



**Dissertation in partial fulfillment of the
Requirements for the Degree of Master of Engineering
in Humanitarian WASH (Water Sanitation and Hygiene)**

**Analysis and improvement of Hand
Pumps Spare Part Retailing Network in
the county of Lofa, Liberia.**

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DEDICATION

I dedicate this work to:

- My mother **KOFFI Oro Agathe**
- My deceased father **ACHI Atté Emile**
- My brother **ATTE Yao Bernard**
- My daughter **ATTE Oro Marie-Ashley**
- My fiancée **KEITA Affoué Marie Josée**

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Finally, we urge all those people that do not have their name cited our apologies and to accept our sincere tanks.

ABSTRACT

Lofa County has a reduced number of hand pumps with a high failure rate (34.17%) in general according to the ministry of public works. In communities concerned by this project, failure rate reached 47.17%. This situation forced the communities to use alternative water resources (rivers, backwaters, traditional wells) of poor quality.

This high failure rate of hand pumps is generally due to a poorly structured of a spare parts dealers' network. In turn attributed to the weak supply chain of spare parts by the dealers, lack of monitoring by the authorities and shortcomings in procedures while establishing spare part. In one hand these SPDs are few in number, on the over hand, they are not known by the communities. Of eight (8) SPD implemented by ACF between 2004 and 2009 in previous projects, only two (2) SPD are functional, carry on normal sale of spare parts.

Pump mechanics are also few in number. For the four districts with 556 water points equipped with hand pumps, there are only three (3) pump mechanics that lack means of conveyance and require capacity reinforcement. Thus, one new pump mechanic and one new SPD have been identified and trained and five (5) former SPD and three (3) former pump mechanics were refreshed. To do this, workshops were organized with SPD, pump mechanics and local authorities to identify the pit falls of existing spare part network and adapt the strategy that will overcome them. A database was set up to allow better monitoring of the network by policy makers. Also, a new system for the implementation of dealer network spare parts has been developed.

Key Words:

- 1- Diagnosis
- 2- Spare Part Dealers
- 3- Afridev pumps
- 4- Network establishment
- 5- Management

RESUME

Le comté de Lofa a un nombre de pompes à motricité humaine réduit avec un taux élevé de pannes (34,17%) de façon générale selon le ministère des travaux publics. Dans les communautés concernées par le présent projet, ce taux de panne atteint 47,17 %. Cette situation contraint les communautés à utiliser des ressources alternatives (rivières, marigots, puits traditionnels) dont la qualité de l'eau est douteuse. Ce fort taux de pannes des pompes manuelles est en général dû à un réseau de distribution de pièces de rechange mal structuré et non fonctionnel. Ce dysfonctionnement est imputé à la faiblesse de la vente des pièces de rechanges des pompes manuelles par les revendeurs et à un manque de suivi par les autorités, mais aussi des manquements dans le mode opératoire de la mise en place des revendeurs de pièces de rechange. Ces points de vente sont également peu ou pas connus par les communautés. Sur huit (8) revendeurs mis en place par ACF entre 2004 et 2009 lors des précédents projets, seuls deux (2) revendeurs continuent la vente normale des pièces de rechange d'où l'importance de l'étude qui vise la mise en place d'un réseau de revendeurs de pièces de rechange de pompes manuelles performant.

On note également une insuffisance des artisans réparateurs des pompes. Pour les quatre (4) districts avec près de 556 points d'eau équipés de pompes manuelles, ils n'existent que trois (3) artisans réparateurs qui manquent de moyens de transport et un besoin de renforcement de capacité. Ainsi donc, un nouveau artisan réparateur ainsi qu'un nouveau revendeur de pièces ont été identifiés et formés et cinq (5) anciens revendeurs de pièces de rechange et trois (3) anciens artisans réparateurs ont été rafraichis.

Pour ce faire, des ateliers ont été organisés avec les revendeurs de pièces de rechange, les artisans réparateurs et les autorités locales pour relancer le réseau des pièces. Une base de données a été mise en place pour permettre un meilleur suivi du réseau par les décideurs. Aussi, un nouveau système pour la mise en place du réseau des revendeurs des pièces de rechange a-t-il été élaboré.

Mots Clés :

- 1- Diagnostic
- 2- Revendeurs de pièces de rechanges
- 3- Pompes Afridev
- 4- Etablissement de réseau
- 5- Gestion

GLOSSARY

2iE : Institut International de l'Ingénierie de l'Eau et de l'Environnement

ACF: Action Contre la Faim

CHF: Cooperative Housing Foundation

CWC: Community Wash Committee

ECHO: European Community Humanitarian aid Office

LISGIS: Liberia Institute of Statistics and Geo-Information Services

MoU: Memorandum of Understanding

MPW: Ministry of Public Works

NGO: Non-Governmental Organization

SPD: Spare Part Dealer

SPIR: Samaritan's Purse International Relief

UEMOA: Union Economique et Monétaire Ouest Africaine

WASH: Water, Sanitation and Hygiene

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INTRODUCTION AND PROJECT CONTEXT

Lofa is Liberia's second largest County, and arguably the most severely affected by the 14 years of war, suffering extensive damage of infrastructure, basic social services as well as mass displacements and loss of life (**Republic of Liberia, 2008**).

Action Contre la Faim (ACF) has been providing humanitarian aid in Liberia since 1991. From mid 2003, after the last acute crisis, ACF has been expanding its intervention to newly accessible and most-affected up-country areas, with assistance in emergency water and sanitation, nutrition, and food security. It was in such context that ACF returned to Lofa County in 2004, focusing its WASH interventions in the districts of Kolahun, Foya and Voinjama and to lesser extent Vahun.

From 2008, ACF has been shifting from a context of emergency to a context of development. More capacity building activities have been undertaken and sustainable projects have been emphasized through new community approaches. In that sense ACF had trained and installed some small shop owners in the intervention area through a Spare Part Dealer (SPD) network to ensure the flow of spare part for villagers in order to rehabilitate their water facilities.

Being the main NGO providing water facilities in the area (drilling of new borehole, construction of new hand-dug well, rehabilitation of existing water point: all equipped with Afridev hand pump), ACF goal was to ensure the long term establishment of these seller through a network to promptly supply the main requested spare to the villagers when they needed.

In line with this new strategy the following activity are automatically included in our WASH implementation strategy where we have WASH project on going:

- capacity building
- training of Community Wash Committee (CWC)
- establishment and refreshment of CWC

In Lofa county and also in Nimba, where this approach was also done it appears that sustainability of existing SPD networks has not been ensured. In Lofa county last year, monitoring of SPD network has showed that, the three existing spare part dealers are not working in proper synergy anymore and don't have any connection between themselves. Two of them were not selling anymore the Afridev Pump spare part. Regarding the number of pumps not functioning in the area due to minor problem related to small spare part highlights the gap of spare part dealers and marketing in the area. While the availability and the quality of water are generally guaranteed by the proper operation and maintenance of facilities to optimize water and preserve water quality (**ACF, 2006**).

The main challenges can be summarized as follow:

- problem of permanent supply chain of hand pump spare parts for the network members and communities
- Existing spare part deal not operating
- Gap of spare part dealers
- Lack of connection between Community Wash Committees and Spare part dealers network

Aim of study / mission:

- Conduct a participatory diagnostic of existing spare part dealers network and come up with sustainable solution to reactivate them;
- Conceive and Design a SPD network establishment process and contribute to the establishment of one network in the frame of the current ECHO project (**Annex 1**).

Task to be conducted

Task 1: Design process and approach of the study

- Literature review (projects documents, capitalization of work done in Liberia, external resources)
- Identify respectful and ethical approach of project
- Define targeting of project participants, and approach.
- Formalize project methodology

Task 2: conduct a participatory diagnosis of non-functional networks and identify appropriate solution to make them functional:

- Group and individual discussion with CWC board and members (pump care takers and pump mechanics) to understand the key problem they are facing
- Individual discussion with existing spare part dealers
- Identification of existing coping mechanisms, gaps, acceptance issues, cost, access to suppliers, competitors, marketing strategies, appropriateness of the technology, etc.

Task 3: design appropriate procedure of SPD network creation and establish one network of new SPD:

- Work with the technical and social team to identify new SPD;
- Work in coordination groups to determine appropriate design for network creation;
- Perform the full process of SPD network installation including trainings;

Task 4: replicate successful design and capitalise on Experience:

- Work with WASH Project manager to replicate and setup a plan for more Network creation or SPD members selection
- Propose a monitoring process of Network established
- Capitalize on experience on writing a final report

This memory is divided into three main parts:

- The first part presents ACF and describe the study's area;
- The second part is devoted to the study material and the various stages of the methodology;
- And the third part presents the results after which the conclusion and recommendations are proposed.

PART 1 :

PRESENTATION OF ACF AND GENERALITIES
ABOUT STUDY'S AREA

I. GENERALITY

1.1. PRESENTATION OF ACF

1.1.1. History

Action Contre la Faim (ACF) was founded in 1979 by a group of French intellectuals in response to the emergency in Afghanistan.

ACF is an international humanitarian organization committed to ending world hunger. Recognized as a leader in the fight against acute malnutrition, ACF works to save the lives of malnourished children while providing communities with sustainable access to safe water and long-term solutions to hunger.

With over 30 years of expertise in emergency situations of conflict, natural disaster, and chronic food insecurity, with 4600 field staff, seasoned professionals and technical experts in nutrition, water and sanitation, public health, and food security, carry out life-saving programs in more than 45 countries of which 23 countries in Africa (**Figure 1**).

In 2010, ACF's humanitarian programs directly assisted some 6.4 million people, along with countless others through capacity building in collaboration with government ministries. Committed to principled humanitarian action, ACF restores dignity, self-sufficiency, and independence to vulnerable populations around the world. (ACF, 2010)



Figure 1: Countries with ACF missions **Source :** www.actioncontrelafaim.org (24/08/2012)

1.1.2. ACF-France in Liberia

ACF France has been implementing programs in Liberia since 1991. Nowadays the ACF team works in collaboration with Government bodies and local entities to increase the coverage of water, sanitation, hygiene, nutrition, food security services. Specific focus is paid to long term, sustainable assistance to underprivileged people in both remote rural areas and impoverished urban areas.

In addition the above, the organization maintains a significant capacity to react in emergency situations, such as the influx of Ivorian refugees in early 2011 (**Yamoussou, 2011**).

1.2. GENERAL DATA OF STUDY'S AREA

1.2.1. Physical setting

Lofa County has six political sub-divisions, namely: Salayea, Zorzor, Voinjama, Kolahun, Foya and Vahun; one Township, Zogolomai, and one additional pending District, Quadru Gboni. The capital of Lofa is Voinjama. Traditional culture remains strong in Lofa with the Poro and Sande societies still playing a critical role in the education and initiation of boys and girls. The two largest tribes are the Lorma and Gbandi, which are largely Christian and Muslim respectively. The two coexisted peacefully prior the conflict, but current issues of land ownership, traditional practices and power sharing have led relations to deteriorate. Before the war, Lofa was considered the “breadbasket” of Liberia as a result of its high level of food production, especially of rice, the national staple food.

Lying in the north-western corner of the country, Lofa is bounded on the east and north by Guinea, west by Sierra Leone and on the south by Gbarpolu and Bong counties. Lofa County is now the second largest County in Liberia (**Republic of Liberia, 2008**).



Figure 2 : Localization of Lofa County

1.2.2. Climate

The climate in Lofa County is tropical, hot and humid. Based on the prevailing precipitation, two seasons are differentiated. The rainy season lasts from mid-April to mid-October. The dry season begins in November and ends in April. The temperature normally ranges annually from 24°C to 30°C. Wind generally blows from the Northeast during the dry season and from the Southwest during the rainy season. The total wind mileage is greatest in the rainy season from July to September and lowest in the dry season during December and January. Lofa County has an average rainfall of around 2,900 mm. Three principal types of rainfall can be distinguished. First, heavy downpours occur at the beginning and at the end of the rainy season. Second, longer periods of precipitation with less turbulence occur, covering larger areas. The intensity of this kind of rainfall is increased through the drop of temperature during the afternoon and the night hours. Third, “Relief Rains” are produced by the friction between the topography and air masses which reach the county from the sea. Relief rains occur at mountain ranges and other relief features.

1.2.3. Topography

The plateaus and mountain ranges lie behind rolling hills. Table lands reach heights of up to 609.6 m and mountain ranges are found up to 600 m. Important ranges are the Wologisie, Wutivi and Wanigisi. The greatest width of this zone is 130 km between the Lofa and St. Paul Rivers. The belt of rolling hills parallel to the east zone has elevation in the order of 90 m. There are numerous hills, valleys and water courses in this zone.

1.2.4. Geology and vegetation

All three kinds of soil produced by different conditions of climate and vegetation in Liberia are found in Lofa: clay loam, sandy clay loam, and loam.

Vegetation in Lofa is composed of tropical rain forest including high forest, broken forest and low bush. The type of forest most common to Lofa County is known as Moist Semi-Deciduous Forest. Some of the most common trees are the nesogordonia papaverifera, the limba (or terminalia superb), and the obechi (or triplochiton scleroxylon).

1.2.5. Demography

The Lofa County's population is estimated at 270,114 inhabitants according to the 2008 census (**Richard and Joseph, 2010**). With a growth rate of 2.1% (LISGIS, 2008), this population is estimated in 2012 to 293,528 Inhabitants. At least six of Liberia's tribes (Lorma, Kissi, Gbondi, Mende, Mandingo and Kpelle) are resident in Lofa County. The population of Lofa is extremely young. The recorded median age of household members is 22 years old; 40% are under 18 (**Fearon and al., 2007**)

Table 1 : Distribution of dialects spoken

Tribes	Gbondi	Kissi	Kpelle	Mende	Lorma	Mandigo	Other
Percentage (%)	26	12	6	1	51	3	1

Source: Comprehensive Food Security and Nutrition Survey (October 2006)

PART 2 :

MATERIALS AND METHODOLOGY

II. MATERIALS AND METHODOLOGY

The present study aims to conceive and design a SPD network establishment process and contribute to the establishment of one network in the frame of the current ECHO project.

To achieve these goals, we adopted a methodology combining information retrieval and processing, interviews with different structures and officials involved in rural water management, the field observations and finally the workshops.

Thus, the study was conducted by adopting the following three steps:

- literature review ;
- Interviews, visits and fieldwork;
- Data processing.

2.1. MATERIALS

2.1.1. Field materials

To implement these steps listed above, certain materials were needed. Materials were ACF's car, telephone, computer, camera and Lofa's map. We have also developed the questionnaires to the attention of the SPD, the CWC, the pump mechanics and spare part suppliers. (**Annex 2, 3, 4 and 5**)

2.1.2. Afridev pump

The pump used is the hand pump Afridev. This is a manual piston pump for deep well suited for installation on pipe wells and wells with static water level up to 45 meters. This pump was made for simple maintenance, requiring minimal tools and minimal skills, and has several novel design features such as fittings pump rods hook and eyelet, pull piston and foot valve, adjustable arm, underground elements resistant to corrosion and plastic bearings. These features make the pump Afridev manual pump easy to install, use and maintain (**SKAT, 1995**).



Figure 3 : Hand pump Afridev

2.2. METHODOLOGY

2.2.1. Literature review

It was the first contact with the subject of memory and the context in which it operates. This allowed us to collect essential information to conduct the study. During this phase, we focused our research on various types of documentation include:

- Existing documents on the country and the study area;
- General documents on Liberian politics in rural water supply;
- Documents dealing with similar themes or common aspects with regard to our memory;
- Documents ACF on the project;
- Internet sites
- Some NGOs such as CHF, SPIR and the Ministry of Public Works (MPW)

2.2.2. Interviews, Field visits

Individual discussions

Individual discussions were held with spare part dealers, spare part suppliers and the pumps mechanics to understand the functioning of these.



Figure 4 : One-to-one discussion with the SPD

We met the officials of Lofa County to explain the project and have their involvement. We also met in Monrovia the ministries in charge of rural water supply such as the Ministries of Public Works and Health. Indeed, after the end of the project, the authorities will be taken to follow the proper functioning through a dynamic network of spare parts dealers in the long term. Authorities are involved early in the project to finally be able to perform all tasks in particular with regard to the monitoring and coordination of different stakeholders.



Figure 5 : Meeting with the authorities

Focus group with the community

Meetings were held with the community. During these meetings, the project is presented to the villagers. Thus, the entire community will be involved in the management of hand pumps. Besides, meetings are held with members of the CWC (Community Wash Committee) and village leaders.



Figure 6 : Meeting with the community leaders

Direct observations

Apart from interviews, direct observations made to see the status of pumps, cleanliness of water points, and the availability of spare parts in SPD shops. These direct observations have verified everything that was said during the interviews.

2.2.3. Workshop

Workshops were organized to the attention of local authorities, the SPD and the pump mechanics in four (4) districts involved in the project: Foya, Kolahun, Quadro Gboni et Voinjama. The main objective of the workshops is to identify the hindrance of the existing spare part network and to derive strategy that will scale it up and make it sustainable. (**Annex 6**)



Figure 7 : SPD network training

PART 3 :

RESULTS, ANALYSIS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

III. RESULTS AND DISCUSSION

3.1. PUMPS CONDITIONS

In communities concerned by the project, there are 53 hand pumps of which 25 are broken down, mounting the failure rate to 47.17%.

With a population of 52,242 inhabitants, this amounts to 986 people per hand pump against the recommended 500 persons per hand pump (**Sphere, 2011**). This necessitates the maintaining of these pumps in good condition.

Table 2 : Pumps conditions

Districts	Working water points	Broken down system
Foya	63	21
Kolahun	155	39
Quadru Boundi	39	24
Voinjama	154	61

Source: Ministry of Public Works, 2011

The analysis of the situation in the districts shows a high rate of pumps failure. Failure rates are highest located in Quadru Boundi (46.03%) and Voinjama (34.42%) against 29.76% in Foya. In fact, the dealer of spare parts for pumps in Foya district is the most functional. He regularly supplies its stock materials from Monrovia. On the over hand, in Quadru Boundi, spare parts are no longer sold by the SPD. So in case of failure, it is difficult to have spare hardware available.

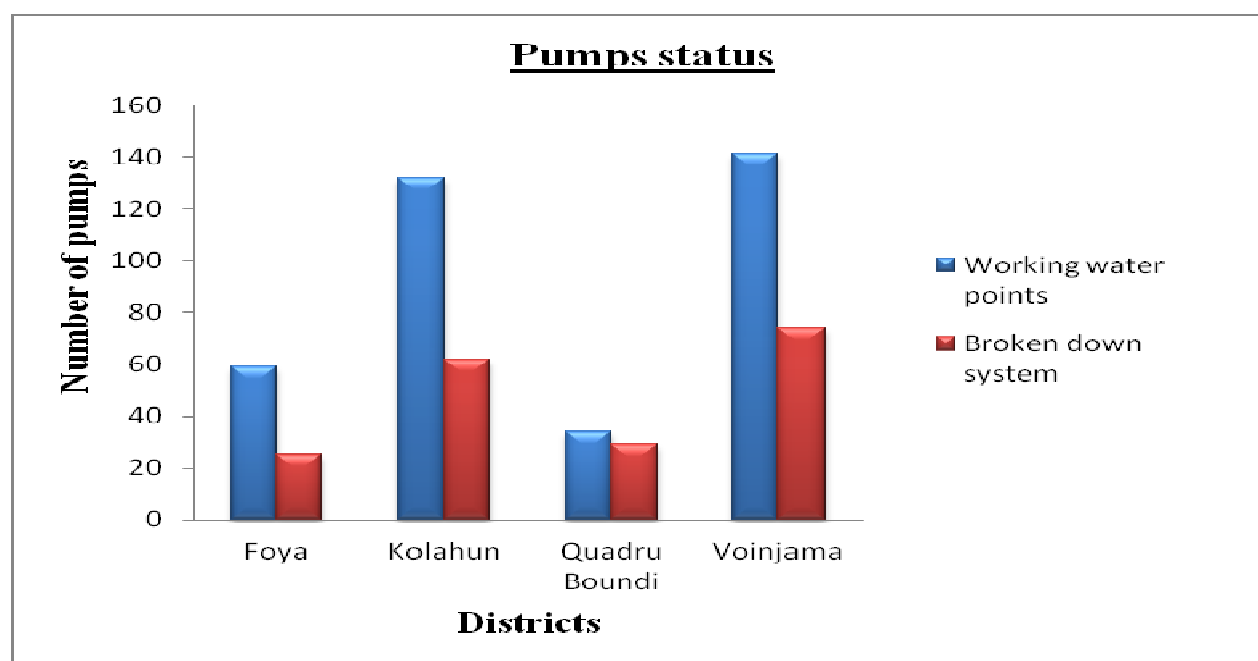


Figure 8 : Diagram of pumps conditions

3.2. COMMUNITY WASH COMMITTEE

After a survey conducted on 210 people in the four districts (table 3) by the social team, 180 of them, (86% of people) interrogated do not know existence of the spare part dealers (Figure 9).

Table 3 : Knowledge of the community on the existence of the SPD

Districts	Foya	Kolahun	Voinjama	Quardo-Gboni
Number of persons	70	49	70	21

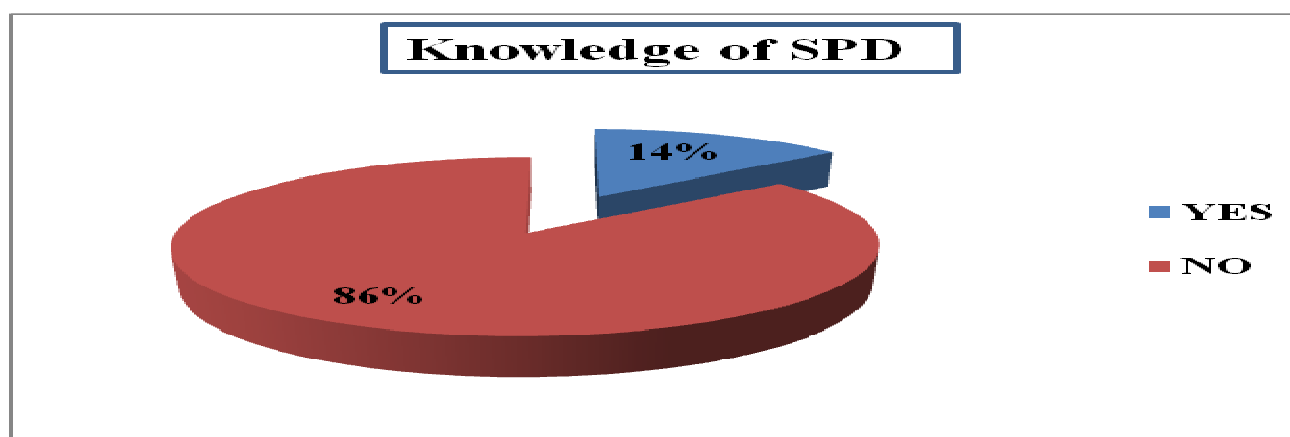


Figure 9 : Knowledge of the SPD by the CWC

3.3. PUMPS MATERIAL SUPPLIERS

In Monrovia (capital of Liberia) three (3) major suppliers sell Afridev hand pumps and spare parts. There is not a special representative who has a monopoly on the sale of these pumps. Pumps sold by different vendors are all from India. However, there is a variation in the selling price of an item from a provider to another (Figure 10).

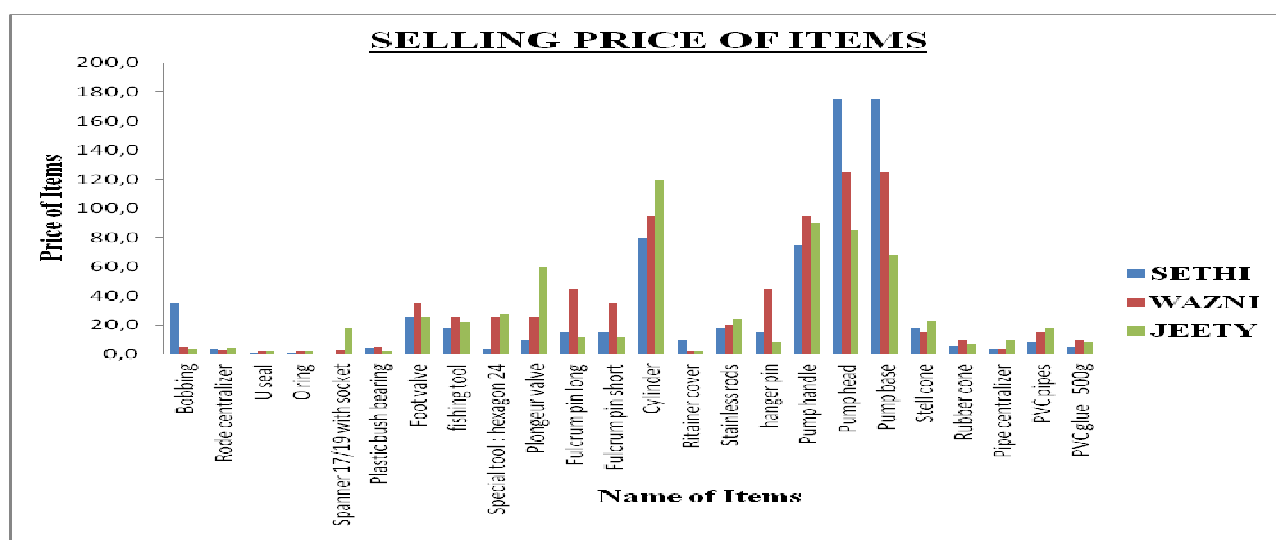


Figure 10 : Selling-price of spare parts in Monrovia

This difference fluctuates from 1 USD at U Seal and O Ring up to 107 USD for the pump base (Table 3). This represents 157% of the minimum price. And this variation according to the suppliers is that they are certainly getting items in India, but not from the same manufacturer. However, the non-involvement of Liberian government in price regulation is a factor in this wide difference in prices of the items.

Table 4 : Variation of selling prices by the suppliers

ITEMS	Prices of the items (USD)			VARIATION
	SETHI	WAZNI	JEETY	
Bobbing	35,0	5,0	3,5	31,5
Rode centralizer	3,5	3,0	4,5	1,5
U seal	1,0	2,0	1,8	1,0
O ring	1,0	2,0	1,8	1,0
Spanner 17/19 with socket	-	3,0	17,5	14,5
Plastic bush bearing	4,5	5,0	2,5	2,5
Foot valve	25,0	35,0	25,0	10,0
fishing tool	18,0	25,0	22,0	7,0
Special tool : hexagon 24	3,5	25,0	28,0	24,5
Plongeur valve	10,0	25,0	60,0	50,0
Fulcrum pin long	15,0	45,0	12,0	33,0
Fulcrum pin short	15,0	35,0	12,0	23,0
Cylinder	80,0	95,0	120,0	40,0
Ritainer cover	10,0	2,5	2,5	7,5
Stainless rods	18,0	20,0	24,0	6,0
hanger pin	15,0	45,0	9,0	36,0
Pump handle	75,0	95,0	90,0	20,0
Pump head	175,0	125,0	85,0	90,0
Pump base	175,0	125,0	68,0	107,0
Stell cone	18,0	15,0	22,5	7,5
Rubber cone	5,5	10,0	7,5	4,5
Pipe centralizer	3,5	3,5	10,0	6,5
PVC pipes	9,0	15,0	18,0	9,0
PVC glue 500g	5,0	10,0	9,0	5,0

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3.4. SITUATION AND BUSINESS OF SPD

3.4.1. Situation of SPD

In Lofa County, particularly in the four (4) districts covered by the project, ACF had organized eight (8) SPD (6 SPD in 2004 and 2 SPD in 2009).

Table 5 : Years of SPD implementation

District	Town	Name of the SPD	Years
Kolahun	Kolahun town	Easy Boy	2004
Kolahun	Massambolahun	Salia K.Konneh	2004
Kolahun	Gondolahun	Henry J. Kpakpai	2004
Foya	Foya City	Nadin Masri	2004
Voinjama	Voinjama City	Lazay Konneh	2004
Voinjama	John town	J. Akoi Coleguwor	2004
Quado-Bondo	Barkedu	Sekou Barwor	2009
Voinjama	Johnny town	Peter Quiyam	2009

Of the eight (8) Spare Part dealers set up in 2004 and 2009 only 25% are functional, while 62% are regularly but do not sell spare parts. And a retailer (13%) of spare parts has closed its store.

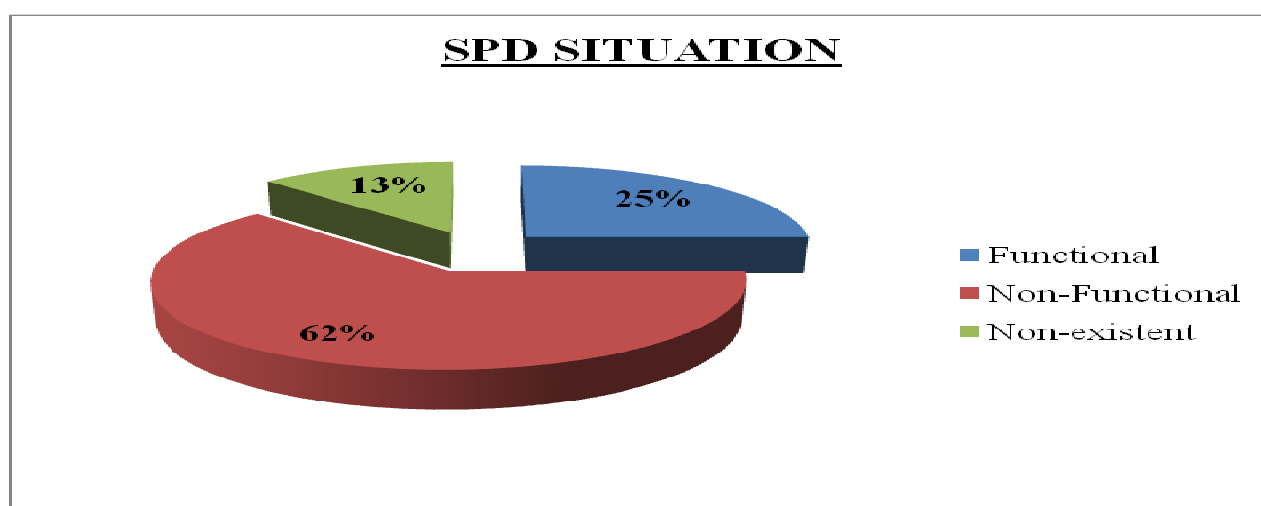


Figure 11: SPD situation in Lofa County

This high proportion of non-functional SPD is mainly because the selling of spare parts is not lucrative, coupled with lack of regular monitoring of these activities.

After observation and discussion with the SPD, authorities and communities, a new SPD and a new pump mechanic were selected, trained and organized. However, it should be two new SPD and two new pump mechanics at Voinjama district level.

3.4.2. Situation of the business of SPD

Most of the dealers of spare parts for pumps (83%) believe that the activity is very slow and unprofitable. They work with other activities targeting the general food and supplies daily. However, they are willing to continue selling parts for first help the community. Because, they say,

if they stop the selling of these items, the number of pump failures in the communities will still increase. They don't see the selling of spare parts as a financial opportunity. However, the spare part dealer in Kolahun, is satisfied with its business of selling spare parts. This is explained by the fact that he is better known by the communities of which he is the main supplier.

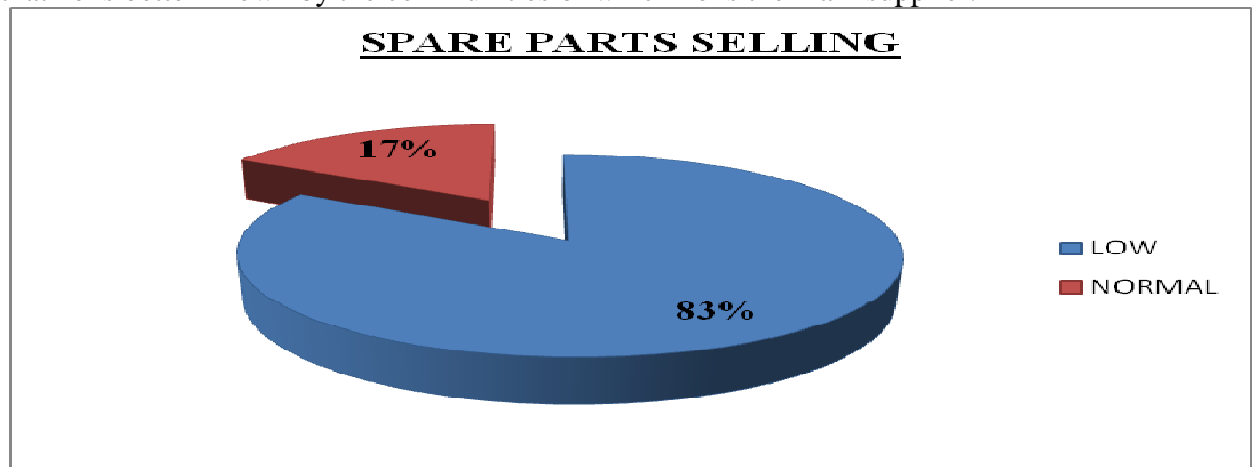


Figure 12: Functioning of spare parts selling

3.4.3. Materials selling by the SPD

The comparative study of the selling price of two (2) major spare part dealers in Lofa county reveals some differences in selling prices. In general the prices are cheaper at the dealer Foya District (NADIM). The latter, regularly buy some spare parts to suppliers in Monrovia. While other retailers are generally bought spare parts with him. Then he sells the U seal (material as purchased) at 4 USD, the second dealer sells at \$ 8, which is the double the price.

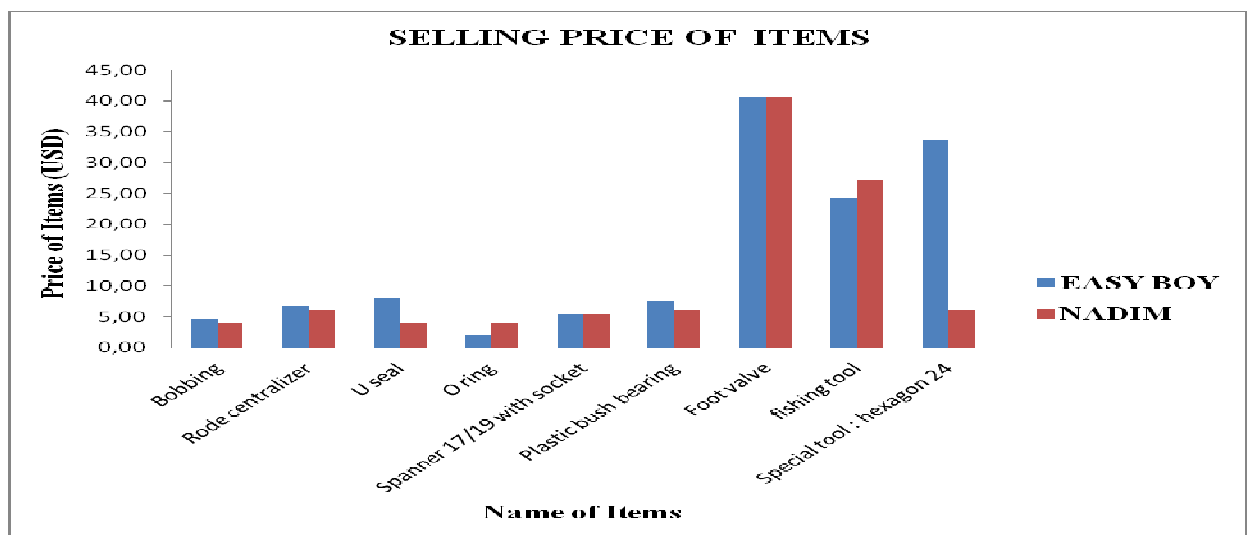


Figure 13: Selling prices of items by SPD

3.4.4. Period of stock output

According to 67% of SPD, spare parts for hand pumps are best selling in the dry season. Indeed, during this season, communities that don't have other places to get water, simply exclusively hand pumps. While during the rainy season, in case of failure, communities use alternative resources such as rivers, traditional wells unprotected (Figure 14) whose water quality is not guaranteed.

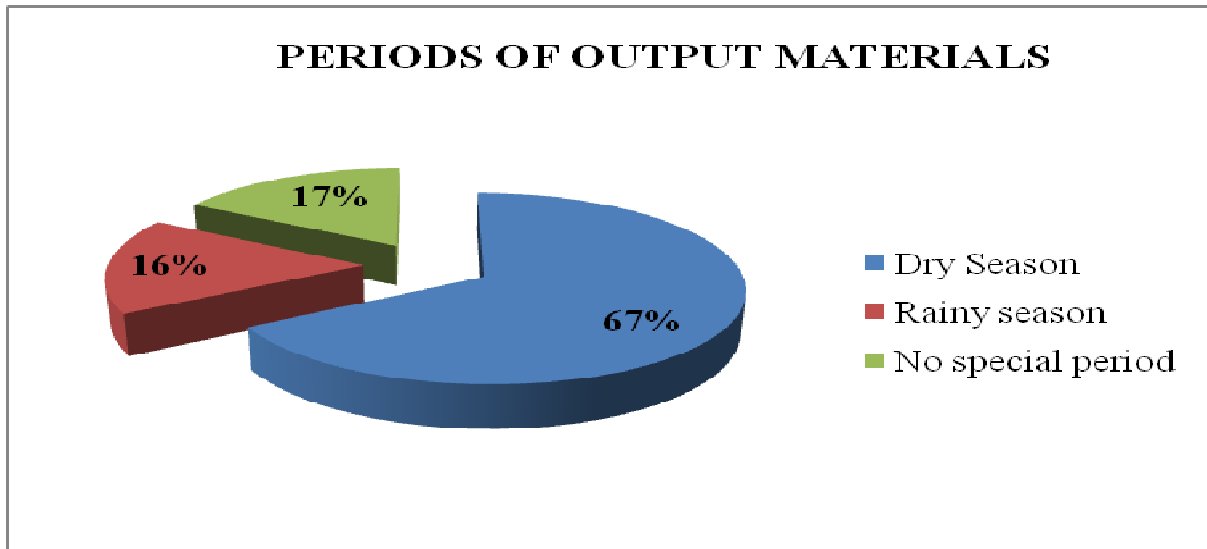


Figure 14: Period of selling spare parts

These alternative sources of water used by communities are exposed to all kinds of pollution.



Figure 15: Alternative sources of water supply

IV. SPARE PARTS NETWORKING SYSTEM IMPLEMENTATION

4.1. PREVIOUS SYSTEM IMPLEMENTATION

Nine steps in the implementation of spare parts networking systems at community level have been set up.

Step 1:

This entails general information dissemination of Spare Parts Network establishment.

Objectives:

To inform targeted communities about what spare part network is all about.

To ask community to give names of reputable business people within target communities

Step 2:

Meeting with recommended businessmen

Objectives:

To get the acceptance or rejection from businessmen identified by community people.

To assess their business capacity and coverage area.

Step 3:

Official Communication to selected businessman

Objectives:

To inform him/her officially about his/her selection.

Step 4:

Follow up with potential spare parts dealer

Objectives:

To get the input of businessman and prepare Memorandum of Understanding (MoU)

Step 5:

Final draft of MoU, preparation of sign board and stock

Objectives:

To formalize the commitments both parties made

Step 6:

Signing of MoU and Delivery of initial stock

Objectives:

To launch the network officially

Step 7:

Information dissemination to beneficiaries/communities

Objectives:

To create awareness about the network establishment

To connect the spare parts dealer to the communities

Step 8:

Training of Spare parts Dealers

Objectives:

To identify items in stock

To increase the motivation of the dealers

To discuss the progress and constraints of the dealers

To involve them and they themselves to find an amicable solutions to the existing problem

Step 9:

Monitoring and Evaluation

Objectives:

To gather information on whether the spare parts dealers are respecting the terms of MoU signed.

To evaluate the progress and constraints of the spare parts Dealer

To give the project manager and other supervisors a clear picture of the happenings and findings in the field

To recommend to the project manager way forward for the problems.

4.2. SHORTCOMINGS OF THIS SYSTEM

1- In the first step, in addition to communities, it should be important to add the local authorities for the choice of SPD. Indeed, it seems important to involve the authorities upon the establishment of spare part dealers to facilitate the monitoring of their activities after by them. Consequently, MoU must be signed amid the three parties: ACF, SPD and local authorities.

2- The second insufficiency of this system is also the delivery of the initial stock to SPD before workshop for training. Having already received the equipment, some did not come to training. This is the case of the Johnny's Town SPD. So after the exhaustion of the initial stock given by ACF, he didn't replenish his stock spare parts.

3- At last, in the step 9, it is projected the monitoring and the evaluation whose responsibility is not defined. It should be necessary to define people or committee which will be responsible to take care of this monitoring and evaluation.

4.3. PROPOSITION OF NEW SYSTEM IMPLEMENTATION OF SPD

After analysis of this methodology and following various meetings and the workshops, we propose a modified system for better implementation of the SPD.

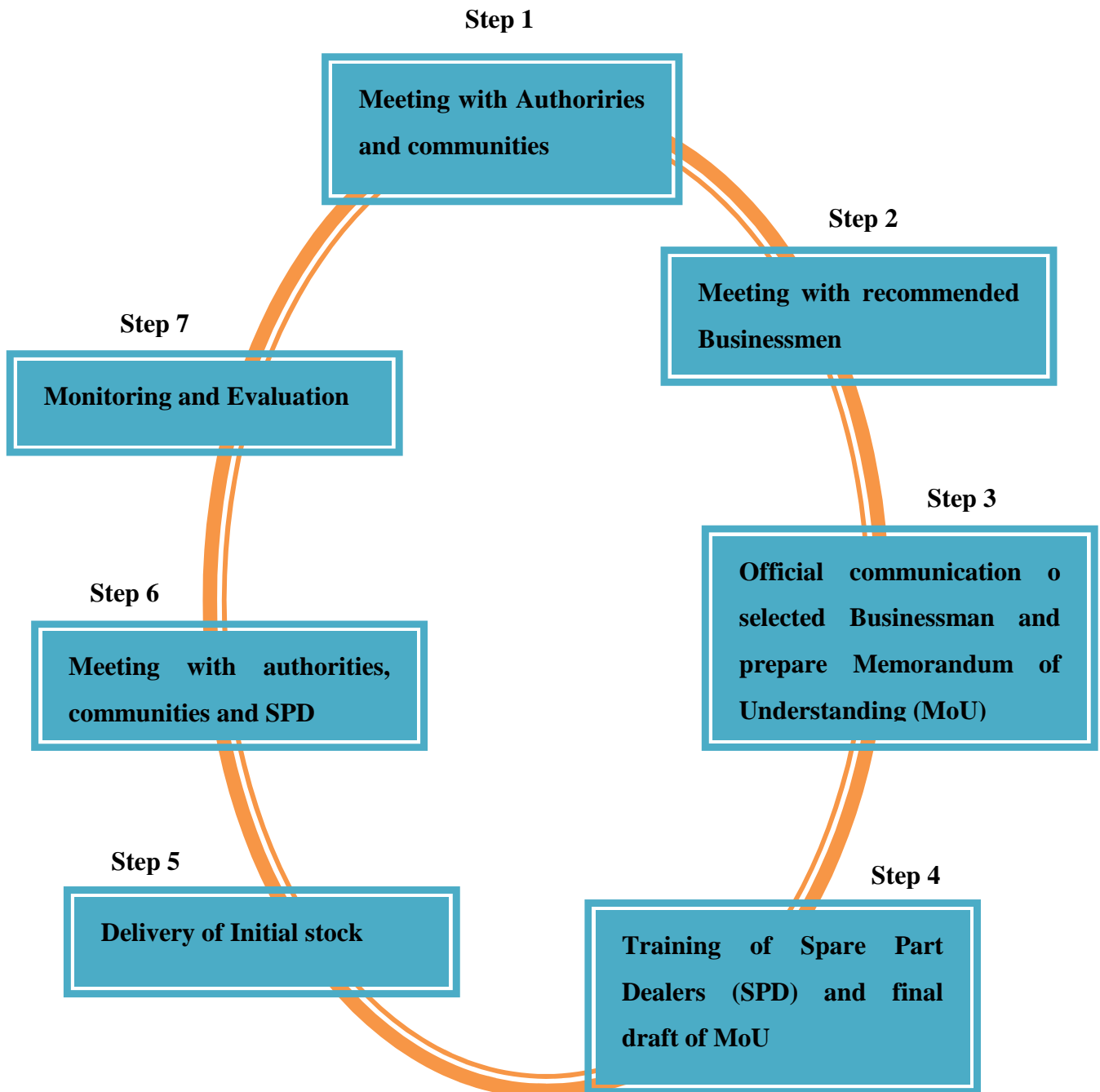


Figure 16: Steps of implementation of spare part dealers

Step1:

This is to inform communities and local authorities the reasons for the establishment of a network of hand pumps spare part dealers. They will be taken to make propositions of businessmen they consider credible for the selling of these spare parts.

Step2:

A meeting is held with businessmen proposed by the communities and local authorities after making a selection on the ability of the latter to sell the equipment. To these also, it will explain what a spare part dealers network. And finally get their agreement for the selling of spare parts.

Step3:

Inform businessmen for their selection as spare part dealers. Then discuss with them and local authorities, elements taken into account in the drafting of a Memorandum of Understanding on Commitments in three parts.

Step4:

A training workshop was organized for the attention of SPD so they can familiarize themselves with spare parts, increases their motivation and jointly agreed problems and possible solutions. At the end of this workshop, the Memorandum of Understanding (MoU) will be signed between ACF, the SPD and the local authorities.

Step5:

Submit an initial stock to SPD. Define the SPD selling prices of items and the profit margin. Give also to the SPD, the list of suppliers of spare parts in Monrovia and the selling price of the items.

Step6:

Organize a meeting with communities and authorities for an official communication of the SPD retained. To link the den spare part dealer, community and local authorities and raise awareness about the need for the existence of a dynamic network to provide parts in case of failure of the pumps.

Step7:

The establishment of a monitoring committee consisting of local authorities (Commissioner, Chairman of District Development), the ministry of Public Works and a technician of ACF to ensure that the terms of the MoU are respected. Monitor the activities of the SPD and in case of problems, finding the right solution.

The difference between the proposed system and the old system is at several levels. In the first step, unlike the first model, we associate in addition to communities, the local authorities for the choice of SPD. Indeed, it seems important to involve the authorities upon the establishment of spare part dealers to facilitate the monitoring of their activities after.

An important element is also the submission of the initial stock SPD after training. Indeed, in the first system, the SPD received initial stock before being invited to a workshop for training. Having already received the equipment, some did not come to training. This is the case of the Johnny's Town SPD. And the latter, after the exhaustion of its initial stock stopped the sale of spare parts.

The third essential element is the monitoring and coordination of the network through the establishment of a monitoring committee.

V. ESTABLISHMENT OF DATABASE

From the ACCESS software, we developed a database called "**SUPPLY CHAIN MANAGEMENT OF SPARE PARTS IN LOFA COUNTY-LIBERIA**". Indeed, the authorities of Lofa County and ACF can use this database to monitor the network for spare parts of hand pumps from the pump status at the community level, parts availability, purchase prices and selling prices. Updates must be done through field visits for data collection. Using of this database very simple and does not require extensive knowledge of computers.

5.1. GENERAL PRESENTATION OF DATA BASE

For facilitate the use of the database, we present the main menu at two (2) parts (**Figure 17**):

- Forms
- Reports

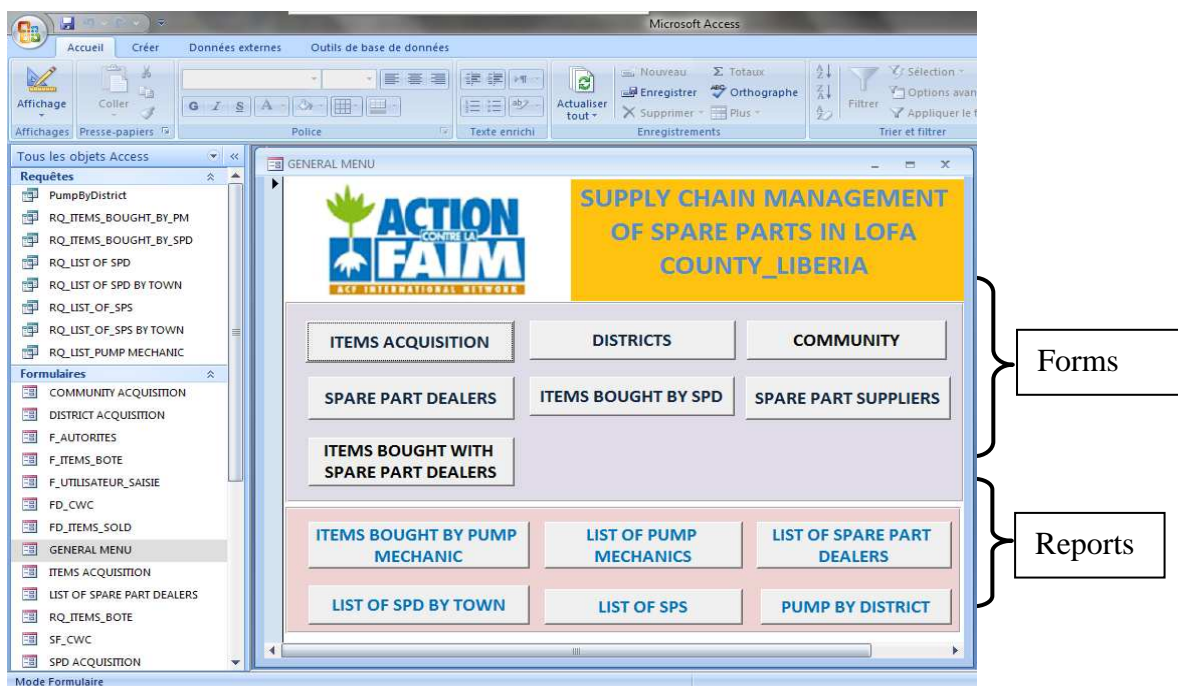


Figure 17: General Presentation of data base

5.2. USE OF THE DATABASE

5.2.1. Forms

The Forms guide the user through the process of man-machine dialogue. They can guide the user to enter data, so to add rows to the table. Formularies identified are:

- **ITEMS ACQUISITION:** For the input of spare parts sold by suppliers to the SPD;
- **DISTRICT:** To enter different local authorities by district, their function and telephone number;
- **COMMUNITY:** To enter communities per district, the total number of pumps, pumps functional and pumps non-functional, but also the members of the community wash committee;
- **SPARE PART DEALERS:** To enter SPD per district as well as pump mechanics;
- **ITEMS BOUGHT BY SPD:** To enter the purchase price of spare parts by SPD, the number of items purchased and the purchase price for pump mechanics and CWC;
- **SPARE PART SUPPLIERS:** To enter suppliers based in Monrovia, their contacts, and the selling prices of spare parts.
- **ITEMS BOUGHT WITH SPARE PART DEALERS:** To enter spare parts by pumps mechanics and the number of pieces and the total cost.

The screenshot shows the Microsoft Access interface for the 'ITEMS ACQUISITION' form. The form is titled 'ITEMS' and contains a list of items: Pump base, Stell Cone, Rubber Cone, Pipe centralizer, PVC pipes, and PVC glue 500g. The left sidebar shows a list of forms including 'PumpByDistrict', 'RQ_ITEMS_BOUGHT_BY_PM', 'RQ_ITEMS_BOUGHT_BY_SPD', 'RQ_LIST_OF_SPD', 'RQ_LIST_OF_SPD_BY_TOWN', 'RQ_LIST_OF_SPS', 'RQ_LIST_OF_SPS_BY_TOWN', 'RQ_LIST_PUMP_MECHANIC', 'COMMUNITY ACQUISITION', 'DISTRICT ACQUISITION', 'F_AUTORITES', 'F_ITEMS_BOTE', 'F_UTILISATEUR_SAISIE', 'FD_CWC', 'FD_ITEMS_SOLD', 'GENERAL MENU', 'ITEMS ACQUISITION', 'RQ_ITEMS_BOTE', 'SF_CWC', 'SPD ACQUISITION', and 'SPS ACQUISITION'.

Figure18: Form of spare parts

The screenshot shows the Microsoft Access interface for the 'SPARE PART DEALERS' form. The form is titled 'SPARE PARTS DEALERS ACQUISITION' and contains fields for Full Name, Phone, and Town. Below this is a section for 'PUMP MECHANICS' with fields for Pump Mechanic's Full Name and Phone Number. The bottom of the form shows a table with columns: Full Name, Phone Number, Town, Pump Mechanic's Full Name, and Phone Number. The table contains data for Nadin MASSE, Allassane BALDE 'Easy Boy', Konney SALIA, SECKOU Bayor, Joseph GBEMBO, and Jacob GBORAI.

Full Name	Phone Number	Town	Pump Mechanic's Full Name	Phone Number
Nadin MASSE	0886657246	FOYA	Joseph GBEMBO	0886-911414 / 0886-633844
Allassane BALDE "Easy Boy"	0886630513	KOLAHUN	Jacob GBORAI	0886401926
Konney SALIA	0886630511	MASSABOLAHUN		
SECKOU Bayor	077780 65 95	Barkedu Town		

Figure 19: Form of SPD

5.2.2. Report

The report used to display and print the data in a suitable form. The result is a file formatted. We therefore implemented six reports:

- **ITEMS BOUGHT BY PUMP MECHANICS:** Enables the display of names of spare parts for pumps purchased by the pump mechanics, unit price and total cost;
- **LIST OF PUMP MECHANICS:** Displays the name of the mechanic pump, SPD, items purchased, their number and their costs;
- **LIST OF SPARE PART DEALERS :** Enables the display on the same page all the SPD and the pump mechanics and their phone numbers and where they are;
- **LIST OF SPD BY TOWN :** Displays for each locality the SPD and the pump mechanic and their telephone number;
- **LIST OF SPS :** Allows the display of all spare part suppliers that are located in Monrovia, as well as their address and location;
- **PUMP BY DISTRICT :** Displays for each district a list of all communities, the total number of pumps, those that are functional and non-functional ones.

The screenshot shows a Microsoft Access window titled 'RQ_LIST OF SPD - Microsoft Access'. The main view is a report titled 'LIST OF SPARE PART DEALERS'. The report contains a table with the following data:

Spare Part Dealers	SPD's Phone Number	Town	Pump Mechanic	PM's Phone Number
Allassane BALDE "Easy Boy"	0886630513	KOLAHUN	Jacob GBORIE	0886401926
Kaifa OCHIY	0880420934	MASSABOLAHUN	Momoh K. SANOH	0886941743
Nadim MASRI	0886657246	FOYA	Joseph GBEMBO	0886911414 / 0886633844
SECKOU Ballouh	077780 65 95	Barokedu Town	Valieu SHERIFF	0777123017

The report footer indicates the date 'Jeudi 6 septembre 2012' and 'Page 1 sur 1'. The left sidebar shows a list of objects, including 'RQ_LIST OF SPD BY TOWN' and 'RQ_LIST OF SPD BY TOWN'.

Figure 20: Example of report « LIST OF SPARE PART DEALERS »

VI. LIMITATIONS AND PROBLEMS

In the achievement of this work, problems were encountered on both the language, material and infrastructure:

- Indeed, we arrived in Liberia in the end of June; this period coincided with the trips of the WASH coordinator. He should to go to Ivory Coast, France and the Democratic Republic of Congo. Thus, the whole month of July, he was not available so we can't work together;

- Also, the non presence of the Field Manager. Indeed, he should supervise my fieldwork in Lofa County. In relation to his program, he came in Liberia a month after my arrival.

The non-availability of the coordinator and the absence of Field Manager allowed me to have a high level of autonomy. In fact, I could develop my methodology and my work schedule in collaboration with the two WASH technicians of Voinjama base in Lofa County;

- Another difficulty was the problem of communication. Indeed, my English level was average, so the beginning was difficult, but with the time, communication has improved.

- The fourth difficulty is infrastructure order. In fact, the intership was held in the rainy season (July, August, and September). Therefore the roads were almost impassable. What made that we have not been able to visit some localities for meetings (eg Gondolahun to meet SPD).

- The last difficulty is the lack of vehicles on the base. Indeed, three vehicles were based on Voinjama, two are rented (one used to carry the social team and the second for the technical team). There remains only one vehicle of ACF for the base and the field studies. Therefore, we regularly lose some days on the schedule.

CONCLUSION - RECOMMENDATIONS

After analysis of this study, we can make the following observations as a conclusive synthesis. Several factors come into consideration for establishing a network of parts dealers performing among others, the availability of parts, the effective training of pump mechanics to repair the pumps, the existence and operation of the CWC and government involvement in the monitoring and coordination of medium and long term. To do that, we make the following recommendations:

At ACF level

- Involve at the beginning of the establishment of spare parts dealers network, the local authorities;
- Sign a Memorandum of Understanding with suppliers in Monrovia to allow SPD to have the spare parts at reduced prices;
- In the implementation of SPD in a community, ACF should also train in same locality a pump mechanic, so that these two work together;
- Provide pump mechanics of means of conveyance (motor bikes, bicycles) in the project in order to facilitate their movements;
- Establish a monitoring committee of spare part dealers network composed of Local Authorities, technicians of ACF and ministry of public works.

At the authorities level

- A proposition for invitation of tenders to select a national distributor for Afridev pump parts ;
- Supervise the selling prices of spare parts for hand pumps at Monrovia suppliers in order to harmonize the prices;
- At the local level, to get involved in monitoring and coordinating of the spare parts dealers network,

At the SPD level

- In view of the long distance between Lofa County in Monrovia, a grouping of the SPD would enable them to send one of them, in a defined period, every month or every two months, to supply spare parts to suppliers in Monrovia;
- Maintain good relations with the local authorities, the CWC, the pump mechanics and SPS;
- Use local radios stations and the various market days to get acquainted with the community;

- Don't wait for a break of stock before supplying the spare parts

At the SPS level

- Failing to open a store in Lofa due to the long distance from Monrovia and bad road conditions during the rainy season, it would be possible to open a store in the medium term in Gbarnga;
- In agreement with ACF, provide discounts on the selling prices of spare parts for SPD;
- Harmonize the selling prices price of spare parts.

At the CWC level

- Supply regular renewal fund, which will enable to face with the rising costs of maintenance of pumps over the years;
- Encourage communities to preventive maintenance of hand pumps;

At the pump mechanics level

- Work closely with the SPD and the CWC;
- Demonstrate professionalism in the repairing of manual pumps.

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www.actioncontrelafaim.org

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Annex 1: Activities per community per district

ACTIVITIES IN THE COMMUNITIES PER DISTRICT							
District of focus	Communities	New Borehole	Rehab Borehole	New Hand Dug well	Rehab Hand dug well	New Latrine	Rehab Latrine
Voinjama	Samita	0	0	0	1	0	0
	Jayamai	0	0	0	1	0	0
	Manamai	0	0	0	1	0	0
	Bakuma	0	0	0	2	0	0
	Balakplasue	0	0	0	2	0	0
	Massamai	0	0	0	1	0	0
	Zewodamai	0	1	0	1	0	0
	Kolliemai	0	1	0	0	0	0
	Seekemai	0	1	0	0	0	0
	Zakota	1	0	0	0	0	0
	Karza	1	0	0	0	0	0
	Kozemai	0	0	1	0	0	0
	Vavamai	1	0	0	0	0	0
	Betijimai	0	0	1	0	0	0
Sub-total per distret		3	3	2	9	0	0
Quado-Bondo	Fafinidu	0	0	0	1	0	0
	Koikilidu	0	0	0	1	0	0
	Sewoledu	1	0	0	0	0	0
	Konanadu	1	0	0	0	0	0
	Sasanor	1	0	0	0	0	0
	Bakadu	0	0	1	0	0	0
Sub-total per distret		3	0	1	2	0	0
Kolahun	Kporkulahun	0	1	0	2	0	0
	Hengbelahun	0	1	0	0	0	0
	Massabolahun	0	2	0	0	0	0
	Ngornbu	1	0	0	0	0	0
	Heilahun	0	0	1	0	0	0
	Koilahun	0	0	1	0	0	0
	Doudou	0	1	0	0	0	0
	Kpandehiwah	0	1	0	0	0	0
	Balahun	0	0	1	0	0	0
	Bolahun	0	1	0	0	0	0
	Mbalotahun	0	1	0	0	0	0
	Sovasu	0	0	1	0	0	0
Sub-total per distret		1	8	4	2	0	0

District of focus	Communities	New Borehole	Rehab Borehole	New Hand Dug well	Rehab Hand dug well	New Latrine	Rehab Latrine
FOYA	Solomba	0	0	0	1	0	0
	Fembadu	0	0	0	1	0	0
	Baindenin	0	0	0	1	0	0
	Kudu	0	1	0	0	0	0
	Konduma	0	1	0	0	0	0
	Mambo rankollie	0	1	0	0	0	0
	Langbnba	1	0	0	0	0	0
	Kpelo	1	0	0	0	0	0
	Worsanga	1	0	0	0	0	0
	Sengalo	1	0	0	0	0	0
	Farsie	0	0	1	0	0	0
	Fornin	1	0	0	0	0	0
	Ngessakongai	0	0	0	1	0	0
	Sondorkolobondo	1	0	0	0	0	0
	Sengai	1	1				
	Siandadu	0	0	1	0	0	0
	Barsor	0	1	0	0	0	0
	Sasanin	0	1	0	0	0	0
	Boya	0	0	1	0	0	0
Sub-total per distret		7	6	3	4	0	0

Annex 2 : Questions to SPD

SPARE PARTS DEALERS DATA

County:.....

District:.....

Town:.....

Date:.....

Dealer's name:.....

Contact:.....

Name of Shop:

1 - Since when do you sell the spare parts of the pumps?

2 - How is the selling of Afridev spare parts going with you?

3 - Have you ever bought spare parts on your own?

4 - Which items do people buy most?

5- Do you have a marketing strategy? If yes, which?

6 - Do you know the other spare parts dealers of the city? /district? If yes, did you have contact with them?

7 – Do you know the Community Wash Committee members? the pump mechanic?

8 – Do you supply spare parts directly from Monrovia? If not, where?

9 - What time of the year do people buy more items?

10 - How do you think other communities know that you are selling spare parts?

11- Can you name and identify all the spare parts that you are selling? If yes, name just few.

12 - What are the problems that you are presently encountering?

13 - Do you still want to continue to sell? Why?

14 – What are your propositions for the establishment of better supply chain?

15 – Final comment

Annex 3 : Questions to spare part suppliers

SPARE PARTS SUPPLIERS DATA

Town:.....

Date:.....

Supplier's name:.....

Contact:.....

Name of Shop:

1 - Since when do you sell the spare parts of the pumps?

2 - How is the selling of Afridev spare parts going with you?

3 – Where did you buy spare parts?

4 – Is there an Afridev pump representing here in Monrovia?

5- Do you have a marketing strategy? If yes, which?

6 - Do you know the other spare parts suppliers here in Monrovia?

7 – Do you know the spare part dealers in the other county, especially in Lofa County?

8 - What time of the year do spare part dealers buy more items?

9- Can you name and identify all the spare parts that you are selling? If yes, name just few.

10 - What are the problems that you are presently encountering?

11 - Do you still want to continue to sell? Why?

12 - Is it possible to give the pump spare parts to the dealers and to discern money after? If yes, to what conditions?

13 – What are your propositions for the best partnership between you and the spare part dealers of Lofa County?

Annex 4 : Questions to pump mechanics

PUMP MECHANIC DATA

County:.....

District:.....

Town:.....

Date:.....

Name:.....

Contact:.....

1 - Since when are you a pump mechanic?

2 - Which items do repair frequently?

3 - Do you know the other pump mechanic of the city? /district? If yes, did you have contact with them?

4 – Do you know the Community Wash Committee members? SPD?

5 - What time of the year do people repair pump?

6 - What are the problems that you are presently encountering?

7 - Do you still want to continue to repair? Why?

8 – What are your propositions for the establishment of better supply chain?

9– Final comment

Annex 5 : Questons to CWC

COMMUNITY WASH COMMITTEE DATA

County:.....

District:.....

Town:.....

Date:.....

Name:.....

Function:

Contact:.....

Name:.....

Function:

Contact:.....

Name:.....

Function:

Contact:.....

Name:.....

Function:

Contact:.....

1 - Since when does the CWC exist?

2 - Does the committee function normally? Do you organize some meetings in order to take stock of the management?

3 – Do the villagers contribute financially?

4 – How does it make the contributions? By house? by container?

5 – Can I see your book of account? How much do you have in your case?

6 - What are the reasons for which the pumps fall in breakdown?

7 – What time of the year are the pumps more in breakdown?

8 – Do you know les pump mechanics? The spare part dealers? Their Name and contact?

9 – When the pump is in breakdown, how you organize yourselves for the repair?

10 - What are the problems that you are presently encountering?

11- What are your propositions in order the pumps don't fall in breakdown?

Annex 6 : SPD training guide

ACF WASH Department
Voinjama City, Lofa County
September, 2012

WORKSHOP

General Objective: To enhance a sustainable and an affordable Afridev spare parts network that each community in Lofa County will have easy access.

Specific : To identify the barriers of the network and adapt strategy that will overcome them.

Topics messages	Activities	Tools	Time	Trainers
Devotion	Signing and praying	Verbal	9:30 - 10:00	Guillaume (ACF) Peter (ACF)+ Solomon (ACF) + Leewar (MPW)
Participants registration/Introduction	Writing names and self introduction	pen, paper		
Planning	Presentation/explanation of workshop plan	Verbal		
w/shop objective	participants' expectation = above	Verbal		
Brief history of ACF	Explanation, Meaning of ACF ACF WaSH Program	Verbal		
Break (SESSION 1)				
Problems analysis (the problem tree)	spare part network not working, what are the reasons?	poster sheet, marker, white board, pens	10:30 - 12:30	Solomon + Leewar
	participatory discussion of problem tree diagram. (identifying root cause, what leading to root cause and the effects/impact)			
	Conclusions - Action plan			
Solution Tree	participatory discussion of solution tree diagram. (identifying root cause, what leading to root cause and the effects/impact)			

lunch				
Scaleing up SPD supply chain	Reminder of our objectives (sustainability, accessibility to everybody...)	poster sheet, marker	13:30 - 15:00	Solomon + Leewar
	Ministry of Public Works			
	Conclusions - Action plan			
Super Afridev Pump spare parts Dealer(s)	Group discussion/selection	Verbal		
	Conclusions - Action plan			
Conclusion of workshop	Remarks - summary of action points	poster sheet	15:00 - 15:30	Peter + Solomon + Leewar

Break (SESSION 2)				
Pump parts and their function	Pump Mechanic's roles, Name and functions of pump parts, Assembly and desassembly, function of foot valve and plonger, fast wearing spare parts, inspection tests, pump use	poster sheet, marker, white board, pens	10:30 - 12:30	Peter
lunch				
How to identify pump problems and their causes , do repairs	Routine maintenance, Problem/cause/how to repair, Pump mechanics problem	poster sheet, marker	13:30 - 15:00	Peter
		Verbal		
Conclusion of workshop	Remarks - summary of action points	poster sheet	15:00 - 15:30	Peter + Solomon + Leewar

