D1	Resources available for district/service authority to fulfill functions	7%	17%	6%	13%
WT-IHP-F-S1	Spare parts are available and affordable, including those provided by the private sector	0%	35%	0%	25%
WT-IHP-T-N1	There are national/local norms that define acceptable service levels with explicit indicators and thresholds (e.g. water quality, quantity, accessibility, affordability, etc.)	69%	59%	84%	65%
WT-IHP-T-N2	There are national/local norms that define equipment standardization and arrangements for providing spare parts	57%	58%	64%	58%
WT-IHP-T-D1	The district water staff are able to provide support for maintenance and repairs on request	28%	36%	0%	29%
WT-IHP-T-S1	Hand pump is functional and provides basic level of service according to national policy	11%	53%	0%	33%
WT-IHP-T-S2	Hand pump complies with standards and norms in terms of siting and public health risk	0%	90%	0%	50%
WT-IHP-T-S3	The knowledge and spare parts are available to conduct maintenance and repairs in a timely	4%	10%	12%	8%

REFERENCE	Water -Institutional Hand Pump Indicators	Bong	Nimba	Lofa	Overall
	manner				
WT-IHP-E-N1	National environmental protection standards are established and applied to WASH services	64%	56%	74%	60%
WT-IHP-E-N2	National integrated water resources management plan is in place, updated regularly, and applied to WASH services planning	29%	19%	41%	25%
WT-IHP-E-S1	Natural resources are managed to support sustainable WASH service delivery	83%	83%	83%	83%

RESULTS COMMENTARY

INSTITUTIONAL INDICATORS

Institutional indicator scores range from 22-50%, with a median of 39% and an overall factor score of 37%. Average indicator scores are I-N1: 57% and I-D1: 15% (see Table 1-1). There is national policy that recognize responsibilities for institutional-based water service providers (national score I-N1a: 100%). However, at service level none of the respondents were aware of the existence of such a policy.

Similarly, the responses for whether MoHSW/MoE plans recognize need for water point construction/ rehabilitation and O&M in institutions at national and SP level differed (national I-N1a:100% and SP I-N1a: 0%). The national WASH sector strategic plan (2012-2017) recognizes the need for WASH services at schools and proposes supporting the education sector to mainstream WASH into its budgets including infrastructure plans and inspection procedures; develop WASH guidelines on for school and modify routine monitoring of schools to include WASH among other proposals.

Although all institutions visited own the water points, there is no clear law that acknowledges institutional ownership of water points (I-N1c: 33%). The national water supply and sanitation policy recognizes community ownership of water points but does not mention institutional ownership except in regards to sanitation facilities. However this may change in the foreseeable future if the proposal to make WASH in schools the responsibility of the ministry of education. The roles and responsibilities of the county government staff involved with maintenance of facilities is not clear (I-D1a: 8%). During the assessment, 8 out of 13 respondents at county level, 6 out of 10 at district level and all respondents at service level indicated the county staff roles in regards to institutional water facilities was not clear.

All institutions visited had a formalized structures for the management of the hand pumps (service level 1-D1b:100%). The management committees are formed by the school administration in all of the schools visited, however the committee constitution of members varies from school to school. For example at one school the committee comprised of a teacher, the janitor and two students while in another it was comprised of a teacher and 2 PTA members and in yet another it was comprised of a Teacher, the chief and 2 community members. This brings to the fore the lack of guidelines/standards or norms to govern the constitution of the management committees.

There are staff at the county level for supporting institutional water points (County score 1-D1c: 92% District score 1-D1c: 71%), however at the service level only one school authority out of 7 school authority knew what department at the county level is responsible for supporting institutional water points. Generally, the County staff do not support the institutions in promoting proper facility use (1-D1d: 42%) with all of the institution indicating that they do not receive any form of support from the County.

MANAGEMENT INDICATORS

Management indicator scores range from 0-100%, with a median of 50% and an overall factor score of 51%. The average indicator scores are as follows; M-N1: 46%, M-N2: 50%, and M-D1: 56 % (see Table 1-1).

There is a central registry for facility water points (M-N1a:67%). The national status of WASH in schools is organized in the Statistical Bulletins of the Education Management Information System (EMIS).³¹ However, it is unclear whether the institutional data is sent to the County for relay to the central registry (M-N1b: 38%). This could be because the data collection process for the EMIS is done by sending questionnaires to a targeted number of schools (sample) as opposed to the submission of data being a requirement for all schools. The data in EMIS is used government and NGO programs for WASH in schools (including institutional water supply) as it helps in establishing trends in WASH coverage in schools and identify key areas of intervention (M-N1d: 51%).

However the data is mainly used at national level (national score M-N1d:67%). The government conducts training for county/district staff to support O&M at facilities (M-N2a:72%) and offer refresher training (M-N2b: 66%). However this is mainly on an ad hoc basis rather than an established schedule. In regards to training on AKVO FLOW system of monitoring, 7 out of 13 respondents at county level and 9 out 10 respondents at district level indicated they were unaware of such training having taken place (M-N2c:29%) and have no access to the AKVO FLOW forms (M-N2d: 33%). In general the monitoring of water services at institutions and institutional service providers is good (M- D1: 78%) however, the provision of follow-up support weak (M-D1c: 33%). At service level the institutions conduct their own monitoring of the hand pumps through the management committee.

FINANCIAL INDICATORS

Financial indicator scores range from 0-50%, with a median of 2% and an overall factor score of 11%. The average indicator scores are as follows; F-N1:0%, F-D1:13%, F-S1:19%. In general the financial indicators score are very low. There are no mechanisms to provide financial resources to meet the hand pump life-cycle costs at national or county level (F-N1: 0%). The MoE does not have a budget line for WASH in Schools and mainly depends on NGOs for support³². The lack of dedicated WASH budget within the Ministry of Education, hampers the ability of the school to meet the O&M recovery costs for institutional water points especially because few collect money from the parents/PTA. During the assessment, only one school (Gbechon School) indicated that they collect money from PTA members when there is need for repairs on the hand pump. In addition, all institutions visited with the exception of St. Mary's catholic school are public schools that do not collect school fees and as such they are unable to budget for the O&M of the hand pump (F-D1a: 0%). Up to a third of the institutions surveyed rely on NGOs funding for the repair of the hand pumps as well as for the construction/rehabilitation of other school facilities (F-Dd: 33%). Spare parts are available at district level for 5 out of the 7 institutions visited (F-S1a:71) all of which fall within Sanniquelleh Mahn and Gbehley Geh Districts. However, with the exception of St. Mary's Catholic School (Catholic compound in Sanniquelleh Mahn), none of the schools could afford spare parts (F-S1b: 11%) mainly because the schools have no budget for O&M rather than due to prohibitive prices - the average prices for the quick moving spare parts, i.e., bearing – 5USD, U-seal -10USD, O-ring – 3.5USD and bush bearing 20USD. Private sector service providers are scarce (F-S1c: 14%) and no institution could afford their services (F-S1d: 0%).

³¹ WASH Sector Report. (2013).

³² African Development Bank (AfDB). (June 2014). National Rural Water Sanitation & Hygiene Program (NRWASHP) Development Study Briefer: Inception Report. Prepared by Egis Eau (France) in association with Trend Group (Ghana) and Cape Resources, Inc. (Liberia).

TECHNICAL INDICATORS

Technical indicator scores range from 0-100%, with a median of 38% and an overall factor score of 41%. The average indicator scores are as follows; T-N1: 65%, T-N2: 58%, T-D1: 29%, T-S1:33 %, T-S2: 50%, and T-S3: 8%. There are standards and norms for water service in regards to water quality, quantity, accessibility equipment standardization and infrastructure construction (T-N1a, T-N1b, T-N1c, T-N2a and T-N2b), however the knowledge of their existence varies between levels with the district level recording a much lower score or the sub-indicators. This indicates that the dissemination of and staff familiarity with the standards is a potential problem. The MPW or department of public works and utilities are involved in the design and construction/rehabilitation of water supply systems (T-N1d: 64%), however this seems to be at national and county levels (district level score TN1d: 13%).

Generally, the roles and responsibilities with regard to monitoring and enforcement are not clear (T-N2d: 42%) and the knowledge of their existence varied greatly between levels (District T-N2d: 6%, County T-N2d: 81%, National T-N2d: 33%). The district staff are unable to provide technical support for maintenance and repairs on request (T-D1a: 26%, T-D1b: 33%). 8 out of the 13 respondents at county level and 8 out the 10 respondents at district level indicated the district staff are unable to provide technical support on request. However, at the service level all institution surveyed indicated they have never received any technical support from district staff with the exception of St. Mary's catholic school which indicated they never had to request for technical support from the district staff.

Generally the functionality status of the institutional hand pumps is low. At the time of assessment, more than half (63%) of the institutional hand pumps were non-functional (see technical inspection results) which nullified the sub-indicator questions T-S1a and T-S1b for those water points (i.e. score =0%). Only about half of the institutional water pumps comply with norms/standards for siting, sanitary conditions and drainage (T-S2: 50%).

With the exception of Kpairplay public school (Kpairplay community) none of the institutions have a staff available to perform repairs on the hand pump (T-S3a:11%) and only in Sanniquelleh Mahn are spare parts easily available for the institutions (T-S3b:11%). There is no standard/norms in regards to pump repair time and as such it could not be determined if repairs were done within the set standards. At the time of assessment, some of the IHPs had been down for months e.g. the pump at Zorgowee elementary and junior high school had been down since March 2014 while the pump head at Lowley public school was stolen in August 2014 and had not been replaced. The extended down times could be due to the fact that the public schools have no budgets for O&M and as such have to rely on NGOs or the government for installation or rehabilitation of water points.

ENVIRONMENTAL INDICATORS

The environmental indicator scores range from 17-83%, with a median of 58% and an overall factor score of 56%. The average indicator scores are as follows; E-N1: 60%, E-N2: 25%, E-S1: 83%. Although, national standards/regulations environmental protection and proper disposal/management of waste exist (E-N1a: 100%, E-N1b: 100%) the roles/responsibility for their monitoring and enforcement are unclear (E-N1c:25%) and they are not widely disseminated and enforced (E-N1d:16%). At district level 6 out of 10 respondents and 8 out of 13 at county level indicated the roles/responsibility in regards to monitoring and enforcement of environmental protection laws are unclear. In regards to dissemination, 11 out of 13 respondents at county level and 9 out of 10 respondents at district level indicated the environmental protection law is not widely disseminated.

Although a National integrated water resources management policy is in place, there is no IWRM Plan. However, compliance of the county sanitation and wastewater treatment plans with the provisions of the policy is low (E-N2a:34%) it is also unclear how often the IWRM plan is updated. In addition, it is unclear if sanitation and wastewater monitoring data is collected and relayed to central level (E-

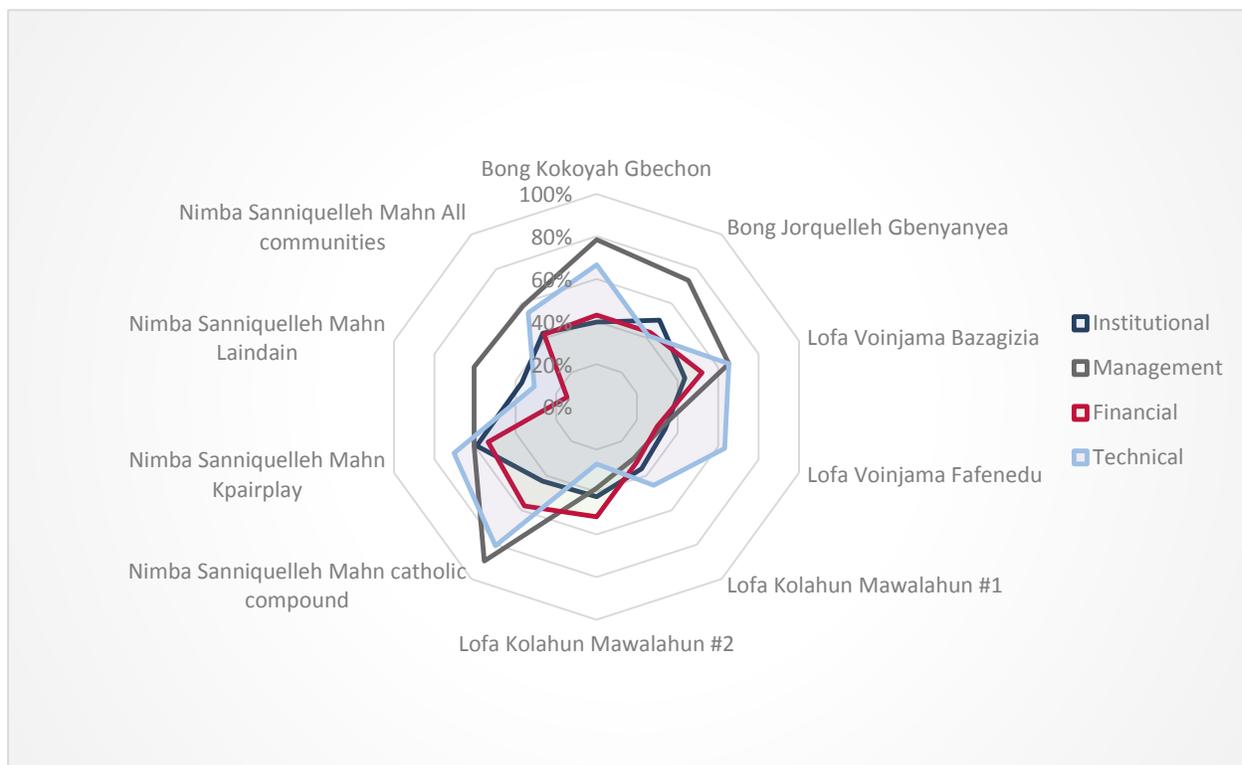
N2b:16%). 10 out of 13 respondents at county level and 8 out of 10 respondents at district level either had no knowledge of whether such data is collected or indicated that no data was collected. Vulnerability to climate-related impacts has been assessed for the sanitation and/or wastewater treatment service (E-S1a: 67%) and climate-related adaptation measures been incorporated in the development of sanitation and/or wastewater treatment services (E-S1b: 100%).

ANNEX 6: DETAILED SIT FRAMEWORK RESULTS – WASH ENTREPRENEUR

This section presents the detailed SIT framework results for the WASH entrepreneurs. Specifically it presents the overall factor scores disaggregated by community (Figure A6-1); the indicator scores by county (Table A6-1) and a detailed commentary for each sustainability factor i.e. institutional, management, financial, technical and environmental.

The factor scores by community for WASH entrepreneurs are shown graphically in Figure A6-1. Table A6-1 shows the sub-indicator scores by county.

Figure A6-1. Sustainability Factor Scores by Community for ENTs



The indicator scores for ENT are presented in Table A6-1 showing the average scores for each county and the overall score. In general the scores were low for all indicators.

Table A6-1. ENTs Indicator Scores

WEIGHTING	FACTOR	BONG	LOFA	NIMBA	OVERALL
25%	Institutional	45%	39%	46%	43%
25%	Management	76%	41%	70%	59%
25%	Financial	43%	41%	42%	42%
25%	Technical	54%	50%	61%	55%
100%	Overall Sustainability Index Score	54%	43%	55%	49%

REFERENCE	Water -ENTs Indicators	BONG	LOFA	NIMBA	OVERALL
WT-ENT-I-N1	Appropriate guidelines and legislation is in place that facilitate and enable the activities of ENTs	18%	15%	0%	11%
WT-ENT-I-D1	There is a clear process for identifying and training ENTs/hand pump mechanics?	59%	47%	59%	54%
WT-ENT-I-D2	There is a clear process for accrediting and regulating ENTs/ hand pump mechanics	63%	50%	56%	55%
WT-ENT-I-S1	WASH entrepreneur has sufficient skills and competencies to be successful	41%	43%	70%	52%
WT-ENT-M-D1	WASH entrepreneur provides regular and relevant monitoring on a timely basis to higher level authority	40%	43%	60%	48%
WT-ENT-M-D2	There is a viable market for the services provided by WASH entrepreneurs	100%	63%	100%	83%
WT-ENT-M-S1	WASH entrepreneur has an established business plan providing WASH goods and services	88%	19%	50%	44%
WT-ENT-F-D1	County Government is open to the possibility of contracting ENTs for major repair or rehabilitation	13%	35%	23%	26%
WT-ENT-F-S1	WASH entrepreneur understand finances of WASH goods and services	67%	58%	44%	56%
WT-ENT-F-S2	Community willingness-to-pay and ability to pay price for WASH Entrepreneur services for minor repair and maintenance	50%	31%	58%	44%
WT-ENT-T-D1	WASH entrepreneur has reliable access to affordable spare parts, tools and equipment for the hand pump repair (primary market activities)	49%	52%	69%	57%
WT-ENT-T-D2	WASH entrepreneur has reliable access to affordable consumable goods for the secondary market activities	50%	38%	50%	44%
WT-ENT-T-S1	WASH entrepreneur responds within national norms for system downtime?	30%	55%	49%	47%
WT-ENT-T-S2	Households served by WASH entrepreneur regularly disinfect water for human consumption	88%	56%	75%	69%

RESULTS COMMENTARY

INSTITUTIONAL INDICATORS

Institutional indicator scores range from 0-96%, with a median of 50% and an overall factor score of 43%. Average indicator scores are as follows I-N1: 11%, I-D1: 54%, I-D2: 55%, I-S1: 52% (see Table 1-

1). In general, based on the data collected it appears there are no guidelines or legislation in place to facilitate and enable the specific activities of ENTs (I-N1: 11%). However this could be because the WASH entrepreneur concept is fairly new and as such no legislation has been put in place to govern their operations.

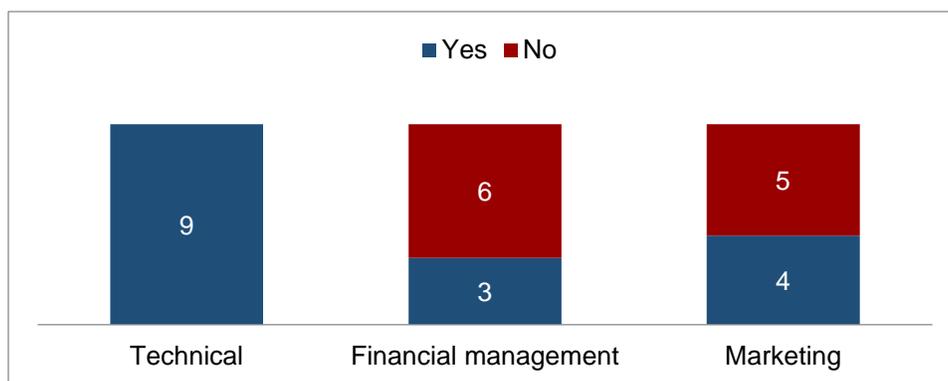
It is unclear what qualifications are required for one to be trained as an entrepreneur (I-D1a: 40%). At the service level, 5 out of 9 of the WASH entrepreneurs interviewed indicated that they were unaware of any specific qualifications required while the remaining 4 indicated one criteria: literacy. The process of selecting and training WASH entrepreneurs is clear (I-D1b:75%, I-D1c:79%) however, it is unclear if the development of training materials was done in collaboration with the relevant county government department or whether they are available at the county level (I-D1d: 22%). At the county level, 9 out of the 11 respondents interviewed had no knowledge of the training materials. Similarly at district level 6 out of 8 respondents had no knowledge of training materials. At the service level, however, the WASH entrepreneurs indicated they were given some materials during the training but a majority (7 out of 9) of them were unaware if these materials were disseminated further.

All entrepreneurs interviewed indicated that one had to be selected/nominated by their community for training. The training of the entrepreneurs under the iWASH program was conducted over 11 days and covered two main areas i.e. pump repair/maintenance and basic entrepreneur skills. The pump repair training was carried out using a combination of teaching methods including lecture, demonstration and field/practical sessions. The key topical areas covered included: an introduction to Afridev hand pump and hand-dug wells; the assembly/disassembly of the hand pump and general care of the pump parts; similarities and difference between various pump types common in Liberia; and demonstrations on the construction of key components of the hand-dug wells. The entrepreneurship training covered basic business principles, marketing, costing and pricing, record keeping and business planning. However, it is unclear if this process of training is standardized or was unique to the iWASH program.

The process of accrediting the WASH entrepreneurs is not clear (I-D2a:55%). At the County level 7 out of the 11 respondents interviewed either indicated there was no certification/accreditation process or were unaware of the existence/non-existence thereof. Similarly at district level half of the respondents were unaware of the existence/non-existence of a certification process. Although at the service level all entrepreneurs indicated they were certified and accredited, they referred to the certificates issued after the training under the iWASH program rather than a standardized certification/accreditation by a regional or national accreditation body or system.

The WASH entrepreneurs receive technical support (I-D2c:83%) however, 7 out of 10 entrepreneurs interviewed indicated that the support was not in sufficient frequency (I-D2d:21%). All entrepreneurs receive support from global communities only; there was no mention of any other organization or government department. WASH entrepreneurs have appropriate technical skills and competences to perform basic repairs of hand pumps (I-S1a:73%) however majority of them lack appropriate marketing (I-S1b: 45%) and financial management (I-S1c:37%). The entrepreneurs interviewed clearly had very strong technical skills, however only about one-third of the respondents felt that they had adequate financial management or marketing skills despite having had training on the same (Figure A6-2).

Figure A6-2. WASH Entrepreneur Skills



MANAGEMENT INDICATORS

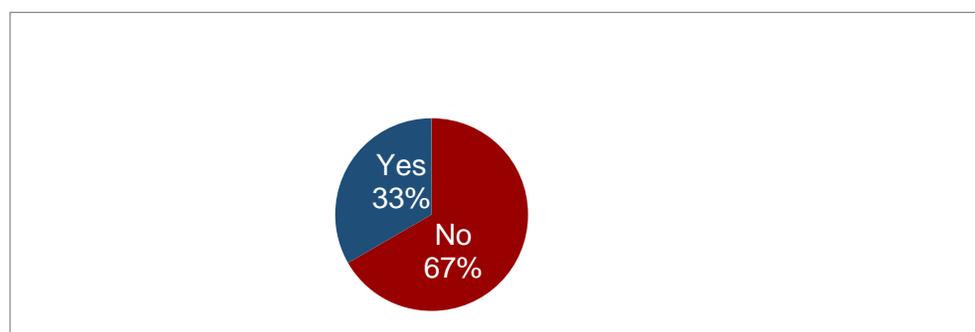
Management indicator scores range from 0-100%, with a median of 50% and an overall factor score of 69%. The average indicator scores are as follows; M-D1: 48%, M-D2: 83%, M-S1: 44% (see Table 1-1).

There are indications that the County sends M&E updates to the central ministries (M-D1a: 65%), however, these updates are not always on regular schedule (M-D1b:59%). At the county level the frequency cited by the respondents was monthly while at district level the frequency cited were monthly, quarterly and annually; it appears that there is no clear standardization/harmonization of the M&E data updates between levels. The County does not utilize the network of ENTs to collect information (M-D1c:30%).

It is clear that in the areas visited in the assessment that there is a need for the ENTs and sufficient demand for entrepreneurs to earn a livelihood from the WASH activities alone (M-D2a: 89%). Five of the nine WASH entrepreneurs interviewed did at least a quarter of their business outside their immediate community. Most ENTs served the surrounding communities visiting up to 5 communities which were close in proximity. With very few transportation options especially in the more remote parts of the counties, the WASH entrepreneurs are only able to visit communities close to their own and those which they can access easily. The occupations of the entrepreneurs interviewed included: 5 farmers and 1 each-student, community health worker, teacher, and unemployed.

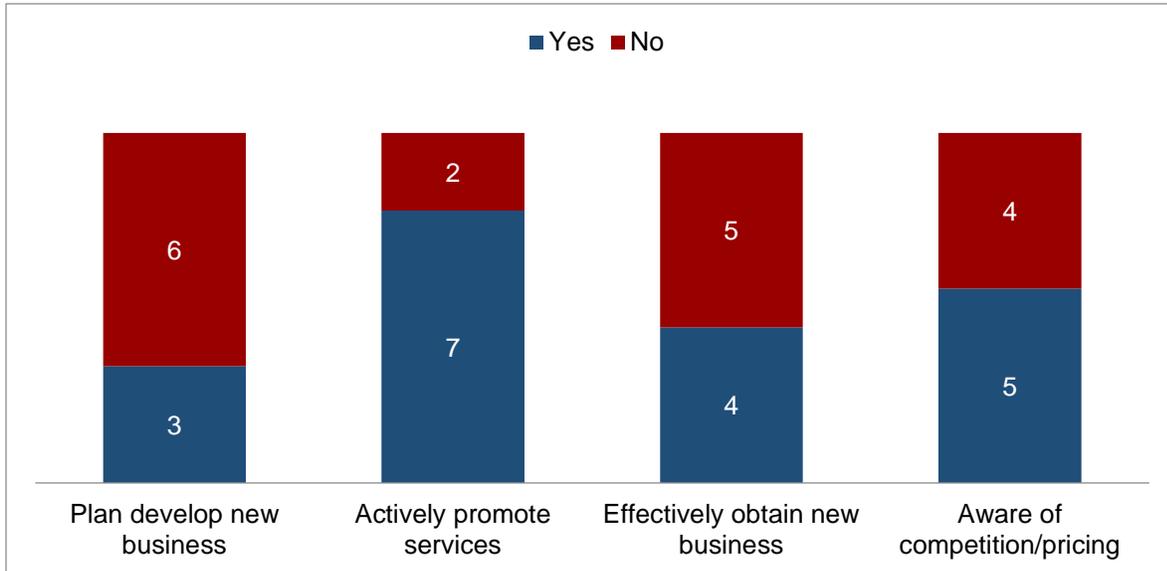
Slightly more than half of the WASH entrepreneur are aware of the opportunity costs of their services (M-S1a: 56%) and the earning potential as a WASH Entrepreneur was higher than the individual’s other earnings in only a third of the cases (M-S1b: 33%); see Figure A6-3 below. This likely represents a low willingness of communities to pay for the services to the WASH Entrepreneur. There appeared to be competition from other individuals in the area—but it was unclear if these individuals received formalized training. Five WASH entrepreneurs admitted lowering prices to attract customers.

Figure A6-3. Earning Potential of ENTs Greater Than Other Occupations



Of the ENTs interviewed, only three had a plan for new business development (M-S1d: 33%). Seven were actively promoting their services, but only 4 of those were effective at developing new business. Five admitted that they were aware of competition and pricing issues in their areas which could impact their business.

Figure A6-4. WASH Entrepreneur Business Acumen



The most common repairs performed by the WASH entrepreneurs interviewed were as follows.

Table A6-2. Common Repairs Performed by ENTs

Type of repair	Frequency
Replacement of U-seal	9
Replacement of O-ring	8
Replacement of Bush bearing	5
Replacement of rods	1
Replacement of Bobbin	2

FINANCIAL INDICATORS

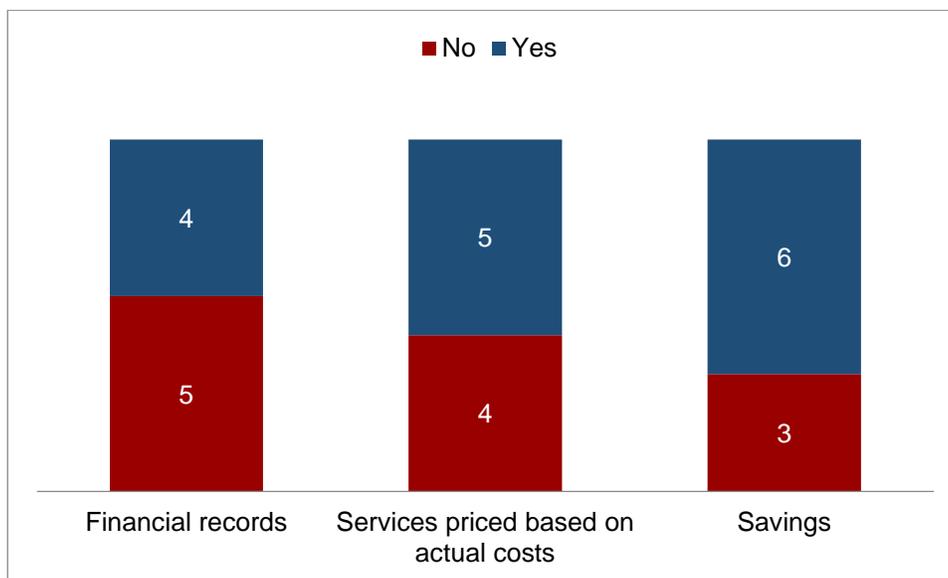
Institutional indicator scores range from 0-75%, with a median of 32% and an overall factor score of 42%. The average indicator scores are as follows; F-D1:26%, F-S1:56%, F-S2:44%.

County Government is open to the possibility of contracting ENTs for major repair or rehabilitation

It is unclear if the County understands the life-cycle costs of the hand pumps (F-D1a: 51%). At the county level 5 out of 11 respondents interviewed responded in the negative, 5 in the affirmative and 1 was unaware. At the district level 1 out of the 8 respondents interviewed responded in the negative, 2 in the affirmative and 5 were unaware. It was however very clear that County authorities did not have adequate funds allocated for major repair or rehabilitation of hand pumps (F-D1b:0%). It is unclear if the County government is open to or able to contract ENTs to perform work (F-D1c:40%) and only one entrepreneur interviewed had received a contract for repairs from the county government (F-D1d: 13%).

In general WASH entrepreneurs have limited understanding of finances of WASH goods and services (F-S1: 42%). Regarding financial management of their business, just over half had financial records and less based the price of their services on the actual costs they incurred. As a result only three individuals had any savings. The three ENTs who had savings were saving between 166-300 LD per month (\$2-\$3.50 per month), this is compared to the average income in these communities of USD500. All three of these individuals were involved in a savings club in their communities which probably helped them cultivate a culture of saving.

Figure A6-5. ENTs Financial Management Practices



Community willingness-to-pay and ability to pay price for WASH Entrepreneur services for minor repair and maintenance is low (F-S2:44%) even though majority of entrepreneurs communities collect tariffs for

water services (F-S2a:89%). The tariffs, however, are not based on the actual life-cycle costs (F-S2b: 0%) and is insufficient to pay for minor repairs (F-S2d:33%).

TECHNICAL INDICATORS

Technical indicator scores range from 0-100%, with a median of 52% and an overall factor score of 55%. The average indicator scores are as follows; T-D1: 57%, T-D21: 44%, T-S1: 49%, T-S2: 69%,

WASH entrepreneur has reliable access to affordable spare parts, tools and equipment for the hand pump repair (primary market activities) (T-D1: 57%)

In general access to spare parts is a problem in most areas surveyed (T-D1a: 43%) and mainly dependent on the entrepreneurs proximity to the County headquarter cities. 4 out of the 5 entrepreneurs who could easily access spare parts were from Voinjama and Sanniquelleh districts that host the county headquarters for Lofa and Nimba counties respectively. Only about half of the entrepreneurs interviewed could afford to pay for spare parts and equipment (T-D1b: 51%). All entrepreneurs interviewed had the tools needed for minor/routine repairs (T-Dc: 100%) while only a third had tools needed to make the major repairs (T-D1d: 33%) – see Annex 10 for details on tools owned by the entrepreneurs. It also emerged that the entrepreneurs may not have the technical competence to perform major repairs and as such most did not see the need for acquiring tools for the same.

WASH entrepreneur access to affordable consumable goods for the secondary market activities was low (T-D2: 44%). Although more than half of the entrepreneurs could afford the materials and supplies (T-D2b:67%), only a third of the entrepreneurs had supply arrangements with a wholesaler (T-D2c: 33%) and fewer knew more than one supplier (T-Dd: 22%).

In general response to requests from the community to WASH entrepreneurs or district/county staff for technical assistance is low (TS1: 34%). However this varies between levels with the district recording the lowest unable to respond to request for assistance within the recommended 1 day (district score T-S1a:0%). At service level about 2/3 of the entrepreneurs are able to respond to request for assistance within a day (SP score T-S1a: 56%). The response times at the service level is mainly dependent the accessibility of the areas, the availability of spare parts and ability of the communities to cover the WASH entrepreneur's costs i.e. labor fees and cost of spare parts. As such while the entrepreneurs may be able to get to the site on the same day they are requested they may not be able to perform the repairs right away as is the case most times. In addition it is common for the entrepreneurs make return trips to the same sites for repairs. The returns frequency ranged from 3 times a month to once a year with most indicating they return to the site between 2-3 times in a year. Information on what motivated the returns to same site was not systematically captured so it isn't possible to definitively identify the most common issue. However various options were identified including frequent breakdowns due to harsh use of hand pump, or the use of poor quality or improvised spare parts (e.g. u-seals made from cutting from tire rubber).

In general households served by WASH entrepreneur are aware of the risks of water borne disease and the benefits of treating water (T-S2a: 100%), treat water for human consumption (T-S2b: 78%) and have access to a source of water that is regularly treated (T-S2c: 67%). However, only a small proportion practices safe water storage and handling (T-S2d: 33%). It was observed during the survey that most community members use buckets without lids/covering to collect and store water which increases risk for contamination during transit from source to homestead and during storage.

ANNEX 7: HAND PUMP MECHANICS AND SPARE PARTS SUPPLY CHAIN ANALYSIS

HAND PUMP MECHANICS AND SPARE PARTS SUPPLY CHAIN

Under the Strategic Objective 2 of the WASH Sector Activity Plan 2012-1017 there are specific items related to the hand pump mechanics. To reach the objective of rehabilitating 2,000 water points (SO 2.2.2) there is a plan to train 1,400 community pump mechanics, 400 in urban areas and; 1,000 in rural areas (SO 2.2.3). In addition there is the objective of training and equipping 136 hand-pump mechanics (SO 2.3.4) who would work at the district level (one per district) supporting the community hand pump mechanics for major repairs and rehabilitations. To facilitate the work of these hand pump mechanics it will be necessary to ensure that there are sufficient spare parts available at the district level. Therefore the WASH Sector Activity Plan has a strategic objective of establishing 136 spare parts depots (SO 2.3.2), to ensure that the supply of spare parts is sufficient to meet the demands in each district and the establish a supply chain

Spare parts management is crucial to proper maintenance and sustainability of water supply systems. The WASH SIT assessment in Liberia revealed major challenges in spare parts management. The two top issues are the availability and quality of spare parts. Other issues include the limited transportation/mobility options in rural Liberia which make it difficult for the WASH entrepreneurs to access spare parts depots which are currently located in the county capitals. In addition, this increases the price which communities have to spend to obtain spare parts. Increased cost of spare parts can impact the affordability of spare parts and could drive communities to buy lower cost spare parts which are of lower quality, which could result in a lower willingness to pay by the community if the parts prematurely fail. Therefore it is recommended that efforts are taken to improve the spare parts supply chain.

The goal of any spare parts supply chain development activities should be to ensure that four characteristics are met. These characteristics include: 1) **availability** - i.e. the required components are in stock or can be rapidly delivered; 2) **accessibility** - i.e. WASHCOs are aware of where to find spares outlets and the nearest of these is within easy travelling distance; 3) **appropriateness** - i.e. of correct specification and good quality; and 4) **affordability** - i.e. priced within the means of the target communities.

All these characteristics are either directly or indirectly related to the market for spare parts. This market is defined by the number and type of hand pumps in the geographic area where the spare parts are being sold. One way to analyze the market for spare parts is to look at the commercial viability of a spare parts supply shop. The following section presents this analysis.

HAND PUMP DENSITY BREAKPOINT

One methodology which can be used to analyze the commercial viability of spare parts supply at the user level is to consider the hand pump density required to produce sufficient demand to generate an income which would be acceptable for a potential retailer. The minimum density required to fulfill this is defined as the Hand pump Density Breakpoint (HDB). The methodology used to analyze the HDB is similar to the analysis used in Ethiopia³³. Comparative figures for the average profit per part sold, duration between subsequent repairs and radius of access. The HDB was estimated as follows.

If the profit is determined by:

$$P = P_{average} \times n \quad \text{Equation 1}$$

Where: P = profit
 $P_{average}$ = average profit per spare part sold
 n = number of parts sold per year.

If the number of parts sold per year is estimated using:

$$n = \frac{N \times A}{t_{average}} \quad \text{Equation 2}$$

Where: N = number of hand pumps
 A = number of spare parts which fail at any given time per hand pump (assumed 1 spare part /hand pump)
 $t_{average}$ = average time period between subsequent spare part failures (years)

So therefore if we can identify what the minimum desirable profit is for a hand pump spare parts dealer, we can determine the minimum number of hand pumps or the required “market size”. Assuming that there is no competition (i.e. that there is only one spare parts dealer in a given area), then we can establish a “catchment” area which defines the market. This is done by estimated the radius of access, or the maximum distance that a customer will travel to access spare parts. The required hand pump density to meet this market size in the specified catchment area would be calculated as follows:

$$\text{HDB} = \frac{\# \text{ handpumps}}{\text{area}} = P_{min} \times \frac{t}{\pi \times R^2} \quad \text{Equation 3}$$

Where: P_{min} = minimum profit required to stay in business
 R = radius of access or the average of the maximum distances from the retailer that potential customers could live.

The same average time between spares ($t_{average}$) from Ethiopia was used for Liberia. The average profit per spare part, which is derived from focus group studies of shop owners in rural Ethiopia, was used to derive a similar value for Liberia considering the differences in GNI per capita between Ethiopia and Liberia. These values were considered the minimum that shopkeepers could generate from the sale of spare parts to warrant carrying them in their shop. A more detailed assessment of opportunity costs, startup costs, etc. could be done to determine more precise figures. A smaller radius of access was used for Liberia following the findings of Foster (2013). Table A7-1 provides a comparison of the variables between

³³ Ministry of Water, Irrigation and Energy of Ethiopia and FINDA have developed materials under the CoWASH Project. See MoWIE (2013) for more information

Ethiopia and Liberia and also presents the overall HDB for Liberia which was calculated following Equations 1-3.

Table A7-1. Variables used to calculate the hand pump density breakpoint in Ethiopia and Liberia

Variable	Description	Ethiopia	Liberia
n/a	GNI per capita, Atlas method (2010-2014) ³⁴	550 USD	400 USD
t _{average}	Average time between spares	2 years (India Mark II)	2 years (Afridev)
P _{average}	Average profit per spare	15 ETB (0.72 USD)	44.37LD* (0.52 USD)
R	Radius of access	50 km	40 km
P _{min}	Minimum profit required to stay in business	1000 ETB (47.55 USD)	2,956.59 LD(34.58 USD)
HDB	Hand pump density breakpoint	0.1946pumps/km²	0.2210 pumps/km²

Assuming that the minimum profit required to stay in business between Ethiopia and Liberia is proportionate to the purchasing power parity of the two countries, then the HDB for Ethiopia is 0.1946 pumps/km² while the value for Liberia is 0.221 pumps/km². In other words there needs to be a hand pump every 5.14 square kilometers in Ethiopia and every 4.52 square kilometers in Liberia. These figures for HDB can be compared against the actual hand pump density to determine whether there is sufficient density of hand pumps to support a spare parts supply business in the area. Using data from the 2011 Water Atlas census, the hand pump densities for the counties and districts surveyed during the assessment was calculated. All hand pumps regardless of their functionality status at the time of the census were included and are shown in Table A7-2.

Table A7-2. Hand Pump Density by District and County for Bong, Lofa, and Nimba Counties

County	District	Area (sq. km)	Total No. of hand pumps	Hand pump density (HP/km ²)
Bong	Jorquelleh	1,302.76	215	0.165
	Kokoyah	216.59	16	0.074
Bong County		8694.59	824	0.095
Lofa	Kolahun	2,242.93	195	0.087
	Voinjama	1,908.82	216	0.113
Lofa County		9870.44	829	0.084
Nimba	Gbehlay-Geh	562.03	99	0.176
	Sanniquellie Mahn	484.33	140	0.289
Nimba County		11429.62	1192	0.104
Total for surveyed area		6,717.46	881.00	0.131

Considering all the areas in the study there was only one hand pump every 7.6 square kilometer (i.e. hand pump density of 0.131 pumps/km²). Only in Sanniquellie-Mahn District was the hand pump density sufficient to meet the HDB which was previously calculated in Table A7-1.

The fact that the actual hand pump density is insufficient to meet the HDB in five out of the six districts, or in any of the three counties when looking at the overall density county-wide, can be attributed to a number of factors. In rural areas in Liberia, the population density is low. Liberia is ranked at 164 out of 246 countries with a population density of 46 persons per square kilometer (World Bank, 2015).

³⁴ Source World Bank (2015)

Furthermore there are still large segments of the population that don't have access to an improved water source, which in most cases in Liberia would be an Afridev hand pump. The national coverage rates for rural areas, as reported by the Joint Monitoring Program is 63% (UNICEF, 2013). Using more precise data from the 2011 Water Atlas, the coverage rates in the six districts surveyed range from 33% to 74% with a median of 45% (see Table A7-3 for details).

Assuming the minimum required profit is representative, then the low hand pump density in the areas surveyed would indicate that it would be commercially unviable and therefore unsustainable to establish a spare parts supply store in these districts unless subsidies or incentives were introduced. As such alternative spare parts supply models which don't rely on commercial viability, should be explored in these districts. It is possible that as the plans to increase coverage are implemented which would raise the hand pump density and could make establishment of commercially viable spare parts vendors in the district.

The Water point Atlas assumes a capacity of a maximum of 250 persons per water point to calculate coverage rates. This threshold should ensure that the population would be have sufficient water quantity while the sustainability of the water point would not be negatively affected due to overuse, breakage or well-depletion. Based on the Water Atlas analysis the coverage rates in the counties surveyed is 32%, 43% and 34% for Bong, Lofa and Nimba counties respectively (see Table A7-3 for details). The analysis also reveal great intra-county disparities in coverage rates with some districts recording single digit coverage rates while others record a coverage rate in excess of 80%.

According to the Water Point Atlas analysis, achieving 100% coverage would require the construction or rehabilitation of approximately 8,775 water points. Based on these figures, and assuming all new community level water points in rural areas would employ the use of hand pumps and not alternative technologies (e.g. spring boxes, rainwater harvesting systems, mechanized reticulated systems), then the hand pump density at 100% coverage in the areas surveyed would be as shown in Table A7-3.

Table A7-3. Estimates of Hand Pump Density at 100% Coverage by District and County for Bong, Lofa, and Nimba

County	District	Current total No. of HPs	Current Coverage (Assume 250 persons/HP)	No. of new communal water points required to achieve 100% coverage	Total No. of HPs at 100% Coverage	HPD at 100% Coverage
Bong	Jorquelleh	215	35%	234	449	0.345
	Kokoyah	16	33%	13	29	0.134
Bong County		824	32%	1094	1918	0.221
Lofa	Kolahun	195	47%	151	346	0.154
	Voinjama	216	70%	76	292	0.153
Lofa County		829	43%	762	1591	0.161
Nimba	Gbehlay-Geh	99	42%	82	181	0.322
	Sanniquellie Mahn	140	74%	35	175	0.361
Nimba County		1192	34%	1377	2569	0.225

Even at 100% coverage only Jorquelleh, Gbehley-Geh and Sanniquelleh-Mahn districts would have sufficient hand pump density to make commercial spare parts depots viable. As such, establishment of private spare parts depots in the remaining district would only be possible if some form of subsidy were introduced. However this option may be expensive and contingent on the availability of funds, while it is recognized that the sector already has existing financial gaps which are significant. Therefore it would be

prudent for developing partners to explore alternative spare parts supply models which might include spare parts provision through government offices, seeded rotating funds, or others models. Additional information is available in MoWIE (2013) and at Harvey and Reed (2004).

Availability of spare parts is not a sufficient condition to ensure proper maintenance of water supply systems. It has to be coupled with the availability and access to competent technical services providers (i.e. water systems mechanics/technicians, or hand pump mechanics). Table A7-4 presents a brief analysis of the ratio of hand pumps to hand pump mechanics. As previously mentioned the iWASH project trained ENTs to serve as hand pump mechanics. In addition, the WASH Sector Activity Plan 2012-1017 has a strategic objective to train a total of 1400 community based hand pump mechanics. Assuming these mechanics would be equally distributed among the 15 counties in Liberia; we can calculate the total number of hand pump mechanics which would be operating in each country if SO 2.2.2 of the activity plan were implemented. These are compared against the current coverage rates and if total coverage were achieved in each of the counties (see Table A7-3).

Table A7-4. Service Capacity (Number of Hand Pumps per Hand Pump Mechanic) for Bong, Lofa, and Nimba Counties

County	Current*	Proposed		Ration of Hand pumps to Hand pump Mechanics**		
	WASH Entrepreneurs	Community HP mechanics	Total HPM	Status Quo***	Current Coverage and Proposed Total HPM	100% Coverage and Proposed Total HPM
Bong	16	94	110	52	8	18
Lofa	20	94	114	42	8	14
Nimba	20	94	114	60	10	23

*Only considers those hand pump mechanics trained under the current iWASH project

**Ratios were rounded up to nearest whole number

***Includes all hand pumps both those which were functional and non-functional

The current number of hand pumps per community hand pump mechanics (i.e. WASH entrepreneurs) in Liberia is very high. Data from Uganda suggests that an ideal ration should be approximately 35 hand pumps per hand pump mechanic (Magara, 2014), while in Nicaragua the figure ranged from 30-50 HPs/mechanic, however it is noted that in Nicaragua the transportation infrastructure is significantly more developed. Although Liberia has no standards or guidelines on the hand pump/mechanic ratio, a WASH expert in Liberia suggested an ideal ratio would be 20-25 HPs/mechanic with 40 hand pumps being the maximum number considering the hand pump density and the accessibility challenges in rural Liberia. Uganda and Liberia have similar indicators with regard to transportation coverage (i.e. roadways per square kilometer), and therefore the ideal range likely should be between 25-35 hand pumps per HP/mechanic. The training of the community based pump mechanics as proposed in the WASH Activity Plan would greatly reduce the HP/mechanic ratio which could improve access to technical services for maintenance and repairs.

Even if the spare parts supply chain development activities address the four criteria listed above, there are two additional conditions which must be satisfied to ensure that the impact of an effective and sustainable spare parts supply chains is realized. These conditions are as follows:

1) **Technical knowledge and skills** required to diagnose the problem, identify the solution including the spare parts and equipment necessary to solve it, and carry out the required repair. These capacities may fall with the staff of local government or NGOs, an artisan, or a trained member of a WASH committee. The more closely connected this person is to the geographic area where the problem is located, the shorter the downtime is likely to be (i.e. county level technical response will likely be slower then district level).

2) **Financial capacity:** In Liberia WASH Committees are required to cover routine maintenance, and therefore must have the financial resources (i.e. savings or ability to raise capital) to fund the repair of the hand pump. This includes the cost of the technical support (i.e. communication, transport, fees) and also the procurement costs for the spare parts.

Therefore, to maximize the benefits of the efforts to improve the spare parts supply chain, it will be necessary to also include elements which address deficiencies with regard to these two additional conditions.

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ANNEX 8: SIT FRAMEWORKS FOR IWASH LIBERIA

COMMUNITY HAND PUMP FRAMEWORK

https://www.dropbox.com/s/f0yveifzsgavt70/CHP_Liberia%20SIT%20Framework.xlsx?dl=0

INSTITUTIONAL HAND PUMP FRAMEWORK

https://www.dropbox.com/s/8li0i87qs2rrttg/IHP_%20Liberia%20SIT%20Framework%20.xlsx?dl=0

WASH ENTREPRENEURS FRAMEWORK

https://www.dropbox.com/s/qccs4585u868rqz/ENT_Liberia%20SIT%20Framework.xlsx?dl=0

Water: Community Hand Pumps (CHP) iWASH Liberia

WT-CHP-I-N1	Primary	Secondary	National policy, norms and guidelines for community-managed water supply and enabling legislation is in place
WT-CHP-I-N1a	MPW	WASH coordinator	a) Does national policy for water supply recognize community management?
WT-CHP-I-N1b	MPW	WASH coordinator	b) Have national norms and standards been set for the constitution and governance of community-based service provider (i.e. WASH Committees) (e.g. WASH Committees in terms of functions)?
WT-CHP-I-N1c	MPW	WASH coordinator	c) Is legislation in place that gives community management legal standing (e.g. by-laws formalizing WASH Committees)?
WT-CHP-I-N1d	MPW	WASH coordinator, pump	d) Is there a national registry of the water systems/points that are managed by community based organizations?
WT-CHP-I-D1	Primary	Secondary	Roles and responsibilities of County WASH Team and ownership arrangements are clearly defined
WT-CHP-I-D1a	WASH coordinator,	N	a) Are there formalized roles and responsibilities for the County WASH team?
WT-CHP-I-D1b	WASH coordinator,	N	b) Are the roles and responsibilities of the County WASH Team written down and accessible? (Verify)
WT-CHP-I-D1c	WASH coordinator, pump technician	N	c) Are the roles and responsibilities of the County WASH Team understood by all key members of the County WASH team involved in overseeing the water system?
WT-CHP-I-D1d	Community WASH Committee	WASH coordinator, pump technician	d) Are the roles and responsibilities of the County WASH Team understood by the service provider (i.e. WASH Committee)?
WT-CHP-I-S1	Primary	Secondary	There is a WASH Committee which has been constituted in line with national norms and standards
WT-CHP-I-S1a	Community WASH Committee	HH	a) Is there a WASH Committee in the community?
WT-CHP-I-S1b	Community WASH Committee	HH	b) Are there national (or local) norms and standards for the composition of a WASH Committee?
WT-CHP-I-S1c	Community WASH Committee	HH	c) Does the WASH Committee meet the target with regard to gender representation (i.e. at least 50% of the WASH Committee comprised of women)?
WT-CHP-I-S1d	Community WASH	HH	d) Was the town chief involved in selecting the committee?
WT-CHP-I-N2	Primary	Secondary	Institutional framework and governance of sector is established and functioning
WT-CHP-I-N2a	N	WASH Coordinator	a) Are coordination mechanisms in place at national level?
WT-CHP-I-N2b	WASH Coordinator	N	b) Are coordination mechanisms in place at county level?
WT-CHP-I-N2c	N		c) Is there an interministerial body responsible for sector oversight and resource mobilization?
WT-CHP-I-N2d	N		d) Is there an established and functioning sector regulation body?
WT-CHP-I-N3	Primary	Secondary	Capacity is sufficient at central and county level and capacity development initiatives underway
WT-CHP-I-N3a	N	WASH Coordinator	a) Is the sector operating under a decentralized system?
WT-CHP-I-N3b	N	WASH Coordinator	b) Is there sufficient capacity at central level to manage and expand services?
WT-CHP-I-N3c	WASH Coordinator	N	c) Is there sufficient capacity at county level to manage and expand services?
WT-CHP-I-N3d	N		d) Are there ongoing capacity development activities in line with Capacity Development Plan?
WT-CHP-M-N1	Primary	Secondary	There is an updated national monitoring system or database available
WT-CHP-M-N1a	MPW	WASH coordinator, pump	a) Is there a national water system/water point database?
WT-CHP-M-N1b	WASH coordinator,	MPW	b) Does county-level collect monitoring data?
WT-CHP-M-N1c	WASH coordinator,	MPW	c) Is data sent to central level?
WT-CHP-M-N1d	MPW	WASH coordinator, pump	d) Is database used to influence government or NGO programs planning?

WT-CHP-M-N2	Primary	Secondary	National support to County WASH Team is provided, including refresher training
WT-CHP-M-N2a	N	County WASH Team, local	a) Has government or NGO trained the County WASH Team to support community O&M?
WT-CHP-M-N2b	N	County WASH Team, local	b) Does government or NGO provide refresher training to the County WASH Team?
WT-CHP-M-N2c	N	WASH coordinator, pump	c) Was training given to the County WASH Team in AKVO FLOW?
WT-CHP-M-N2d	County WASH Team, N		d) Does the County government (County WASH Team) have access to data collection forms (on smart phone or hard copy) and do they have the skills to digitize/modify forms on the
WT-CHP-M-D1	Primary	Secondary	There is regular monitoring of water services and community management service provider (i.e. WASH Committee) and follow-up support
WT-CHP-M-D1a	WASH Coordinator	Community WASH	a) Has a county WASH Coordinator or handpump technician visited the hand pump?
WT-CHP-M-D1b	County WASH Team	Community WASH	b) Does the County WASH Team have a registry of service providers (i.e. WASH Committees)?
WT-CHP-M-D1c	County WASH Team	Community WASH	c) Does the County WASH Team monitor the service provider (i.e. WASH Committees)?
WT-CHP-M-D1d	County WASH Team		d) Does the County WASH Team keep records?
WT-CHP-M-S1	Primary	Secondary	Representative WASH Committee actively manages water point and keeps records
WT-CHP-M-S1a	Community WASH	HH	a) Are the management roles and responsibilities of the WASH Committee clearly defined? ("No" if there is no committee)
WT-CHP-M-S1b	Community WASH	HH	b) Does the WASH Committee meet on a regular basis? (weekly; monthly; bi-monthly; quarterly)
WT-CHP-M-S1c	Community WASH	HH	c) Does the WASH Committee keep records? (Meeting Agenda; Minutes; Financial Records; WO records)
WT-CHP-M-S1d	Community WASH	HH	d) Are these records available to the community?
WT-CHP-M-S2	Primary	Secondary	There was initial water quality testing and reporting conducted
WT-CHP-M-S2a	District EHT	Community WASH	a) Was water quality tested before water point was handed over to community?
WT-CHP-M-S2b	Community WASH	District EHT	b) Does WASH Committee have access to results and records of the test? Does the community understand what the test results mean?
WT-CHP-M-S2c	District EHT	Community WASH	c) Are 10% of points spot monitored?
WT-CHP-M-S2d	County EHT	District EHT	d) Are test results conveyed and compiled at County Level?
WT-CHP-F-N1	Primary	Secondary	There is a national budget to support rural water supply, construction and rehabilitation
WT-CHP-F-N1a	MPW		a) Is there a line item for construction/ rehabilitation of rural water points in the national budget?
WT-CHP-F-N1b	MPW		b) Is O&M considered in rural water supply budgeting?
WT-CHP-F-N1c	County WASH Team	N	c) Is there funding available to rural water point construction/ rehabilitation in the County Development Funds?
WT-CHP-F-N1d	County WASH Team	MPW	d) Is there sufficient operations budget allocated to the county water staff through national budget mechanisms?
WT-CHP-F-D1	Primary	Secondary	Resources available for County WASH Team to fulfill functions
WT-CHP-F-D1a	County WASH Team	N	a) Is there adequate staffing within the County WASH Team?
WT-CHP-F-D1b	County WASH Team	N	b) Do job descriptions adequately reflect needed skills?
WT-CHP-F-D1c	County WASH Team	N	c) Do the staff have adequate qualifications and skills?
WT-CHP-F-D1d	County WASH Team	N	d) Does the County WASH Team have the relevant financial skills to carry out their duties?
WT-CHP-F-S1	Primary	Secondary	Funds collected O&M or Repair are sufficient
WT-CHP-F-S1a	Community WASH	HH	a) Is money collected for OSM?
WT-CHP-F-S1b	Community WASH	HH	b) Does the community have a cash box for water supply?
WT-CHP-F-S1c	Community WASH	HH	c) Does the WASH Committee keep financial records? (verify)
WT-CHP-F-S1d	Community WASH	HH	d) Does the committee have a bank account? (verify)
WT-CHP-F-S2	Primary	Secondary	Tariff collection is regular and sufficient

WT-CHP-F-S2a	Community WASH	HH	a) Is the tariff collected on a regular schedule (e.g. on pay-as-you-fetch basis, or monthly household levies, instead of collecting money when there is a breakdown)?
WT-CHP-F-S2b	Community WASH	HH	b) Is money collected sufficient to cover costs?
WT-CHP-F-S2c	Community WASH	HH	c) Do most households pay a tariff?
WT-CHP-F-S2d	Community WASH	HH	d) Does the tariff make provision for poorest within the community?
WT-CHP-T-N1	Primary	Secondary	There are national/local norms that define acceptable service levels with explicit indicators and thresholds (e.g. water quality, quantity, accessibility, affordability, etc.)
WT-CHP-T-N1a	N	County EHT (water quality)	a) Are there national/local norms for water quality?
WT-CHP-T-N1b	N	WASH Coordinator	b) Are there national/local norms for quantity? (e.g. the borehole is deep enough to provide water throughout the year, including during the dry season)
WT-CHP-T-N1c	N	WASH Coordinator	c) Are there national/local norms for accessibility (distance from household, crowding at water point) which also explicitly address issues of equity and non-discrimination against
WT-CHP-T-N1d	N	WASH Coordinator	d) Are there national/local norms for affordability?
WT-CHP-T-N2	Primary	Secondary	There are national/local norms that define equipment standardization and arrangements for providing spare parts
WT-CHP-T-N2a	MPW	WASH Coordinator	a) Do national/local norms define equipment standardization and arrangements for providing spare parts?
WT-CHP-T-N2b	MPW	WASH Coordinator	b) Do national guidelines exist with regard to the construction of water points (borehole apron or platform, drainage, fencing, etc.)?
WT-CHP-T-N2c	MPW	WASH Coordinator	c) Are these guidelines available and widely disseminated?
WT-CHP-T-N2d	MPW	WASH Coordinator	d) Are the roles and responsibilities with regard to monitoring and enforcement clear?
WT-CHP-T-D1	Primary	Secondary	The county water staff is able to provide support for maintenance and repairs on request
WT-CHP-T-D1a	Pump Technician	Community WASH	a) Are the Hand Pump Technicians able to provide technical support for maintenance on request?
WT-CHP-T-D1b	Pump Technician	Community WASH	b) Are the Hand Pump Technicians able to provide technical support for repairs on request?
WT-CHP-T-D1c	Pump Technician	Community WASH	c) Are there spare parts depots or private stores that stock spare parts in the district?
WT-CHP-T-D1d	Pump Technician	Community WASH	d) Is the pump trademark Afdev?
WT-CHP-T-S1	Primary	Secondary	Hand pumps are functional and provide basic level of service according to national policy
WT-CHP-T-S1a	Community WASH	HH	a) Does hand pump meet criteria for quantity year-round (i.e. sustainable yield of at least 264 gallons per hour)?
WT-CHP-T-S1b	Community WASH	HH	b) Was seasonality taken into consideration during construction/ rehabilitation (i.e. higher static water column during rainy season)?
WT-CHP-T-S1c	Community WASH	HH	c) Were traditional leaders and members of community (including women) involved in siting?
WT-CHP-T-S1d	HH	observation	d) Is the hand pump designed, constructed, and maintained so as to ensure ease of use by potentially marginalized populations (poor, elderly, women, children, disabled, etc)?
WT-CHP-T-S2	Primary	Secondary	Hand pump complies with standards and norms in terms of siting and public health risk
WT-CHP-T-S2a	observation	Community WASH	a) Does hand pump meet siting requirements (i.e. 90 feet above potential source of contamination)?
WT-CHP-T-S2b	observation	Community WASH	b) Does hand pump has a sanitary surrounding that complies with national/ local norms (i.e. well seals, and apron of 5 degree slope, distance from edge of well head to edge of drainage
WT-CHP-T-S2c	observation	Community WASH	c) Does hand pump meet design and construction requirements in terms of drainage channel (i.e. 10 x 6 x 16 inches)?
WT-CHP-T-S2d	observation	Community WASH	d) Does hand pump meet design and construction requirements in terms of soak away pit (i.e. 3.2 ft in diameter and 6.5 feet deep, and connected to well apron by drainage channel)?
WT-CHP-T-S3	Primary	Secondary	Hand pump complies with water quality standards and norms
WT-CHP-T-S3a	Community WASH	County EHT/ water	a) Was well disinfected after construction/ repair?
WT-CHP-T-S3b	Community WASH	County EHT/ water	b) Did the water meet quality standards?
WT-CHP-T-S3c	Community WASH	County EHT/ water	c) Has MOHSW visited the water point?
WT-CHP-T-S3d	Community WASH	HH	d) Is water clean and free of odor?
WT-CHP-T-S4	Primary	Secondary	The knowledge and spare parts are available to conduct maintenance and repairs in a timely manner
WT-CHP-T-S4a	Community WASH	HH	a) Is there service provider (i.e. WASH Committee) staff available for basic repairs?
WT-CHP-T-S4b	Community WASH	HH	b) Is there a trained hand pump tech in each community, or nearby?

WT-CHP-T-54c	Community WASH	Pump technician	e) Can spare parts be obtained?
WT-CHP-T-54d	Community WASH	HH	d) How long did it take to repair the pump the last time it broke?

WT-CHP-E-61	Primary	Secondary	National environmental protection standards are established and applied to WASH services.
WT-CHP-E-61a	N		a) Is there a national climate change adaptation strategy?
WT-CHP-E-61b	N		b) Do national standards exist to mitigate the environmental impacts of constructing water supply infrastructure?
WT-CHP-E-61c	N	County WASH Team	c) Are the roles and responsibilities clear with regard to the monitoring and enforcement of environmental impact mitigation standards for water supply services?
WT-CHP-E-61d	N	County WASH Team	d) Are these standards available, widely disseminated, and enforced?

WT-CHP-E-62	Primary	Secondary	National integrated water resources management plan is in place, updated regularly, and applied to WASH services planning.
WT-CHP-E-62a	N		a) Is the national water resources management plan publicly available?
WT-CHP-E-62b	N	County WASH Team	b) Is there a county water supply plan that includes integrated water resources management linking to national plan if applicable?
WT-CHP-E-62c	N	County WASH Team	c) Do various stakeholders meet to discuss water resource management plans?
WT-CHP-E-62d	N	County WASH Team	d) Are stakeholders educate county water offices and WASH service provider (i.e. WASH Committees) and water users about the national water resources management plan?

WT-CHP-E-51	Primary	Secondary	Susceptibility of Water Supply Infrastructure to Environmental Change is accounted for.
WT-CHP-E-51a	N		a) Are there national environmental guidelines and prescribed protection measures for land use planning at national level?
WT-CHP-E-51b	HH	Community WASH	b) Has land use within the community changed within the past year?
WT-CHP-E-51c	HH	Community WASH	c) Have the characteristics of the traditional water sources changed?
WT-CHP-E-51d	HH	Community WASH	d) Has flow of the water point stayed the same since construction/rehabilitation? Do you think it is a technical issue or a water resource issue?

Water: Institutional Hand Pumps (IHP) iWASH Liberia

WT-IHP-I-N1	Primary	Secondary	National policy, norms and guidelines for community-managed water supply and enabling legislation is in place
WT-IHP-I-N1a	N	SP	a) Do sector policy instruments recognize responsibilities for institutional-based service providers?
WT-IHP-I-N1b	N	SP	b) Do MOHSW/MOE plans recognize need for water point construction/ rehabilitation and O&M in facilities?
WT-IHP-I-N1c	N		c) Does law acknowledge institutional/facility ownership of water points?
WT-IHP-I-N1d	N	SP	d) Is there effective coordination between MOHSW/MOE and the county Department of Public Works and Utilities?
WT-IHP-I-D1	Primary	Secondary	Roles and responsibilities of county (service authority) and ownership arrangements are clearly defined
WT-IHP-I-D1a	D	SP	a) Are roles and responsibilities clear and understood by all those in count government involved with maintenance of facilities?
WT-IHP-I-D1b	SP	D	b) Is there a water committee or other formalized structure for the management of the handpump?
WT-IHP-I-D1c	D	SP	c) Are there institutional water point support staff at county level?
WT-IHP-I-D1d	SP	D	d) Does staff support institutions in their promotion of proper facility use?
WT-IHP-M-N1	Primary	Secondary	There is an updated national monitoring system or database available
WT-IHP-M-N1a	N		a) Does MOHSW/MOE maintain registry of facility water points at central level?
WT-IHP-M-N1b	SP	D	b) Is institutional data sent to county information officer?
WT-IHP-M-N1c	D	N	c) Is data uploaded to HMIS/EMIS?
WT-IHP-M-N1d	N	D	d) Is database used to influence government or NGO program planning?
WT-IHP-M-N2	Primary	Secondary	National support to district/service authority is provided, including refresher training
WT-IHP-M-N2a	N	D	a) Has government or NGO trained facility staff to support O&M?
WT-IHP-M-N2b	N	D	b) Does government or NGO provide refresher training?
WT-IHP-M-N2c	N	D	c) Was training given in AKVO FLOW?
WT-IHP-M-N2d	D	N	d) Does staff have access to forms (on smart phone or hard copy)?
WT-IHP-M-D1	Primary	Secondary	There is regular monitoring of water services and service provider and follow-up support
WT-IHP-M-D1a	SP		a) Is there regular monitoring of the service point?
WT-IHP-M-D1b	SP		b) Is there a monitoring coordination and response mechanism in place?
WT-IHP-M-D1c	SP		c) Does monitoring lead to direct support to the service provider when required?
WT-IHP-M-D1d	SP		d) Is there an overall asset management plan?
WT-IHP-F-N1	Primary	Secondary	There are national/local mechanisms beyond community contributions and tariffs, to meet life-cycle costs, while ensuring affordability, equity, and non-discrimination
WT-IHP-F-N1a	N		a) Does MOHSW/MOE central budget have a line item for such infrastructure (ie for use in transfer mechanism ?
WT-IHP-F-N1b	SP	N	b) Does MOHSW/MOE have line item for such facilities and O&M through County Development Funds?
WT-IHP-F-N1c	N	SP	c) Was the budget created considering total life-cycle costs including operation and minor maintenance costs, as well as making provision for capital maintenance (rehabilitation and replacement?)
WT-IHP-F-N1d	N	SP	d) Is there a clear process for soliciting and distributing these funds to schools/institutions?
WT-IHP-F-D1	Primary	Secondary	Resources available for district/service authority to fulfill functions
WT-IHP-F-D1a	SP		a) Does the health facility/school budget for O&M?
WT-IHP-F-D1b	D	SP	b) Is there sufficient budget allocated to the district water staff to provide the required support and service?
WT-IHP-F-D1c	SP	D	c) Does health facility/ school collect money from patients and families/PTAs?

WT-IHP-F-D1d	SP		d) Does the facility rely on NGO funding?
WT-IHP-F-S1	Primary	Secondary	Spare parts are available and affordable, including those provided by the private sector
WT-IHP-F-S1a	SP		a) Are supplies for repairs available at the district level?
WT-IHP-F-S1b	SP		b) Are supplies affordable and accessible to health facilities/schools?
WT-IHP-F-S1c	SP		c) Are there private sector operators involved in providing support?
WT-IHP-F-S1d	SP		d) Are their services affordable for the health facilities/schools?
WT-IHP-T-N1	Primary	Secondary	There are national/local norms that define acceptable service levels with explicit indicators and thresholds (e.g. water quality, quantity, accessibility, affordability, etc.)
WT-IHP-T-N1a	N	D	a) Are there ministry norms for water quality?
WT-IHP-T-N1b	N	D	b) Are there ministry norms for quantity? (e.g. the borehole is deep enough to provide water throughout the year, including during the dry season)
WT-IHP-T-N1c	N	D	c) Are there ministry norms for accessibility (distance from household, crowding at water point) which also explicitly address issues of equity and non-discrimination against women, disabled, children, and elderly?
WT-IHP-T-N1d	N	D	d) Was MPW or Department of Public Works and Utilities involved in design and construction/ rehabilitation?
WT-IHP-T-N2	Primary	Secondary	There are national/local norms that define equipment standardization and arrangements for providing spare parts
WT-IHP-T-N2a	N	D	a) Do national/local norms define equipment standardization and arrangements for providing spare parts?
WT-IHP-T-N2b	N	D	b) Do national guidelines exist with regard to the construction of water points (borehole apron or platform, drainage, fencing, etc.)?
WT-IHP-T-N2c	N	D	c) Are these guidelines available and widely disseminated?
WT-IHP-T-N2d	N	D	d) Are the roles and responsibilities with regard to monitoring and enforcement clear?
WT-IHP-T-D1	Primary	Secondary	The district water staff are able to provide support for maintenance and repairs on request
WT-IHP-T-D1a	D	SP	a) Are the district water staff able to provide technical support for maintenance on request?
WT-IHP-T-D1b	D	SP	b) Are the district water staff able to provide technical support for repairs on request?
WT-IHP-T-S1	Primary	Secondary	Hand pump is functional and provides basic level of service according to national policy
WT-IHP-T-S1a	SP		a) Is the water available to all patients/students?
WT-IHP-T-S1b	SP		b) Is the water point well maintained?
WT-IHP-T-S1c	SP		c) Is there a regular cleaning program which is documented?
WT-IHP-T-S1d	SP	observation	d) Are cleaning supplies currently available? (verify)
WT-IHP-T-S2	Primary	Secondary	Hand pump complies with standards and norms in terms of siting and public health risk
WT-IHP-T-S2a	observation	SP	a) Hand pump complies with national/local norms with regard to siting (e.g. distance from nearest latrine, open water, or potential pollution source, uphill/gradient from latrine). (verify)
WT-IHP-T-S2b	observation	SP	b) Hand pump has a sanitary surrounding that complies with national/local norms (e.g. including well seals, apron with a minimum diameter of 1 meter and without cracks, and fencing to prevent animal access. (Verify)
WT-IHP-T-S2c	observation	SP	c) Drainage is controlled to minimize standing water and control disease vectors. (Verify)
WT-IHP-T-S2d	observation	SP	d) The location of the borehole is not at risk of flooding. (Verify)
WT-IHP-T-S3	Primary	Secondary	The knowledge and spare parts are available to conduct maintenance and repairs in a timely manner
WT-IHP-T-S3a	SP		a) Is there service provider staff available for basic repairs?
WT-IHP-T-S3b	SP		b) Can spare parts be obtained?
WT-IHP-T-S3c	SP	D	c) Are there national/local norms for repair times?
WT-IHP-T-S3d	SP		d) Are repairs always achieved within the national/local norms for repair times?
WT-IHP-E-N1	Primary	Secondary	National environmental protection standards are established and applied to WASH services

WT-IHP-E-N1a	N		a) Do national standards exist to protect the natural environment in the design, sizing, siting, and construction of sanitation facilities?
WT-IHP-E-N1b	N		b) Do national standards/regulations exist requiring proper disposal and management of fecal waste and domestic wastewater?
WT-IHP-E-N1c	N	D	c) Are the roles and responsibilities clear with regard to the monitoring and enforcement of environmental impact mitigation standards for sanitation and wastewater management?
WT-IHP-E-N1d	N	D	d) Are these standards available, widely disseminated, and enforced?
WT-IHP-E-N2	Primary	Secondary	National integrated water resources management plan is in place, updated regularly, and applied to WASH services planning
WT-IHP-E-N2a	N	D	a) Do county sanitation and wastewater treatment plans comply with the national water resources management plans?
WT-IHP-E-N2b	N	D	b) Is sanitation and wastewater monitoring data collected on at least an annual basis and incorporated into a national data system?
WT-IHP-E-N2c	N	D	c) Is the national water resources management plan updated based on revised sanitation and wastewater data (with the frequency stipulated by national/local guidelines)?
WT-IHP-E-N2d	N	D	d) Is the national water resource management plan publicly available and are steps taken to educate district sanitation/health offices and sanitation/wastewater service providers about it?
WT-IHP-E-S1	Primary	Secondary	Natural resources are managed to support sustainable WASH service delivery
WT-IHP-E-S1a	N		a) Has vulnerability to climate-related impacts (including droughts and floods) been assessed for the sanitation and/or wastewater treatment service?
WT-IHP-E-S1b	N		b) Have climate-related adaptation measures been incorporated in the development of sanitation and/or wastewater treatment services (including design, sizing, and siting of built infrastructure, and management of natural resources)?

Water: WASH Entrepreneur (ENT) iWASH Liberia

WT-ENT-I-N1	Primary Investigation	Triangulation	Appropriate guidelines and legislation is in place that facilitate and enable the activities of WASH Entrepreneurs
WT-ENT-I-N1a	N	WASH coordinator,	
WT-ENT-I-N1b	N	WASH coordinator,	Have national guidelines been developed to help County governments contract WASH Entrepreneurs to provide services?
WT-ENT-I-N1c	N	WASH coordinator,	Is legislation in place that gives WASH Entrepreneurs legal standing?
WT-ENT-I-N1d	N	WASH coordinator,	Is there a national registry of the the location of spare parts?
WT-ENT-I-D1	Primary Investigation	Triangulation	There is a clear process for indentifying and training WASH Entrepreneurs/hand pump mechanics?
WT-ENT-I-D1a	County WASH Team	Entrepreneur	Is there a clear understanding of the qualifications necessary to be a competent and sucessful WASH Entrepreneur /hand pump
WT-ENT-I-D1b	County WASH Team	Entrepreneur	Is there a clear process for identifying WASH Entrepreneurs/hand pump mechanics?
WT-ENT-I-D1c	County WASH Team	Entrepreneur	Is there a clear process for training WASH Entrepreneurs/hand pump mechanics?
WT-ENT-I-D1d	County WASH Team	Entrepreneur	Have WASH Entrepreneur / handpump mechanic training materials been developed and are they available to County
WT-ENT-I-D2	Primary Investigation	Triangulation	There is a clear process for accrediting and regulating WASH Entrepreneurs/ hand pump mechanics
WT-ENT-I-D2a	County WASH Team	Entrepreneur	Have WASH Entrepreneurs in the county have been certified or assessed?
WT-ENT-I-D2b	County WASH Team	Entrepreneur	Does the WASH Entrepreneur have any form of accreditation (carnet or similar?) to guarantee the quality of their services?
WT-ENT-I-D2c	County WASH Team	Entrepreneur	Does the WASH Entrepreneur receive technical support from an institution or organization?
WT-ENT-I-D2d	County WASH Team	Entrepreneur	
WT-ENT-I-S1	Primary Investigation	Triangulation	WASH entrepreneur has sufficient skills and competencies to be successful
WT-ENT-I-S1a	Entrepreneur	County WASH Team	Does the WASH Entrepreneur have the appropriate technical skills and competencies?
WT-ENT-I-S1b	Entrepreneur	County WASH Team	Does the WASH Entrepreneur have the appropriate marketing skills?
WT-ENT-I-S1c	Entrepreneur	County WASH Team	Does the WASH Entrepreneur have the appropriate financial management skills?
WT-ENT-I-S1d	Entrepreneur	County WASH Team	Does the WASH Entrepreneur have the appropriate technical skills and competencies?
WT-ENT-M-D1	Primary Investigation	Triangulation	WASH entrepreneur provides regular and relevant monitoring on a timely basis to higher level authority
WT-ENT-M-D1a	County WASH Team	N	Does the county send M&E updates to the Ministry?
WT-ENT-M-D1b	County WASH Team	N	How frequently does the District send updates?
WT-ENT-M-D1c	County WASH Team	Entrepreneur	Does the County utilize the network of WASH Entrepreneurs / handpump mechanics to collect information
WT-ENT-M-D1d	County WASH Team		Can the District provide copies of the latest update?
WT-ENT-M-D2	Primary Investigation	Triangulation	There is a viable market for the services provided by WASH entrepreneurs
WT-ENT-M-D2a	Entrepreneur		is there sufficient demand for WASH Entrepreneur to earn a livelihood from the WASH activities alone?
WT-ENT-M-D2b	Entrepreneur	HH	What are the most common repairs that the WASH Entrepreneur has to make?
WT-ENT-M-D2c	Entrepreneur		What percentage of the repairs that the WASH Entrepreneur does are outside WASH Entrepreneur's community?
WT-ENT-M-D2d	Entrepreneur	WASH Committee	Is the WASH Entrepreneur able to effectively market their services and are their services widely known/recognized.

WT-ENT-M-S1	Primary Investigation	Triangulation	WASH entrepreneur has an established business plan providing WASH goods and services
WT-ENT-M-S1a	Entrepreneur	WASH Committee	Is the WASH entrepreneur aware of the opportunity costs of their services (i.e. the amount of money they could be earning doing
WT-ENT-M-S1b	Entrepreneur		Is the earning potential for WASH Entrepreneur services are greater than the opportunity costs?
WT-ENT-M-S1c	Entrepreneur	HH	Is the WASH entrepreneur aware of competition and pricing issues?
WT-ENT-M-S1d	HH		Does the WASH Entrepreneur have a plan for new business development and is actively promoting their services?

WT-ENT-F-D1	Primary Investigation	Triangulation	County Government is open to the possibility of contracting WASH Entrepreneurs for major repair or rehabilitation
WT-ENT-F-D1a	N	WASH coordinator	Does the County understands the life-cycle costs of the handpumps?
WT-ENT-F-D1b	WASH coordinator		Does the County have adequate funds allocated for major repair or rehabilitation?
WT-ENT-F-D1c	WASH coordinator,		Is the County government open to/able to contract WASH Entrepreneurs to perform work?
WT-ENT-F-D1d	WASH coordinator,		

WT-ENT-F-S1	Primary Investigation	Triangulation	WASH entrepreneur understand finances of WASH goods and services
WT-ENT-F-S1a	Entrepreneur		WASH Entrepreneur has financial records
WT-ENT-F-S1b	Entrepreneur		WASH Entrepreneur has savings
WT-ENT-F-S1c	Entrepreneur		What percent of your total income comes from WASH Entrepreneur activities?
WT-ENT-F-S1d	Entrepreneur		WASH goods and services are priced based on actual costs

WT-ENT-F-S2	Primary Investigation	Triangulation	Community willingness-to-pay and ability to pay price for WASH Entrepreneur services for minor repair and maintenance
WT-ENT-F-S2a	WASH Committee	HH	Is the community water committee collecting a tariff?
WT-ENT-F-S2b	WASH Committee	HH	Is the tariff based on the actual life-cycle costs?
WT-ENT-F-S2c	WASH Committee	HH	Does the community water committee maintains up-to-date financial records and manages cash from tariffs?
WT-ENT-F-S2d	WASH Committee	HH	Does the community has savings and is the community savings is sufficient to pay for minor repairs?

WT-ENT-T-D1	Primary Investigation	Triangulation	WASH entrepreneur has reliable access to affordable spare parts, tools and equipment for the handpump repair (primary
WT-ENT-T-D1a	Entrepreneur	County WASH Team	Are spare parts and equipment accessible to the WASH Entrepreneur?
WT-ENT-T-D1b	Entrepreneur	County WASH Team	Are spare parts and equipment affordable to the WASH Entrepreneur?
WT-ENT-T-D1c	Entrepreneur		Does the WASH Entrepreneur have all the tools needed to make the routine repairs?
WT-ENT-T-D1d	Entrepreneur		Does the WASH Entrepreneur have all the tools needed to make the major repairs?

WT-ENT-T-D2	Primary Investigation	Triangulation	WASH entrepreneur has reliable access to affordable consumable goods for the secondary market activities
WT-ENT-T-D2a	Entrepreneur		Are materials and supplies accessible to the WASH Entrepreneur?
WT-ENT-T-D2b	Entrepreneur		Are materials and supplies affordable to the WASH Entrepreneur?
WT-ENT-T-D2c	Entrepreneur		Does the WASH Entrepreneur have agreements with the materials and supplies wholesaler?
WT-ENT-T-D2d	Entrepreneur		Does the WASH Entrepreneur know more than one wholesale vendor?

WT-ENT-T-S1	Primary Investigation	Triangulation	WASH entrepreneur responds within national norms for system downtime?
WT-ENT-T-S1a	Entrepreneur	County WASH Team	How long does it take you to respond to a request for assistance?

2	WT-ENT-T-S1b	Entrepreneur	County WASH Team	What happens if you don't know how to fix the problem?
2	WT-ENT-T-S1c	Entrepreneur	County WASH Team	How often do you return to the same place to fix something?
2	WT-ENT-T-S1d	Household	Entrepreneur	What is the typical service down time?
1	WT-ENT-T-S2	Primary Investigation	Triangulation	Households served by WASH entrepreneur regularly disinfect water for human consumption
2	WT-ENT-T-S2a	Household		Household is aware of the risks of water borne disease and the benefits of treating water
2	WT-ENT-T-S2b	Household		Households are currently treating water
2	WT-ENT-T-S2c	Household		Households have treated water available
2	WT-ENT-T-S2d	Household		Households practices safe water storage and handling

ANNEX 9: SUMMARY OF SAMPLING PROTOCOL

BACKGROUND

The sample protocol includes the process for identifying the communities where data collection would take place (i.e. sample frame), as well as for determining which and how many specific individuals or organizations will be engaged during field data collection activities.

In 2011 a census of improved water points in Liberia was conducted by the Ministry of Public Works, resulting in the publication of a Water Atlas. This data showed a high breakdown rate with 15% of the hand pumps breaking down in a year and 33% after 6 years. Table A9-1 has a summary of the results of the Water Atlas mapping for the counties included in this assessment.

Table A9-1. Summary of the Results of the Mapping for Bong, Lofa, and Nimba Counties.

Characteristic	Bong	Lofa	Nimba
Population density (person/sq mile)	100	73	105
Population per working water point	730	531	672
Average Age	2005	2006	2005
Percentage of Water Points with committees	55%	76%	67%
Working and protected	457	521	675
Working but with problems	86	61	124
Broken down systems	265	243	377
Problems with Pump			
Pump	41%	54%	45%
Well	36%	37%	24%
Apron	17%	7%	10%
Other	5%	3%	21%

Source: 2011 Water Atlas

The data from the Water Atlas was utilized in a study of the predictors of sustainability for community managed hand pumps (Foster, 2013). Foster determined that in Liberia:

- The adjusted odds of a non-functional hand pump increased by 17% with each additional year since the hand pump was installed.
- The adjusted odds of a non-functional hand pump increased by 8% with each additional 10 km the hand pump was situated from the county capital.
- Higher non-functionality for hand pumps was observed in communities where no revenue was collected (1.48 times more likely to be non-functional)
- Higher non-functionality for hand pumps was observed in areas where perceived water quality was poor (2.85 times more likely to be non-functional)

- Hand pumps were more likely to be functional in the wet season versus the dry season.

In addition to these conclusions there were a number of general trends that were observed in the data, however when adjusting for the effects of multiple variables these trends were not found to be statistically significant. These trends included:

- Non-functionality rates were higher for shallow wells than boreholes,
- A higher proportion of water points were non-functional when installed by NGOs as compared to government.
- Water points located in administrative units with a high hand pump density (>0.4 hand pumps per km²) exhibited higher functionality rates than those in areas of low hand pump density.

Although these trends were not found to be statistically significant, it is worthwhile to consider these issues when designing the final data collection tools to be used in the SIT assessment. This allowed a comparison to the data collected during the Water Atlas and the findings can be compared to those observed by Foster (2013). The results of the Water Atlas and the Foster (2013) study had a number of implications for the frameworks and sampling protocol proposed for this assessment which are discussed in the following sections.

SAMPLE FRAME

During the Inception Visit, it was determined that the sample frame would consist of a minimum of 30 communities, with a minimum of 10 communities in each of three counties: Bong, Lofa, and Nimba. In each of these counties a minimum of 5 communities targeted with iWASH interventions and 5 “non-intervention” communities would be included in the final sample frame. These communities were selected so as to be representative of the diverse conditions found in each of these counties. To capture the maximum heterogeneity, stratified quota sampling was proposed to identify the final communities which constituted the sample frame for the field data collection. Stratification was based on the factors which are most likely to influence the sustainability of these intervention types. These factors along with the assumptions used in establishing the sample protocol are described in more detail in the following sections.

SAMPLE FRAME: SCREENING CRITERIA

To capture the diverse range of challenges facing rural communities in Liberia and also to ensure a sample frame which is representative a number of criteria were used, including screening criteria to identify the pool of possible communities from which to determine the sample frame (i.e. final list of communities to visit).

As per discussions with USAID during the Inception Visit, the screening criteria for intervention communities (i.e. those included in the iWASH program) is the presence of new or rehabilitated hand pumps (i.e. IHP or CHP). For identifying the non-intervention communities to be included in the sample frame, data from the Water Atlas was used. To ensure a meaningful comparison with iWASH communities a number of screening criteria were applied to the water points listed in the Water Atlas.

Table A9-2 provides a list of these screening criteria.

Table A9-2. Screening Criteria for Determining the Sample Frame of Non-Intervention Communities

#	Screening Criteria	Excluded
1	Water points located within Bong, Lofa, and Nimba counties	Water points in all other counties
2	Have a manual pump on a hand-dug well or borehole	Protected springs or other water points fitted with: Automatic pumps Water kiosks Standpipe
3	Were constructed in 2009 or afterwards	All water points constructed before 2009
4	Have a functionality status of "working and protected"	All the water points which were designated as "broken down system" or "working but with problems" were excluded.

The first and second criteria listed in Table A9-2 ensure comparability between non-intervention and intervention communities, since nearly all water supply interventions of the iWASH program were hand pumps and all were located in Bong, Lofa, and Nimba counties. The third criterion listed in Table A9-2 is based on observations made by Foster (2013) that hand pump non-functionality increase becomes less marked after five years. Adopting this criterion along with the fourth criterion from Table A9-1 was done so that non-intervention communities would be screened having water points that have been broken down or abandoned long ago. It is assumed that by having a functioning hand pump or a hand pump more recently broken down, the data will be more insightful and outliers would be removed from the pool of potential communities to be visited.

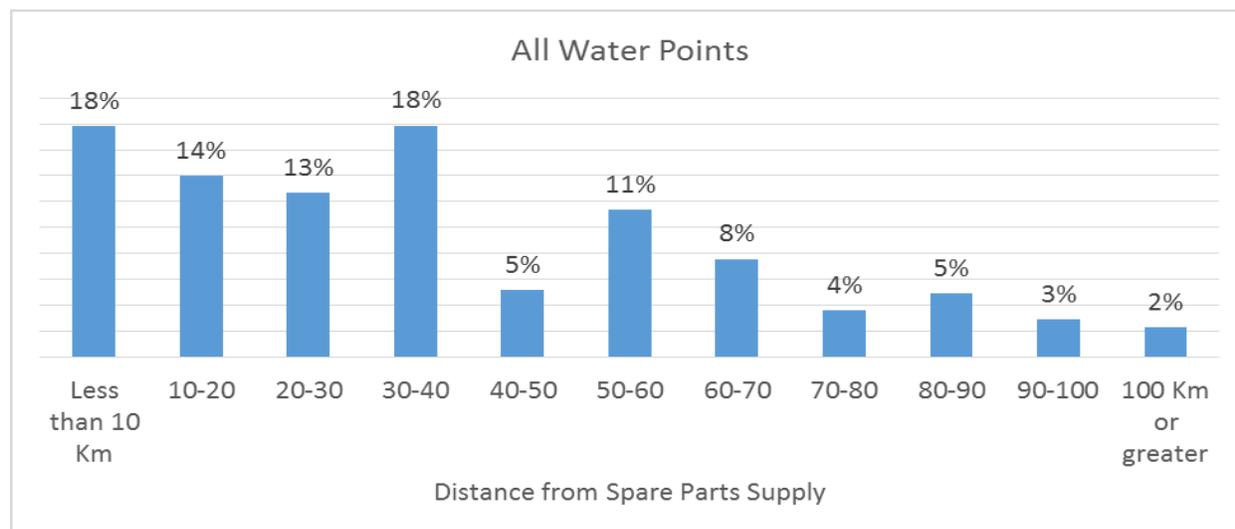
SAMPLE FRAME: KEY SELECTION CRITERION

One key criterion for selecting both the intervention and non-intervention communities for the final sample frame was the distance to the nearest spare parts supply depot/store. For Lofa and Bong counties this is also the distance to the county capital, while in Nimba there are two different cities where spare parts can be obtained. This key selection criterion is based on the findings of Foster (2013) who determined that non-functionality was correlated to the distance that the hand pump was situated from the county capital. Using the data from the Water Atlas the non-functional hand pump increased by 8% with each additional 10 km from the county capital.

Foster's assumptions supporting this trend are that: 1) communities in more remote locations with generally poor populations with less access to education may find the O&M responsibilities required under a community-based management arrangement more difficult; 2) any direct support provided by the county government will be more costly and therefore likely less frequent as compared to communities that are closer to the country capital; and 3) the more remote the more costly goods and services are and the less viable spare parts supply chain is likely to be. With the exception of Nimba, the only spare parts depots in the county are located in the county capital, according to the WASH Products and Services Guidelines produced by the iWASH program.

Each of the intervention and non-intervention communities which meet the screening criteria in the three counties was analyzed to determine the distance from the county capital. Preliminary GIS data was provided by Global Communities for the intervention communities. These results are as shown in the figure below.

Figure A9-1. Histogram Showing the Distribution of the Distance from Spare Parts for All Water Points in Bong, Lofa, and Nimba Counties



It is clear that the majority of water points are located 40 kilometers or less from the nearest spare parts supply. Therefore from this distance analysis it was determined that the final sample should ensure that communities are distributed amongst three groups as shown in Table A9-3.

Table A9-3. Groups of Distance to Spare Parts Supply Shops

Group	Definition	Intervention	Non-Intervention
Group A	$X < 20$ km	2 communities	2 communities
Group B	$20 \leq X < 40$ km	2 communities	2 communities
Group C	$X \geq 40$ km	1 community	1 community

Where X is the distance to the nearest hand pump supply depot which also corresponds to the county.

SAMPLE FRAME: SELECTION PROCESS

The selection of communities was done in two phases. During the first phase, both the Intervention and Non-Intervention communities were divided into the three groups as defined by Table A9-3. For the intervention communities, during the first selection phase it was necessary to select one community from a sub-set of communities within each group. This sub-set of communities are those communities where a WASH Entrepreneur is based or within “walking distance”. This is necessary to be able to capture the impacts of the WASH Entrepreneur. On the other hand, with the Non-Intervention communities one community was randomly selected from each Group (A, B, and C). Therefore after the first phase there were 6 communities identified - three non-intervention communities (Group A, B, and C) and three intervention communities (Group A, B, and C) that have a WASH Entrepreneur in the community or within walking distance.

During the second phase it was possible to consider additional factors or project-related outcomes. This was done through quota samplings whereby the sampling proceeds until a certain quota is reached.

Table A9-4. Summary of the Guidelines for Establishing the Sample Frame

Intervention	Non-Intervention
<ul style="list-style-type: none"> • Minimum of 5 communities per county • At least 2 communities less than 20 km from spare parts supply (Group A) • At least 2 communities between 20 and 40 km from spare parts supply (Group B) • At least 1 community greater than 40 km spare parts supply (Group C) • At least 1 large community (greater than 1,000 people) • At least 1 small community (less than 500 people) • At least 1 community per group with WASH Entrepreneur living in community or within 10 km of community. 	<ul style="list-style-type: none"> • Minimum of 5 communities per county • At least 2 communities less than 20 km from spare parts supply (Group A) • At least 2 communities between 20 and 40 km from spare parts supply (Group B) • At least 1 community greater than 40 km spare parts supply (Group C) • At least 1 large community (greater than 1,000 people) • At least 1 small community (less than 500 people)

SAMPLE SIZE

In the methodology of the WASH Sustainability Index Tool, data should be collected from a statistically significant number of households when the primary unit of analysis for any of the indicators of a given intervention is the household. The three interventions which are the focus of the WASH SIT assessment in Liberia were the community hand pump, institutional hand pump, and the ENTs. None of these interventions utilize the household as the primary unit of analysis, and therefore a statistical calculation was not utilized.

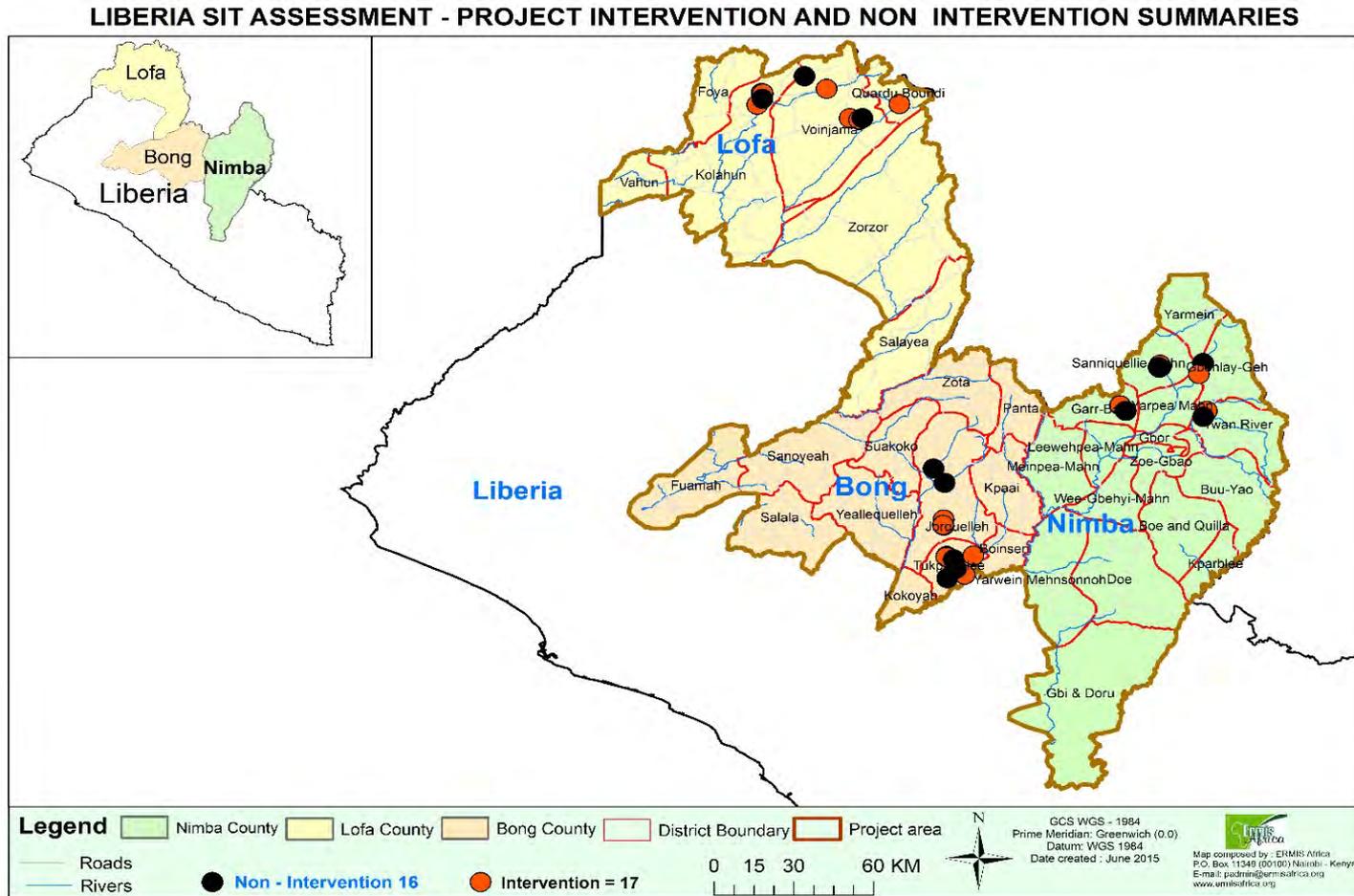
Community hand pumps, institutional hand pumps, and ENTs are all considered “community level interventions” and the primary unit of analysis for these interventions is the service provider. In the case where the primary unit of analysis is not the household, data collection is meant to be “inclusive”. For example, if a community has three hand pumps each with their own WASH Committee, that data should be collected from all three. Similarly, stakeholders representing all the relevant ministries and organizations at the decentralized and national level should be included in the data collection activities.

ANNEX 10: REPAIR TOOLS OWNED BY THE ENTREPRENEURS

Tools	No. of entrepreneurs with the tool
19 and 17 open ended spanner	9
Socket spanner	9
Fishing tools	8
Hard saw	3
Degarmeter	2
5lb hammer	1
Tap line	1
Hand spanner	1

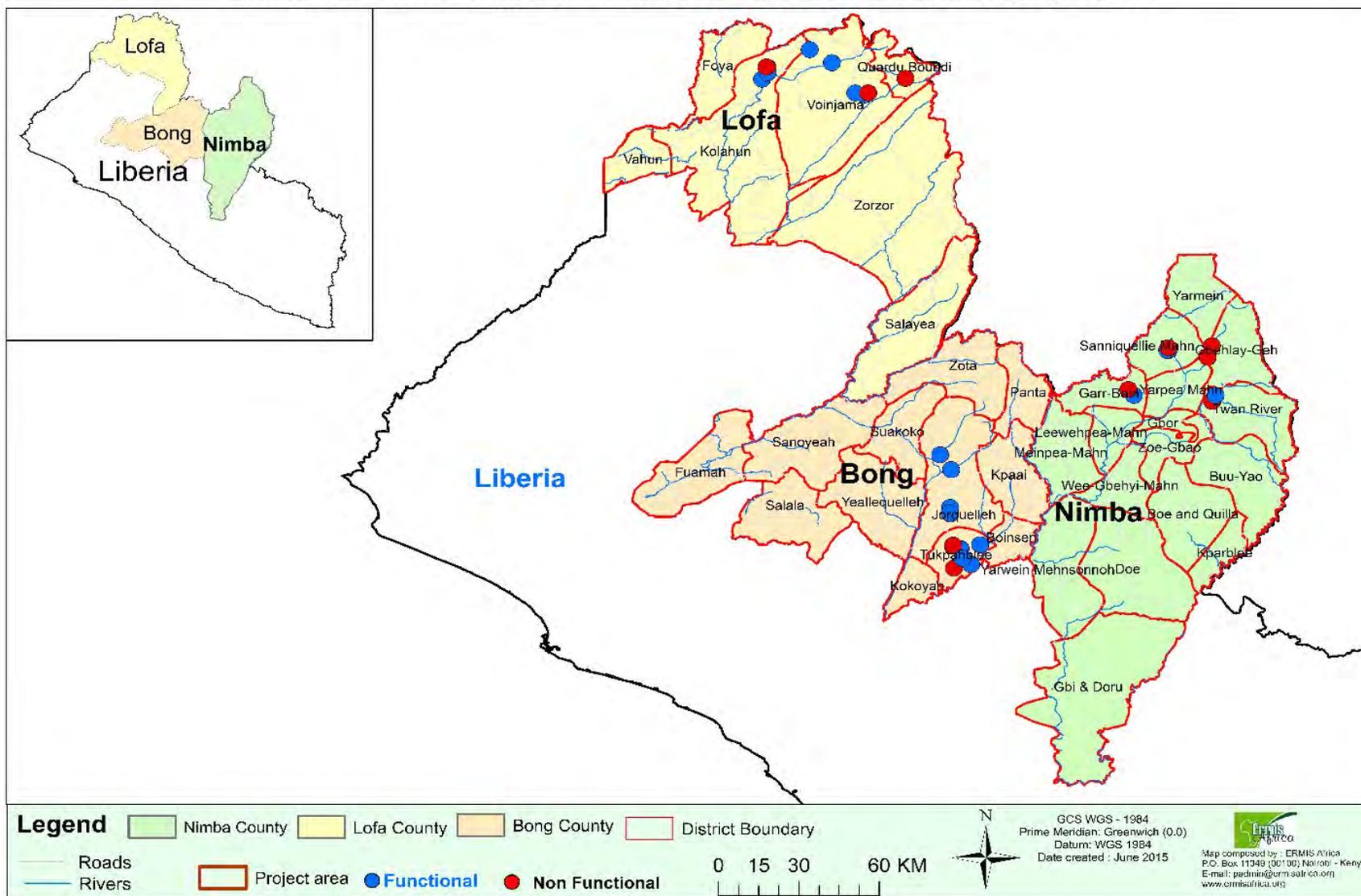
ANNEX 11: SURVEY MAPS

Map showing location of all hand pumps assessed

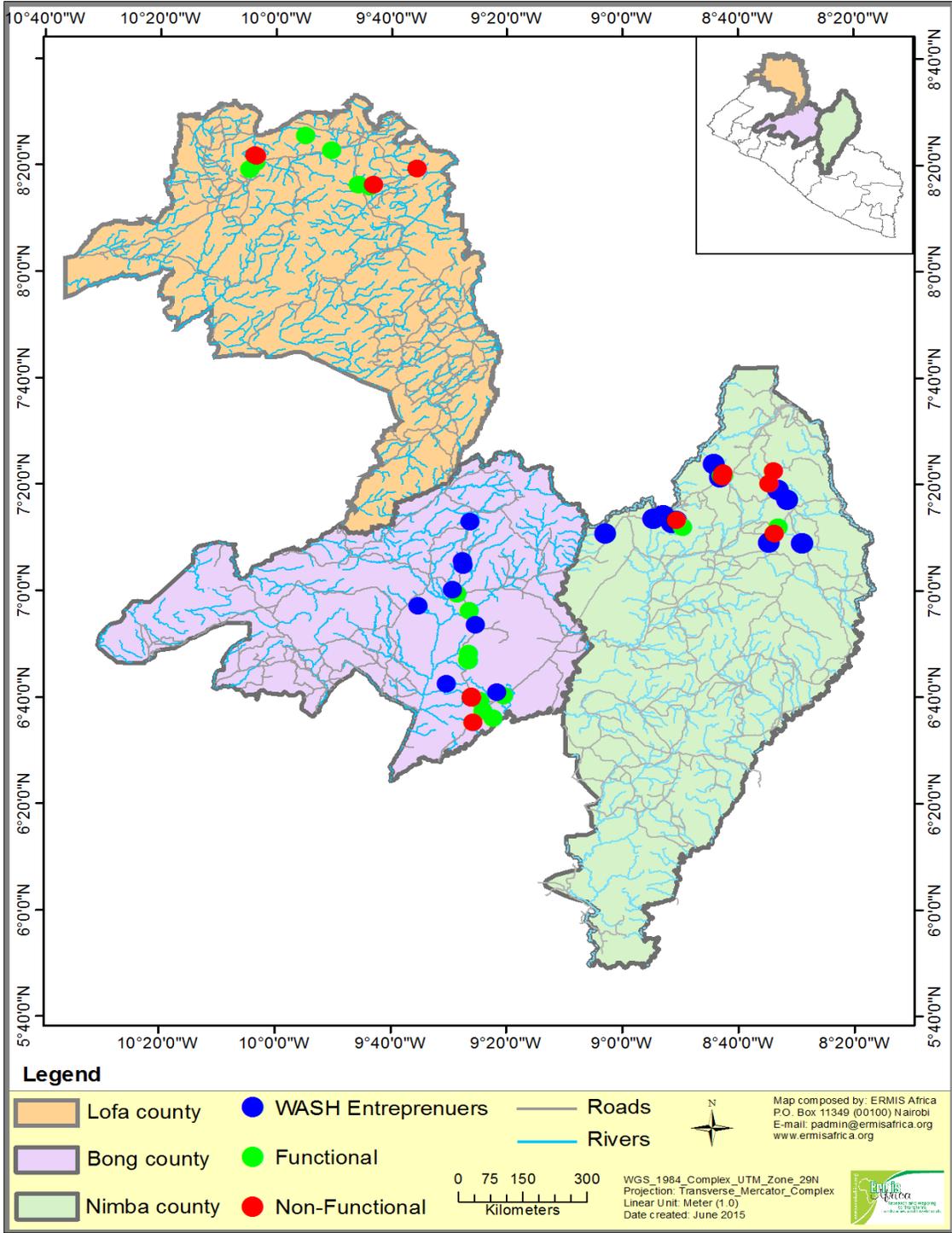


Map showing the functionality status of all hand pumps assessed

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Map showing the functionality of hand pumps assessed against the location of WASH entrepreneurs in the districts. **NB. There were no coordinates available for WASH entrepreneurs in Lofa**



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