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EVALUATION OF THE LEVEL OF SERVICE RENDERED BY FUNCTIONING RURAL WATER SUPPLY SCHEMES: CASE OF FARTA WOREDA, AMHARA REGION, ETHIOPIA

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ABBRIVATION AND ACRONYMS

ACSI	Amhara Credit and Saving Institution
AMCOW	African Ministers' Council on Water
CARE	Cooperative for American Relief Everywhere
CDF	Community Development Fund
CMP	Community Managed Project
COWASH	Community-Led Accelerated WaSH
CSA	Central Statistical Agency
EFY	Ethiopian Fiscal Year
ETB	Ethiopian Birr
GoE	Government of Ethiopia
GoF	Government of Finland
GPS	Global Positioning System
GTP	Growth and Transformation Plan
GTZ	German Technology Corporation
HDW	Hand Dug Well
JMP	Joint Monitoring Programme
km^2	Square kilometer
lpcd	Liter per capita per day
MDG	Millennium Development Goal
mm	Millimeter
MoWE	Ministry of Water and Energy
MoWR	Ministry of Water Resources
mpcd	Minutes per capita per day
MUS	Multiple Use Service

NGO	Non Governmental Organization
NWI	National WASH Inventory
O&M	Operation and Maintenance
O&MM	Operation and Maintenance Management
ORDA	Organization for Rehabilitation and Development of Amhara
OWNP	One WASH National Program
RWSEP	Rural Water Supply and Environment programme
SDP	Spring Development
SIT	Sustainability Index Tool
SPSS	Statistical Package for Social Science
UAP	Universal Access Plan
UNDAF	United Nation Development Assistance Framework
UNDP	United Nation Development Program
UNICEF	United Nations Children Fund
WASH	Water Supply Sanitation and Hygiene
WASHCO	Water Supply Sanitation and Hygiene Committee
WIF	WASH Implementation Framework
WHO	World's Health Organization
WMP	Woreda Managed Project

- Kebele: the lowest administrative body in the government of Ethiopia equivalent to sub-district
- Woreda: the lowest administrative body in the government of Ethiopian next to Kebele equivalent to district

ABSTRACT

Evaluation of the Level of Service Rendered by Functioning Rural Water Supply Schemes: Case of Farta woreda of Amhara region, Ethiopia

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All reports confirm that the rural water supply coverage of Ethiopia have been in strong upward trajectory since 1990. RWSEP/COWASH project has been implementing rural water supply schemes using CMP approach in Amhara region of Ethiopia since 2003. The project has achieved significant result on rural water supply schemes; functionality, implementation rate and community empowerment. CMP related researches confirm that the approach has achieved more than 98% of rural water supply scheme functionality. However, the level of service delivered by those functional water supply schemes had not been studied so far. Therefore, focusing on functioning rural water supply schemes in Farta woreda, the present study evaluated the service level using water quantity, quality, accessibility and reliability indicators, identify determinant factors affecting rural water supply schemes functionality and service level. Comparisons were made on the level of service delivered by those schemes implemented by NGO managed project approach against CMP. The study is both qualitative and quantitative in its design. Questionnaire, focused group discussion, key informant interview, observation, and document analysis are the main data gathering tools used in this study. The quantitative data collected were analyzed using SPSS (Statistical Package for Social Science) and presented through tables, graphs and charts where as the qualitative information were precisely narrated. To come up with valid conclusion rural water supply schemes were selected using representative sampling technique. The household survey found water quantity is the worst to meet the national target, only 1/4th of beneficiaries met the water quantity set by the UAP. Design problems, lack of community cohesion during construction, monitoring and supervision and environmental problems were found as important factors affecting water supply service level beneficiaries get from functioning rural water supply schemes.

Key words: ***rural water supply, water quantity, water quality, accessibility, reliability, functionality and service level/quality***

CHAPTER ONE

1. INTRODUCTION

1.1.Background

Water is one of the most vital resources without which life could be difficult. Thus water is a critical factor for sustainable livelihood. Households need water for domestic use (drinking, cooking, washing, cleaning, etc) and for productive use. Access to adequate, clean and safe water greatly contributes to improve health and productivity (Rahmato, 1999). Access to clean water and sanitation is declared as a human right by United Nations in 2010 (UN, 2013). It is a pre-requisite for the realization of many human rights, including those relating to people's survival, education and standard of living. To a greater or lesser extent, these rights are denied where people are unable, for whatever reason, to access safe water.

By the end of 2011, an estimated 768 million people, the majority in developing countries, are not using improved sources of drinking water, while 2.5 billion people are not using improved sanitation (WHO and UNICEF, 2013). This situation results in unavoidable deaths of an estimated 1.5 million children every year, many victims to diarrhoeal disease. And, whilst improving access to water, sanitation and hygiene (WASH) services is certainly not inexpensive, the economic gains that result are considerable. Huge economic and financial savings would be made, in terms of reducing health care costs; protecting the environment from human waste and freeing-up the time spend for collecting water from remote sources.

Providing access to safe water and sanitation to combat poor health is an integral part of the strategy to alleviate poverty in many countries (UNDAF, 2006). However, unless strategies are found to motivate rural communities and create a demand for water and sanitation, the United Nations Millennium Development Goal of halving the proportion of the world's population without sanitation and access to safe water by the year 2015 cannot be achieved

(Waterkeyn and Cairncross, 2005). Clearly, more resources need to be applied to solve the water supply and sanitation problems of rural people. And for this, stronger methodologies for fostering rapid implementation must be devised, and answers must be found to why sanitation and hygiene programs are often non-sustainable.

It can be observed that there are large gaps in the sustainability of water supply and sanitation services in different rural settings provided by different suppliers, which lead to the hypothesis that the approaches utilized by those suppliers were related to the sustainability of rural water supply and sanitation services. Therefore, these approaches followed by different rural water supply and sanitation service providers in different areas need to be evaluated so that those approaches resulting in sustainable services can be identified and scaled up.

In Ethiopia different actors concerning rural water supply and sanitation has been using different approaches in issuing community mobilization and targeting the expansion of coverage in rural water supply and sanitation and ensuring its sustainability as final goal. At this time, community managed project (CMP), woreda managed project (WMP), NGO managed project and self supply project approaches have been working in different rural dwellers (WIF, 2011).

Currently, CMP approach has been implemented in five regions of Ethiopia. The approach evolved from community development fund implemented in Amhara and Benishangul Gumuz, by Rural Water Supply and Environmental Programme (RWSEP) and the Rural Water Supply, Sanitation and Hygiene Programme respectively.

Researches done on the performance of CMP approach confirm that the approach has good result having on sustainability and constructed schemes are functional above 95 % (Mebrahtu, 2012, Sharma, 2012 and Tesfaye, 2012). The comparative analysis by Tesfaye (2012) revealed that CMP approach has better achievement on the functionality than woreda

managed project approach (an average functionality rate of 96.7% and 88.4%, respectively). Because of these promising results observed, there is a need to promote this approach to other donors and NGOs as an optional approach towards improving rural water supply coverage and developing sustainable schemes. Currently, UNICEF is implementing rural water supply schemes using CMP approach.

However, the final goal of actors in water supply is not limited to improve water supply systems functionality rather to provide sufficient, safe and reliable water supply system. Provision of reliable water supply system is important to achieve the intended targets on different aspects of human life including their social, economic, health, education and dignity. Therefore, impact of accelerated water supply system implementation and improvement in rate of system functionality should be reflected on the improvement in the service delivery.

1.2.Statement of the Problem

Though there is difference on water supply coverage between global and national estimates, all sources confirm that water supply coverage in Ethiopia is on strong upward trajectory (AMCOW, 2010). According to MoWE (2013), the national water access reaches 61.6% (58.71 % rural and 80.72% urban) in 2012/13 fiscal year. 'The National WASH Inventory' (NWI) has been conducted in 2010 to provide reliable data about the water supply coverage of the country. As a result of the NWI the combined urban and rural water supply coverage in 2011 is determined to be 54 percent.

The Government has been working for the development of rural water supply and sanitation along with other international agencies like UNICEF, World Bank, international and local NGOs. Though, the coverage of rural water supply has increased to certain extent in the last

few years, the target to reach the Universal Access Plan (UAP) and MDG target to access safe water supply and sanitation by 2015 needs more resources and efforts.

In Ethiopia 33% of rural water supply schemes are non-functional at any time, owing to lack of funds for O&M, inadequate community mobilization and commitment and a lack of spare parts (MoWR, 2007). Early inventory result of NWI, shows that the rural water supply scheme functionality has been improved and reaches 75.53 percent and it was better for Amhara region (79.62 percent) in 2011 MoWE (2013). These may be due to implementation of a large number of water supply schemes through the community managed project approach. This is confirmed by researches done on the performance of rural water supply schemes developed by CMP approach. The functionality rate of rural water schemes reached more than 95 percent (Mebrahtu, 2012, Sharma, 2012 and Tesfaye, 2012).

The study area Farta woreda, located in South Gondar zone of Amhara region, is one of the implementation areas of CMP approach. According to NWI result, the functionality rate of water supply schemes in this woreda is relatively less than the national average (69.72%) in 2011. While it was more than 95% according to CMP researches (Kebede, 2010 and Sharma, 2012). In addition there is significant difference in the estimate of functionality between different implementers in the woreda.

Though researches done so far assessed and evaluated different aspects of rural water supply schemes; sustainability challenges and determinant factors, functionality rate and project performances, evaluation of the level of service provided by those schemes had not been studied. In addition, the accelerated implementation of water supply schemes alone couldn’t ensure water supply service in a given area. Therefore focused on functioning rural water supply schemes the present study evaluated the level of service by referring national rural water supply service targets of UAP and MDG.

1.3.Objective of the Study

1.3.1. General objective

The main aim of the study was to evaluate the level of service delivered by functioning rural water supply schemes developed through CMP and other project approaches implemented in Farta Woreda of Amhara Region.

1.3.2. Specific objectives

The following specific objectives were assessed to attain the overall objective of the study:

- ✓ Examine the level of services that user communities gain from functioning water supply schemes;
- ✓ Investigate the determinant factors that can determine functionality and the level of services provided by those functional schemes; and
- ✓ Compare the level of service provided by CMP water supply schemes against other project approaches

1.4.Research Questions

The study addressed the following research questions:

1. What is meant by rural water supply scheme functionality to beneficiaries?
2. What are the determinants of functionality of water schemes?
3. Is there any institutional support given to the community after the water supply scheme has been commissioned? If so, why?
4. What types of institutional supports have been given to communities?
5. What is meant by access to safe water supply from different perspectives?
6. Are rural water supply schemes providing the designed/intended water supply service level?

1.5.Significance of the Study

This study investigated important information concerning performance of different rural water supply schemes; level of service rendered and users' satisfaction with the service gained from functioning water supply schemes in the study area. The study also identified different factors that determine water supply schemes functionality; current interventions done by different rural water supply actors and recommended on further interventions that should be done to ensure safe water supply for the rural dwellers. Level of service and water supply scheme functionality were evaluated across different project implementation which could be used to recommend the most effective approach that can play significant role in achieving MDG and UAP adopted by Ethiopian government.

The findings of the study will serve as an input to rural water supply actors to intervene and take effective approach to sustain the water schemes and contribute in the rural water supply framework.

CHAPTER TWO

2. LITERATURE REVIEW

‘‘We shall not finally defeat AIDS, tuberculosis, malaria, or any of the other infectious diseases that plague the developing world until we have also won the battle for safe drinking water, sanitation and basic health care.’’

Kofi Annan, Late United Nations Secretary General

2.1.Domestic Water Supply and Health

Water is of a fundamental requirement for human life without which, life cannot be sustain long. Lack of access to adequate water supply leads human life to multidimensional problems. It affects different aspects of human life including their social, economic, health, education and dignity. The spread of water related and water borne diseases is associated with poor water supply, sanitation and hygiene. Women and children bear the greatest burden related with inadequate water supply, sanitation and hygiene.

More than 768 million people worldwide, most of them in developing countries are lacking access to any form of improved water supply sources within one kilometer of their home (WHO and UNICEF, 2013). Lack of access to safe and adequate water supplies contributes to ongoing poverty through the economic costs of poor health and time and energy expended in fetching water. The importance of adequate quantity of water for human health has been considerable. However, guidance on the minimum household water requirement to assure good health is lacking. Though the MDG declaration targets *'halve the proportion of people who have no access to safe drinking water by 2015’ the* quantity of water that should be supplied had not been specified. The Joint Monitoring Programme (JMP) of WHO and UNICEF, which assesses the global progress towards the MDG targets on water supply and sanitation, described reasonable access as being *'the availability of at least 20 liters per person per day from a source within one kilometer of the users dwelling'* However, this

definition relates primarily to access and should not necessarily be taken as evidence that 20 liters per capita per day is a recommended quantity of water for domestic use.

Different researchers have proposed the minimum quantity of water that should be supplied under different conditions. Gleick (1996) recommended water providers to adopt a basic water requirement standard for human needs of 50 liters per capita per day irrespective of individual's economic, social or political status. While, Carter et al (1997) suggested JMP's indicator of access as a minimum criterion for water supply (20 lpcd).

According to WHO (2003), many uses of water occur largely at the household (for instance drinking, eating and hand-washing); others may occur away from the home (laundry and in some cases bathing). Therefore it is important to keep in mind when ensuring that adequate quantities of domestic supply are available for these purposes and in interpreting and applying minimum values (WHO, 2003). Basically it is important to distinguish quantities of water required for domestic which constitute a minor component of total water withdrawal from other purposes (Gleick, 1996).

WHO in its drinking water quality guideline defines domestic water as *'water used for all usual domestic purposes including consumption, bathing and food preparation'* (WHO, 2003). Therefore, the requirements with regard to the adequacy of water supply apply across all these uses and not only in relation to consumption of water. This definition provides an overall framework for domestic water usage in terms of quality requirement. However, quantities of water required for domestic supply is not well defined.

Sub-dividing different uses of domestic water is useful in understanding minimum quantities of domestic water required. White et al. (1972) cited in WHO, 2003 suggested that three types of use could be defined in relation to normal domestic supply:

- Consumption (drinking and cooking)
- Hygiene (including basic needs for personal and domestic cleanliness)
- Amenity use (for instance car washing, lawn watering)

Considering the relevance of 'productive use' to poor households in developing countries Thompson et al. (2001) cited in WHO, 2003 included 'productive use' as a fourth category. The Productive use of water includes uses such as brewing, animal watering, construction and small-scale horticulture. Abu-Ashour and Al-Sharif (2010), in their investigation of linkage between minimum household water requirement and health; hydration, cooking and hygiene water requirements are discussed as domestic water requirements that have direct consequences on health.

2.1.1. Hydration water requirements

Water is a basic element of the human body and is critical to human life. It supports digestion of food, adsorption, transportation and use of nutrients and the elimination of toxins and wastes from the body (Kleiner, 1999 cited in WHO, 2003). The human body requires a minimum intake of water in order to be able to sustain life before loss of body fluids due to dehydration. Adverse health effects due to dehydration have been noted. Increased risks of urinary stone formation, increased risks of urinary tract cancer and poor oral health are examples of these health problems (WHO, 2003). Hydration water requirement remains elusive, as it is dependent on climate, activity level, age group and diet. Abu- Ashour and Al-Sharif (2010), summarized different reported reference values of hydration water requirement excluding water quantities derived from food (Table 2); which is approximately estimated to be one third of hydration water requirement from drinking water (Kleiner, 1999 cited in WHO, 2003).

Table 1: Minimum domestic water requirement (Abu-Ashour and Al-Sharif, 2010)

Minimum water requirement	Reference
20 lpcd from a source within one kilometer of users dwelling	JMP (WHO, 2000)
15 lpcd for disaster relief	SPHERE, 2002
20 lpcd minimum criterion for water supply	Carter et al. (1997)
50 lpcd basic water requirement for domestic water supply	Gleick (1996)

Table 2: Reported hydration water requirement (Abu-Ashour and Al-Sharif, 2010)

Hydration water requirements	Reference
2 lpcd for adult male and 1.4 lpcd for adult female	Kleiner (1999)
2 lpcd (assumed water consumption for 60 kg adult)	(WHO, 1996)
1 lpcd (for a 10 kg child) and 0.75 lpcd (for a 5 kg child)	WHO (1993)
3 lpcd (for adult in most situations in developing country)	Gleick (1996)
4.5 to 6 lpcd (for adult, moderate to hard activity in the sun)	White et al. (1972)
4.8 lpcd (adult female during pregnancy) and 5.5 lpcd (adult female during lactation)	WHO (2003)

As summarized in Table 2, quantity of water required for hydration should be a minimum of 2 litres for average adults in average conditions, rising to 4.5 litres per day under conditions typically facing the most vulnerable in tropical climates and higher in conditions of raised temperature and/or excessive physical activity (WHO, 2003). These values encompass the range in which beneficial impacts on prevention of coronary disease and kidney stone occurrence appears likely and would be at the lower end of requirements to prevent recurrence of kidney stone (WHO, 2003). WHO (2003) suggested that allocation of hydration water requirement should be fully from drinking water since the proportion of fluid

obtained from food vary significantly in response to diet and culture from negligible to full hydration need.

2.1.2. Quantities of water required for cooking

Water is essential as a medium for preparing food. Defining the requirements for water for cooking is difficult, as this depends on the diet and the role of water in food preparation. Although, it is difficult to be precise; minimum water requirement for water supply should include sufficient water to be able to prepare an adequate quantity of staple food for average family to provide nutritional benefit. Kleiner (1999) Cited in WHO (2003), suggested that approximately one third of the hydration water requirements are derived from food. Gleick (1996) suggested an average of 10 liters per capital per day for food preparation. Whilst, if the quantity of water required for cooking rice is taken as representing the needs for staple preparation and assuming further water is required for preparation of other food, the evidence suggests that in most cases approximately 2 litres per capita per day should be available from domestic supplies to support food preparation (WHO, 2003).

Considering the minimum drinking water requirement for lactating women and adding water for foodstuff preparation; WHO (2003) suggested 7.5 liters per capital per day as basic minimum consumption (drinking water requirement plus water requirement for foodstuff preparation) water requirement.

2.1.3. Water requirements for hygiene

Water requirements for hygiene can be defined as the quantity of water required for maintaining food and personal hygiene through hand and food washing, bathing and laundry (Abu-Ashour and Al-Sharif, 2010). There are several diseases linked to poor hygiene including diarrhoeal and other diseases transmitted through the faecal-oral route; skin and eye diseases, in particular trachoma and diseases related to infestations, for instance louse and tick-borne typhus (WHO, 2003).

The need for domestic water supplies for basic health protection exceeds the minimum required for consumption (WHO, 2003). There is a significant link between water supply, sanitation hygiene and disease. Studies on the relationship between diarrhoeal disease and interventions to control suggest that reduction in diarrhoea disease from water availability were higher than those recorded from water quality improvement (WHO, 2003). The quantity of water used for children's hygiene is sensitive to availability and reducing the time taken to collect water from 5 hours to 15 minutes, result in 30 times more water being used for child hygiene (WHO, 2003). Reducing the time taken to collect water will also allow greater time to be available for child feeding, food preparation or more frequent feeding as well as better hygiene. WHO (2003) concluded hygiene education was of limited value unless water supply were improved.

The minimum water requirement for hygiene is dependent on several factors and conditions. People living in hot weather conditions will need more water for hygiene. Similarly, people who practice a high level of activity will need more water not only for consumption to avoid dehydration, but also for washing their bodies. It should be noted that the availability of water does not necessarily imply better hygiene. The effective use of both water and cleansing agents and the timing of hygiene practices are more important than volumes of water used (WHO, 2003).

2.1.4. Link between accessibility and water quantity

Water use for effective hygiene is important for controlling disease and lack of access may hamper its use which in turn adversely affects health. Availability of water significantly influences individual's hygienic behaviors. Review of literatures by WHO (2003) suggest that increased in accessibility of water equates to increased volume of water used and benefits from increased quantity of water is only felt in relation to the gross differences between service levels. A case study in Mozambique Cairncross (1987) cited in WHO (2003) confirms

the idea of increased in quantity from gross difference in service level. This study demonstrated that water consumption in a village with a standpipe within 15 minutes was 12.30 litres per capita per day compared 3.24 litres per capita per day in a village where it took over five hours to collect a bucket of water. The difference in time points to the influence of only gross differences in service level, in this case between effectively no access and a service level that can be described as basic access (WHO, 2003).

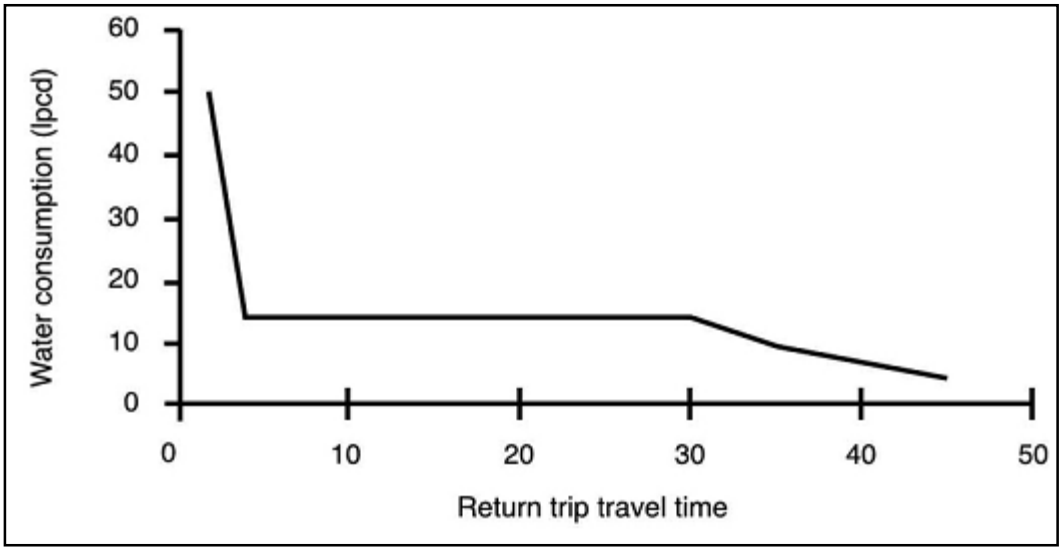

Figure 1: Relationship between water collection journey time (in minute) and domestic water consumption (Cairncross and Feachem (1993) cited in WHO, 2011)

From figure 1, once the time taken to collect water from the source exceeds 5 minutes (100meter), the quantity of water collected decreased significantly. While, there is little change in quantity of water collected within collection distance of 100 to 1000 meter (5 to 30 minutes) from house. However, beyond the distance of one kilometer (more than 30 minutes of total collection time) the quantities of water decreased further (WHO, 2003).

Though quantities of water collected varies with travel time (Figure 1) and type of supply (house connection, yard tap, stand post or traditional sources; springs or hand pumps); It is more sensitive to the gross difference in service level. Review of different studies suggest that beyond the amount of water that could be collected within one kilometer (JMP's

indicator of access to improved water source), unless water is provided at household level there will not be a significant change to the amount of water collected (WHO, 2003).

2.1.5. Productive water uses and domestic water quantity

Use of water sources for economic activities exceeds its use for domestic water supply, thought it may compromise the ability of resource to meet basic needs through over consumption or quality deterioration. Households in low-income areas use domestic water at household level for productive purpose including: brewing, small scale food production, gardening and household construction. Productive uses of water have particular value for low-income households and communities and have health and well-being benefits (Gleick, 1996 and WHO, 2003)

Generally adequate and safe water supply should be assured for basic consumption (drinking and cooking), hygiene and household productive uses in order to achieve health benefits that could be obtained from water supply. The quantity of water that households collect and use is primarily dependent on accessibility though cost and system reliability may also have significant influences. Health benefits gained from water supply are more dependent not on the quantities of water rather on the level of service which in turn inform the likely volume of water that can be collected and used. Maximum health benefits are ensured from proper water usage and good hygiene behaviors and simple provision of infrastructure alone is unlikely to maximize health gains.

2.2.Water Supply Service Levels and Ladders

2.2.1. Water service

Water services focus on the delivery of water to people. It can be defined as the quantity of water of a given quality accessible by users (service) and the system used to deliver water. In practice, the two (service and system) are often closely related. According to Moriarty et al

(2011) there is critical difference between system and service. For example, a borehole and hand pump operated at the village level provides one type of service while a professionally managed network of household taps another. However, engineers and planners focus on systems and lose the objectives to be achieved by providing new water supply infrastructure. Coverage is often calculated by counting the number of systems implemented without considering whether they are in fact providing the planned level of service (Moriarty *et al*, 2011).

Moriarty etal (2011), a water service is assessed based on qualitative methods of data gathering. Some questions asked include:

- ✓ Do the systems provide the designed amount of water?
- ✓ Do they do so every day?
- ✓ Does everyone in the community have access to them?
- ✓ Do they meet national norms for quality?

The water service accessed by an individual can only be said to meet a certain standard or level when the answers to all these questions are considered together and meet normative standards (Moriarty *et al*, 2011). A water service therefore refers to the provision of access to water in a way that meets a set of key indicators (or norms). Taken together these key indicators define the service.

2.2.2. Service level

Service level describes and differentiates between qualities of service. It is a ladder in which each level or rung is a step up from the previous. Service level is a collection of different indicators some dependent and some independent of the other. Its definition varies across countries. It may be set through a combination of engineering factors (what is easy/ possible) and social and political factors (what is politically acceptable, the cost, the desire and

capacity of a community to press for improvements, and historical norms) (Moriarty *et al*, 2011). For example, a rural community may live with a level of service, in terms of distance travelled and quality of water that would be regarded as unacceptable in a town. In an ideal world, the level of service would perhaps be set through agreements made between the providers and the users (Moriarty *et al*, 2011).

The most common indicators against which the quality of water services can be assessed include: **quantity**, measured in litres per capita per day (lpcd); **quality**, typically composed of one or more separate indicators looking at chemical and biological quality; and **distance**, from a household or the centre of a community to a water point (Moriarty *et al*, 2011). Inaddition, countries may also use other national or international norms, such as the **number of people** sharing a point source (also known as 'crowding'), and the **reliability** of the service, typically defined as the proportion of the time that it functions to its prescribed level.

Lloyd and Bartram's (1991) cited in (Moriarty *et al*, 2011) identifies five key indicators for assessing access to water services, namely: **coverage**, **continuity**, **quantity**, **cost** and **quality** (analytical plus sanitary inspection). Subsequently the service level concept was further endorsed by the World Health Organization (WHO) in 1997 and 2003. Despite this, the approach has been slow to be adopted at scale, probably falling victim to the broader problem of poor monitoring of access to rural water supplies. Indeed, it is telling that beyond endorsing it in its publications, WHO itself has limited its Joint Monitoring Programme (JMP) of global water coverage primarily to the type of technology used. However, this may change in the future with more recent discussions on post-MDG monitoring.

2.2.3. Service ladder

Service ladder is incremental progression between service levels of different quality starting from bottom rung and climbing to the top (Moriarty et al, 2011). They are highly technology

driven, in that each rung of the ladder is related to specific technical choices and while sometimes they can be completely new systems. Some rungs of the ladder can be climbed by individual household or through the community's effort, while others heavily rely on substantial funding, engineering capacity and professional management. Moriarty et al (2011) argued the concept of service level ladder is about service levels, not infrastructure, though some service levels, in some settings, can never be achieved without substantial infrastructure development and associated running costs.

In Ethiopia, the basic service level for rural communities is defined as the access to safe water supply of 15 liters per capita per day within 1.5 km radius (MoWE, 2011). Regarding the number of households accessing a water point it was determined to be 50 households and 60 to 70 households per water point for hand pump and spring development respectively (OWNP, 2013).

2.2.4. Existing water service ladder

Developing water service ladder has great advantage to provide cost effective WASH service to people on a sustainable basis. In addition service ladders are important for monitoring and evaluation of the service level delivered by water sectors.

The WHO and UNICEF's JMP adopted a simple ladder for water supply in which service level is explicitly linked with technology types. Based on JMP definitions to improved and unimproved sources JMP developed service ladder categories as unimproved, improved, and piped water on household premises (Figure 2). According to Moriarty et al (2011), JMPs decision on limited indicators may probably be due to its global level MDGs WASH monitoring. In addition JMP gives no recommendations at all for either the quantity or quality required of water for domestic use besides the WHO drinking water guideline link.

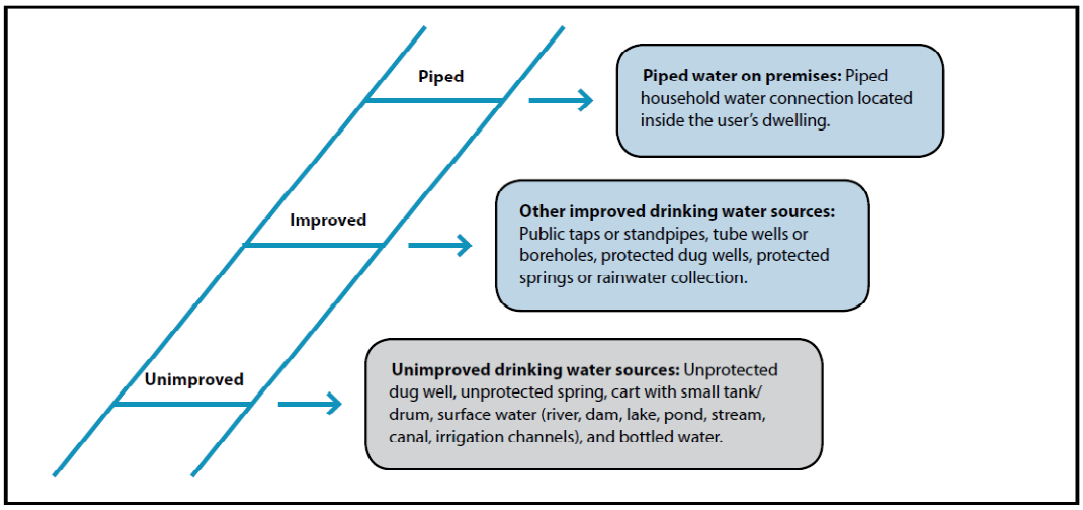

Figure 2: JMP's water service ladder (JMP, 2008)

A second service ladder for water was proposed by Van Koppen et al (2009) (cited in Moriarty et al, 2011) as part of their work on multiple use water services. A multiple use service (MUS) is one in which water is provided for homestead based productive encouraging activities such as livestock rearing, small businesses or horticulture, in addition to domestic consumption (Moriarty et al, 2011). The MUS ladder has as its primary indicators the quantity and ease of access (measured through time to collect water). It qualifies each level of access according to the type of domestic and productive activities that such a level of service can support (Figure 3). Like the JMP ladder, the MUS ladder attempts to link typical service delivery options to different service levels, putting household tap connections as the highest level. The MUS ladder maps relatively easily onto the JMP ladder, with the bottom two tiers corresponding to 'no accesses' on the JMP ladder, and the top three to improved access. The MUS ladder does not differentiate locations and assumes that all households everywhere have a demand for non-basic water consumption.

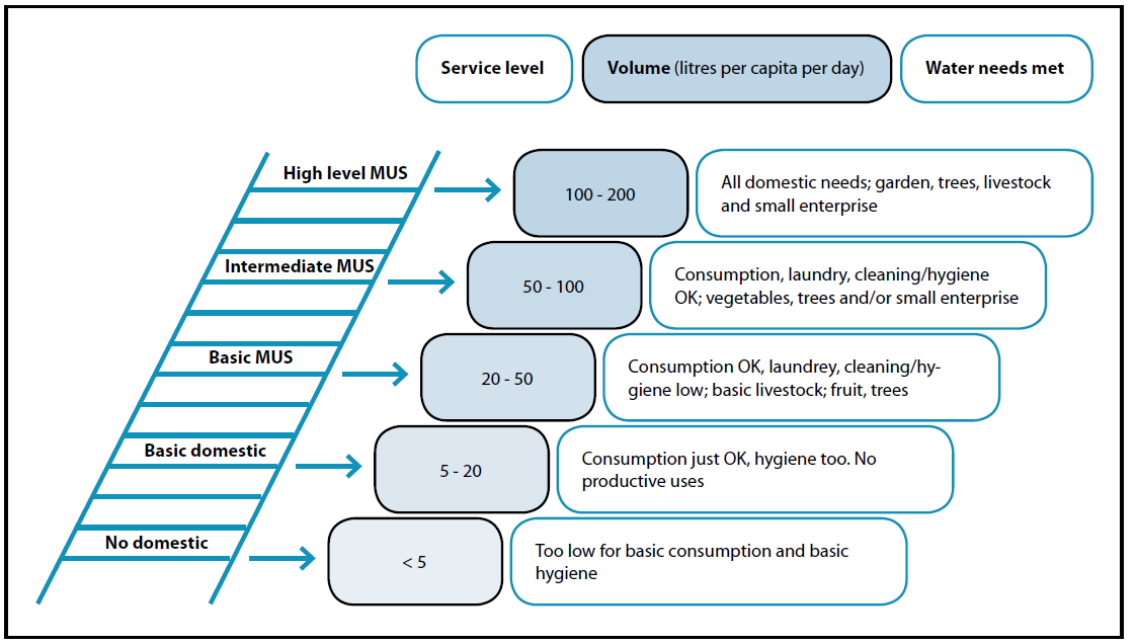

Figure 3: Multiple Use Services ladder (Moriarty etal, 2011)

Using the WASHCost objective of understanding the cost of provision of water supply, sanitation and hygiene services and enable the cost effective and equitable service delivery; Moriarty et al (2011), proposed service level ladder to be used by water sectors. They present a set of core indicators for a WASH service, grouping them together with service delivery technologies, into different service levels (typology). For both exercises, a pragmatic approach was taken: only those indicators that can realistically be identified and relatively easily assessed are chosen; while the groupings of service levels was informed by what they feel to be service differences that are recognisable to most service users and service providers.

WASHCost researchers proposed water quantity, quality, accessibility, and reliability as main indicators. These indicators were proposed based on the desired outcome of providing water services is a reduction in morbidity and mortality related to water-borne diseases and poor hygiene, coupled with a reduction in the burden particularly on women and girls of fetching water for use in the homestead. With a MUS perspective, an additional outcome is reduced poverty through economic activity related to access to water. Yet none of these outcomes can

be achieved if there is not sufficient water of acceptable quality or if the water system is too far or is chronically unreliable. Based on these four key indicators, and looking at the reality of services currently being provided to be able to relate levels to the JMP ladder, Moriarty etal (2011) propose a service ladder comprising of five steps (Table 3).

Table 3: WASHcost proposed service levels and indicators (Moriarty et al, 2011)

Service level	Quantity (lpcd)	Quality	Accessibility (mpcd)	Reliability	Status (JMP)
High	>=60	Good	<10	Very reliable	Improved
Intermediate	>40	Acceptable	<30	Reliable/secure	
Basic (normative)	>20				
Sub-standard	>5	Problematic	<60	Problematic	Unimproved
No service	<5	Unacceptable	>60	Unreliable/insecure	

There is also a service level ladder used by SNV (2013), which include measurable reliability indicator in terms of the number of months that the water supply scheme provide service in a year. SNV's service level ladder also provides better utilization of other indicators. It looks simple and can be applicable.

Generally, to ensure the basic water supply service level, users should access 20 liters per capital per day of potable water, within 1000 meter of collection distance or 30 minutes time for round trip per capita per day. And this service should be reliable (serve at least 7 -8 months per year).

2.3.Community Management Model for Rural Water Supply

Community participation on planning and construction is a prerequisite for rural water supply facilities to be sustainable. There may be effective community participation and contribution to the initial installation and operation and maintenance costs. However it doesn't assure that water supply schemes are sustainable. Setting the appropriate operation and maintenance

management model is a key to deliver rural water supply service on sustainability basis. Community management model has been the prevalent model used to manage rural water supply in sub-Saharan Africa for the last decades. Though it has widespread application and perceptions, the low water supply scheme sustainability posed question whether this model is sustainable or dispensable (Harvey and Reed, 2007). According to Harvey and Reed (2007) community management system should not be 'one size fit all' solution and limited to a number of on-going factors including:

- Community management often relies on voluntary inputs from community members, which people may do for a while but are reluctant to do in the long term; there are often no long-term incentives for community members.
- Key individuals on the water committee leave the community or die, and there is no mechanism to replace them with trained individuals.
- The community organization charged with managing the water supply loses the trust and respect of the general community. This may be related to a lack of transparency and accountability, and lack of regulation by a supporting institution (e.g. local government).
- Failure by community members to contribute maintenance fees leads to disillusionment among committee members who abandon their roles. This may be due to a lack of legal status and authority of the water committee or lack of community cohesion.
- Communities have no contact with local government (or the implementing agency) and feel that they have abrogated responsibility for service provision; they therefore feel abandoned and become demotivated.
- Communities are too poor to replace major capital items when they break down.

Schweitzer and Mihelcic (2011), on their paper entitled '*Community Managed Rural Water Systems: What makes them Sustainable?*' communities using from younger and less shared water systems are more active than those using aged systems and abandoned support institutions. Generally for community management to be sustainable there should be ongoing support from an over-seeing institution to provide encouragement and motivation, monitoring, participatory planning, capacity building, and specialist technical assistance (Harvey and Reed (2007) and Schweitzer and Mihelcic (2011)).

2.4.Sustainability and Functionality of Rural Water Supply Schemes

2.4.1. Existing sustainability and functionality scenario

Rural water supply system sustainability and functionality are interrelated but different performance indicators of service delivery. Functionality is a simple snapshot view of whether or not water supply systems are working at the time of inspection. It cannot on its own tell us anything about the reasons for the particular state that the water point is in, or why it may be providing an adequate service, intermittent service or no service at all. Functionality data are of limited value, but they are often the best indications of inadequacies in sustainable service provision (Carter et al, 2010). While rural water supply scheme sustainability is whether or not facilities provide the designed level of service (water quantity and quality) continues over the designed time period (Abrams, 2013).

Sustainability of water supply schemes is whether benefits from the service continue satisfactorily until the end of the design life. Benefits include health benefits through providing improved quality of water from protected source, water delivery to reduce time spent and convenience (Mebrahtu, 2012). Sustainable rural water supply is defined as one in which the water sources are not over-exploited but naturally replenished, facilities are maintained in a functional state which also ensures a reliable and adequate water supply and

also benefits of the supply continue to be realized by all users over a prolonged period of time. Enabling rural water supply scheme to remain operational over the design period requires a number of complex and interrelated technical, social, environmental, financial and managerial issues upon which failure in meeting any of these can lead to failure of scheme (Abrams, 2013). The same source pointed out that "if the water flows, then all of the many elements which are required for sustainability must have been in place. There must have been money for recurring expenses and for the occasional repair, there must have been acceptance from the consumers of the service, the source supplying the service must have been adequate, the design must have been properly done, and there must have been sound construction."

According to Carter *et al* (2010), sustainability is about the inter-relationship of natural resources, physical assets and the services they provide; the people and organisations which use and manage them; and the rules and financial systems which facilitate effective management. Functionality on the other hand is about whether (and where degrees of service are possible, to what extent) a service is operating at a particular point in time. The partial functionality or non-functionality of a service may provide a trigger for more detailed investigations of sustainability (Carter et al, 2010).

2.4.2. Assessment of rural water supply scheme sustainability and functionality

2.4.2.1.Assessment of sustainability

Monitoring the sustainability of WASH service is complex and multi-dimensional as the term sustainability is linked with number of hardware and software factors. Due to this complexity, assessment of sustainability needs deep analysis and interpretation of those multi-dimensional indicators and possible sub-indicators. Researchers use sustainability factors identified by Len Abrams; technical, social, environmental, financial, and managerial

factors as indicators of sustainability. However, definitions of sub-indicators are not well consolidated and are more reliant on the researcher's objective and insight (Sharma, 2012, Muhumed, 2013 and Mebrahtu, 2012).

To achieve the desired benefits through the provision of sustainable WASH service, there must be well structured and consolidated WASH service sustainability assessment tool. This tool will support to track and better understand the underlying causes of poor sustainability. Aguaconsult with support from USAID and Rotary International developed Sustainability Index Tool (SIT); the objective of the tool is to enable an assessment of the likely sustainability of WASH interventions using a range of both quantitative and qualitative indicators. It is designed to assess the extent to which crucial sustainability criteria are being met across a range of indicators grouped under five main areas or factors: **institutional**, **management**, **financial**, **technical** and **environmental** (Lockwood, 2013).

According to Lockwood (2013) the tool expands the level of enquiry beyond only the physical condition of the water supply, sanitation or hygiene infrastructure to include district and national level aspects which can have a bearing on the continuity of services. The indicators in the tool are based on global best practice and the tool pilot testing experiences, but are also meant to be 'contextualised' to the country or region in question (Lockwood, 2013). The tool provides a step by step process guide for carrying out an assessment, including the modification of indicator questions to fit the reality of whichever country context is being investigated, as well as how to approach sampling of communities and households, preparing field teams and analysing the data (Lockwood, 2013). The tool produces sustainability scores for the different factors and can also present the information by type of intervention.

2.4.2.2 Assessment of functionality

Despite the fact that rural water supply scheme functionality is headache for sector actors and researches confirmed this, accurate and widely accepted indicators were not set so far. In most cases functionality of water supply facilities are roughly defined based on its status at the time of inspection without deep analysis of the level of service it can deliver. Issayas (1988) cited in Sharma (2012), the water supply system should be sufficient to meet the basic demands of communities in the project areas and water is consistently acceptable. There are four indicators of functioning of water supply facilities to manage the increased necessity of water use which are quality, quantity, reliability of water supply and convenience. However the functionality figure presented in Sharma (2012) is not measured accordingly. CARE, an international NGO, on its water point status assessment sheet defined functionality as 'if a water point has been providing service in past six months'-though other proxies have been used. According to SNV (2013), rural water supply schemes are defined as non-functional if they fail to meet the basic level of service based on national standards. Where the levels of service are determined using quantity, quality, reliability and accessibility as indicators and the worst score of these indicators define the service level.

In the first draft of framework for assessing and monitoring water service of Ghana hand pump functionality was assessed based on the stroke and leakage test (Adank, 2013). Stroke test results indicate whether or not a hand pump can be used to fill a 20 litre bucket within a certain number of strokes. For the leakage test, pumping is resumed after 5 minute rest period, after the stroke test. If water flows within 5 strokes, the hand pump passes the leakage test. In order to simplify the functionality assessment and minimize the number of tests, the revised monitoring framework suggests to only using the '5-stroke'test, whereby a hand pump is defined as:

- Functional when water starts flowing in 5 strokes or less
- partially functional when water starts flowing but after more than 5 strokes of the handle of the pump
- Non-functional when water does not start flowing at all.

Comparison was done between the ‘stroke and leakage’ and ‘5-stroke’ test. Based on the comparison most of hand pumps classified as ‘partially functional’, passing either the stroke or leakage test, are classified as fully functional in ‘5-stroke test’ where hand pumps that did not meet the leakage nor the stroke test are classified as partially functional though they do not pass the ‘5-stroke test’(Adank, 2013).

Adank (2013) suggested that determining hand pump functionality using ‘5-stroke test’ has the advantage of being simpler. The disadvantage of not considering the stroke test is that some facilities that are classified ‘functional’ are providing such small quantities, that they can hardly be considered providing a basic level of service.

CHAPTER THREE

3. METHODS AND MATERIALS

3.1.Description of the Study Area

The study was conducted in Farta woreda, located in South Gondar zone of the Amhara National Regional State, Ethiopia (Figure, 4). The woreda lies between $11^0$32' to $12^0$03' latitude and $37^0$31' to $38^0$43' longitude, with the altitude range of 1900 to 4035 meters above sea level (Astatkie *et al*., 2012). The topography of the woreda varies from place to place and significant difference in altitude can be observed even in a short distance. The total area of the woreda is estimated to be 1117.88 km^2 (111788 hectare). The mean maximum and minimum temperature of the woreda is 21^0c from February to May and 9.6^0c from June to January respectively while the mean annual temperature of the woreda is 15.5^0c (Astatkie *et al*., 2012). The rainfall pattern in the woreda is uni-modal. According to the meteorological report, the mean annual rainfall is 1570 mm (Astatkie *et al*., 2012). Rain usually starts in mid March, but the effective rainy season is from May to mid September with mean precipitation of 1950 mm (Astatkie *et al*., 2012). The estimated total population of Farta woreda was 232, 181 of these 225, 398 are rural residents (CSA, 2007). Agriculture contributes much to meet major objectives of farmers such as food supplies and cash needs in the woreda. The agriculture sector is characterized by its rain- fed and subsistence nature.

3.2.Rural Water Supply in Farta Woreda

3.2.1. Existing rural water supply situation

The functionality of rural water supply schemes in Farta woreda by the year 2011 was relatively less than the national average, 69.72% and 75.53% respectively (Table 4). NWI estimate found 43.67% access to rural water supply in 2011. According to Farta woreda water resources development office, it increases to 63.3% at the end of 2012.

Table 4: Rural water supply situation of Farta woreda for 2011 (MoWE, 2013)

Rural water supply indicators	Percentage (%)
Rural water access	43.67
Rural water usage	49.78
Rural water supply scheme functionality	69.72
Rural water access slippage	3.55
Rural water potential	92.87

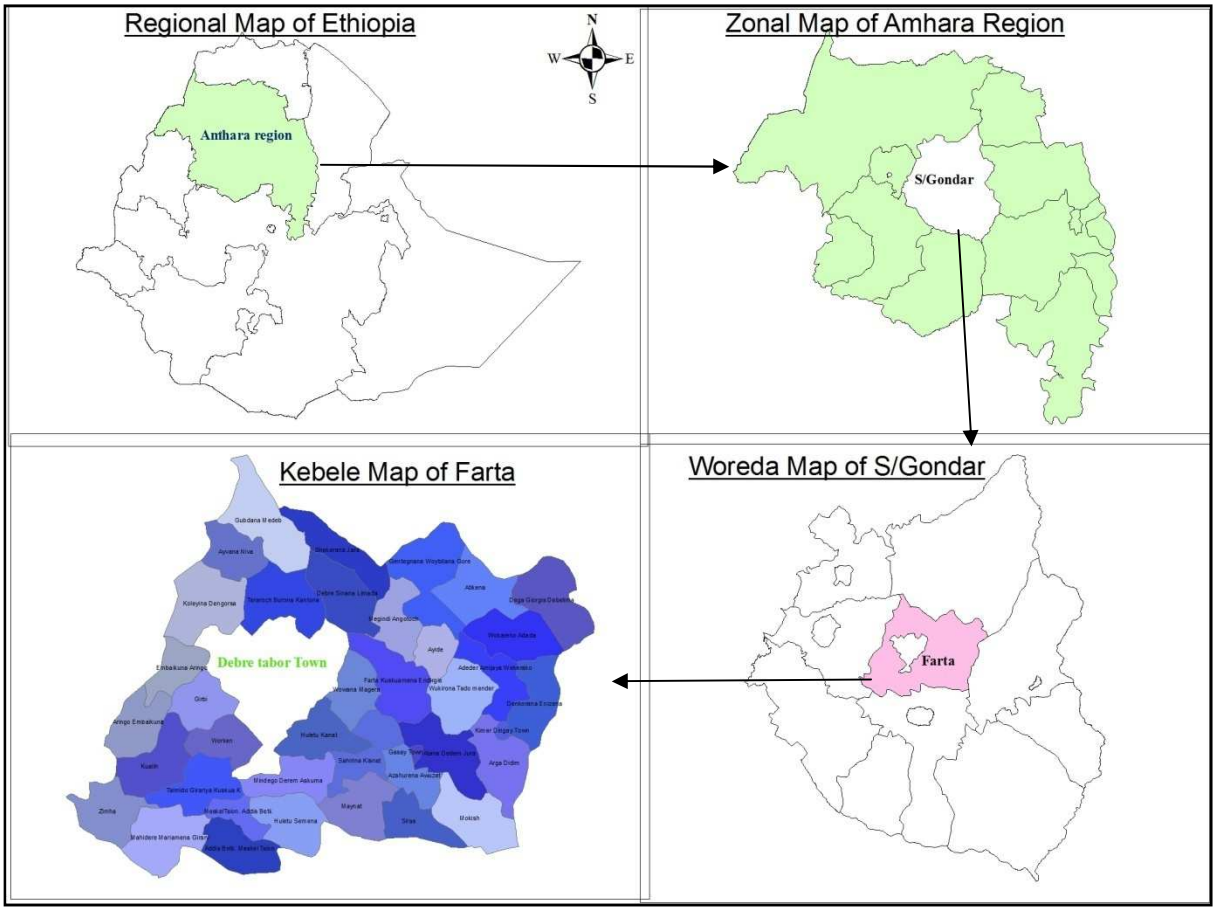

Figure 4: Location and map of Farta woreda divided by administrative kebeles

3.2.2. Major actors on rural water supply of Farta woreda

3.2.2.1.Rural Water Supply and Environmental Programme

Rural Water Supply and Environmental Programme (RWSEP) was a bilateral programme supported by the governments of Ethiopia and Finland. After it started to implement rural

water supply schemes in Amhara region since 1994, it passed through basic changes on its implementation approach to mobilize the community in four project phases. During those project phases the programme achieved better results on the decentralization of rural water supply and sanitation implementation. Basic activities done beyond implementation of water supply and sanitation facilities includes; capacity building at regional, zonal and woreda and community level (Phase I to III) and scaling up of CDF approach to CMP, which is currently one of the implementation modality in WIF (Phase IV).

Farta woreda was one of those implementation woredas of the RWSEP and is now one of the woredas of Community-Led Accelerated WaSH (COWASH) project (2011-2016) implementing the CMP approach. Until 2010/11 RWSEP supported the construction of more than 400 rural water supply schemes for the community and institutions (schools and health facilities). As can be seen in Table 5 below, in the woreda, rate of implementation of water supply schemes by RWSEP were increased after the introduction of CDF approach (since phase III).

Table 5: Rural water supply schemes constructed in Farta woreda to end of 2010/11

Users	Schemes constructed in RWSEP Project Phases				Total schemes constructed
	Phase I	Phase II	Phase III	Phase IV	
Community	59	31	102	182	374
School	0	13	5	9	27
Health institutions	0	3	0	4	7
Total	59	47	107	195	408

According to Kebede (2010), more than 90 percent of rural water supply schemes constructed under CDF (current CMP) approach in the woreda were functional while the functionality rate was only 77.7 percent for water supply schemes constructed under non CDF approach.

Sharma (2012) found out that the functionality of rural water supply schemes constructed using CMP approach was more than 98 percent where total functionality rate in the woreda was 84 percent.

According to Yohannes and Tilahun (COWASH, 2012), CMP approach reach the most deprived community at the grassroots level and ensure high level of community participation that in turn ensure sustainability. They recommended all projects in water supply and sanitation, if constructed using CMP approach they will be sustainable and communities would be empowered to their own scheme and contribute to accomplish the national WASH targets. Currently, CMP is mainstreamed into the national WASH strategy (WIF, 2011). CMP has effective rate of implementation and budget utilization (COWASH, 2013). MoWE called development partners to gear financial resources through CMP approach so that the national WASH targets could be achieved in the GTP period.

3.2.2.2.CARE Ethiopia North Program

CARE Ethiopia, an international nongovernmental organisation, working in different emergency and development programs to support the livelihood of the communities in which the project addresses. CARE works in emergency and development project in South Gondar since 2001 mainly focusing on implementation of rural water supply and sanitation projects. Like RWSEP, CARE implemented more water points in Farta woreda which improved sustainable access to safe water, hygiene and sanitation for poor children, women and men. Decreasing the prevalence of water and sanitation related diseases increasing time available for economic development, education, etc. Promoting integrated water (resources) management at the local level with a focus on maintaining the quantity and quality of drinking water; developing an efficient, effective and replicable partnership model for service delivery and advocacy and creating capacity at grassroots level (in the community) are the core of this intervention.

Though CARE used NGO managed project implementation approach, there is high community mobilization (community participation and contribution) like the CMP approach used by RWSEP and later on COWASH. In both approaches, communities are responsible for post construction management. However, they have basic differences on some approaches:

- ✓ In CMP, communities are responsible for the procurement of construction materials, contract with artesian and mange and administer project finance. In addition, under CMP implementation, communities are required to contribute about Birr 1000 upfront for O&MM and at least 15 percent of the construction in the form of labour, material and cash.
- ✓ While in CARE, the procurement of all construction materials performed by the support organization and communities are not required for initial in-cash contribution. However, in CARE communities must provide local materials including sand which is not a must in CMP.

According to Kebede (2010), functionality rate of rural water supply schemes implemented under CMP approach are better than non CMP approaches (including CARE). Other research by Muhumed (2013) also support Kebede's finding. Despite research done by CMP researchers conclude that water supply schemes implemented by CMP approach has better functionality rate (COWASH, 2013), the findings lack methodological validity and no clear methodology how they assessed functionality. In most cases, researchers used functionality data from secondary sources collected by the woreda water resources development office. In case of Farta woreda, the water supply scheme status inventory has been done in collaboration with CARE project. However, the functionality rate calculated using the same inventory result varies between CMP researches and CARE significantly.

Based on Table 6, the rate of functionality of water supply schemes implemented by CARE is better than those implemented by RWSEP though they did not look at RWSEP before and after CMP. The difference in functionality rate reported by different researcher and project reports are due:

- ✓ Lack of methodological clarity on how to define and assess functionality
- ✓ Not using statistical methods for comparison
- ✓ Reliance on secondary data for assessing functionality of water points and
- ✓ Not considering age of water point when assessing functionality rate

In addition to the above listed factors the process used during water point status inventory is important. Basically, human resources used during the inventory determine the reliability of inventory results.

Table 6: Cross tabulation of implementing agency * scheme status (CARE, 2011)

Implementing agency	Status			Rate		
	Functional	Non functional	Under construction	Functional	Non functional	Under construction
CARE	324	88	9	77%	21%	2%
RWSEP	282	101	36	67%	24%	9%
Tana Beles	26	4	76	25%	4%	71%
Others *	13	17	5	37%	49%	14%
Total	645	210	126	66%	21%	13%

NB: * include: FHI (Family Health International), GoE (Government of Ethiopia), ORDA (Organization for Rehabilitation and Development of Amhara), GTZ (German Technology Corporation) and private

Farta woreda (Figure 4) was selected for the study due to the following basic point:

- ✓ RWSEP/COWASH implementing more water points using CMP approach
- ✓ CARE Ethiopia supported by donors implementing large number of water supply schemes for long period in the woreda

3.3.Research Designs

The nature of the research problems most often dictates the methodology of the study (Creswell, 2003). The research strategy chosen for this study is a cross sectional study so as to examine the level of service, users' satisfaction and various opportunities and challenges/determinant factors affecting functionality and service provision by functioning rural water supply schemes in the woreda. Here, the study commands methodological pluralism (i.e., combination of different data collection techniques). Focus Group Discussions and Key Informant Interviews were also held in order to augment and enhance the study. Such qualitative methods are helpful to find adequate information and to get individual, group and institutional views (Admassie, 2000).

3.4.The Research Instrument and Subjects

Different data collection instruments were used to get information required for the study purpose. Structured Questionnaires, Focus group discussion checklists, key informant interview guides, field observation checklists and other published and unpublished documents and audio-visual materials were used for the data collection.

The study subjects of this study were purposively selected. Local communities using the functional improved water supply schemes were sampled for participation on the household survey. Focus group discussions were held with Water Supply, Sanitation and Hygiene Committee (WASHCO) members of those water points visited. In addition, key informant interview was conducted with Farta woreda water supply coordinator, CMP representative at Farta woreda, Technical manager of CARE project North programme and COWASH project regional team leader.

3.5.Sampling Method

3.5.1. Selection of water points

Selection of samples is decisive to arrive at reliable conclusions and to provide workable recommendations. The purpose of this study was to evaluate the level of service rendered by functioning rural water supply schemes. To provide valid conclusions water supply schemes were selected by representative sampling technique.

3.5.2. Sample frame

According to Farta Woreda water resources development office, there are 1,002 public and institutional water points constructed by different WASH actors: RWSEP, CARE Ethiopia, Tana Beles Project, GoE and NGOs.

Sampling frame of functional community water points (constructed by CARE Ethiopia and RWSEP from 2003/04 to 2009/2010) was established. Only water supply schemes constructed by CARE Ethiopia and RWSEP/COWASH were considered for the study as these implementers are the major ones in the construction of water points in the woreda.

In all, 359 functional community water supply points were identified for the sample frame. Among these functional water supply schemes, 167 (124 hand dug wells, 43 on spot springs) and 192 (167 hand dug wells and 25 on spot springs) were constructed by CARE Ethiopia and RWSEP, respectively.

3.5.3. Sample size calculation

A two stage stratified sampling design was used for the study. The first stage is selection of Kebeles in the woreda and the second stage is drawing of water points constructed by the two implementers. A level of significance of 5% and margin of error of 10% were used for the computation of the sample size. A representative sample of water points was drawn from the frame of water points from CARE and RWSEP/COWASH together. The sample of water

points computed using the sample size computation formula (Schweitzer, 2009) indicated below was apportioned proportionately into CARE and RWSEP/COWASH so that comparison of results is possible among the two projects/institutions in the woreda.

It was not possible to take separate samples from the two categories of water points due to the shortage of resource and time allocated to execute the data collection.

The following maximum sample size formula was used to compute the sample of water points in the study area.

$$ss* = \frac{z^2 * (p) * (1 - p)}{c^2} \text{---------1}$$

$$ss = \frac{ss*}{(1 + \frac{ss* - 1}{pop})} \text{-------------2}$$

Where:

Z = Standardized normal deviate value at 5% level of significance ($Z_{0.05/2}$ = 1.96)

p = Percentage population picking a choice expressed as a decimal (p = 0.5)

C = Margin of error l expressed as a decimal (C = 0.1)

pop = Population (water points sample frame) from which sample of water points are to be drawn SS = Adjusted sample size to achieve determined confidence level and interval (for finite population)

SS*= Unadjusted sample size for a very large or unknown population

Accordingly, a sample of 76 water points was sampled for the study in the woreda. These water points were distributed among the two implementers: CARE (35) and

RWSEP/COWASH (41) water points (Annex A and B). The sample of water points under each implementer were further distributed over the technologies (hand dug well and spring development) under each implementer so that meaningful comparisons among the two low cost technologies in the two categories/implementers can be made (Annex D).

3.5.4. Kebele selection

Firstly, kebeles where the water points have been constructed were selected for the study in consultation with the woreda water resources development office and CARE Ethiopia liaison office at Debre Tabor town.

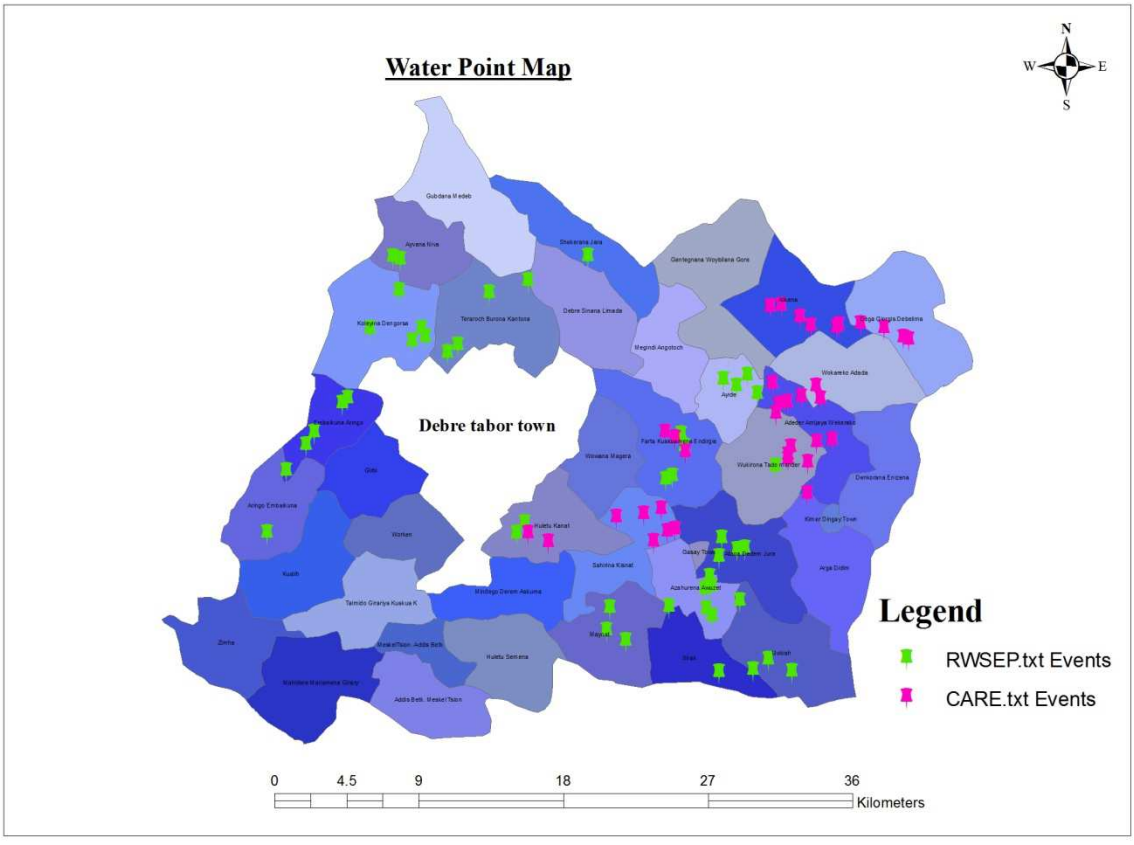

Figure 5: Map of water points visited in the woreda

Due to resources limitation, kebeles having more than ten water points were purposively selected. This increases the probability of visiting more water points per day. However, one of the implementation kebeles with more than ten water points (Gentegna kebele of CARE Ethiopia) was replaced by a kebele (Debelima) with 9 water points due to its inaccessibility

as road construction has been underway in the area. In addition, Kanat kebele, a model kebele in sanitation performance, and implementation kebeles of both programmes were visited. After the implementation kebeles were selected the sample water points under each sample kebele were selected using stratified random sampling. Water points in a given kebele were also stratified by their years of construction. The number and distribution of the water points constructed by each implementer in each kebele are indicated on the above figure (Figure 5).

3.5.5. Selection of households

The sample frame for household survey was user households of each sampled water points. Sample size computation formula was not applied as it results large sample size (not efficient in resource management). Gay and Diehl (1992) cited in Hill (1998), suggested 20% respondents for small population. Therefore 20 percent of user households from each water point were taken as sample. Since household number using a water point varies the sample number also varies from water point to water point. Totally 442 questionnaire were distributed and collected from user households of 83 water points visited.

3.6.Data Entry and Analysis

Once the relevant data were collected, the next step was analyzing it using different methods. The quantitative data collected from the sample households were coded, and processed using SPSS version 20. MS Excel and Word were used to analyze the qualitative data. Descriptive statistics (frequencies, percentages and means) were produced for the quantitative data depending on the nature of data collected about the water points and beneficiary households. Accordingly, report produced on the results of the study. The qualitative data collected through the key informant interviews, focus group discussions, and observations made were used to triangulate the findings of the quantitative survey of water points and beneficiary households. Some of the study findings are presented using pictures, diagrams, tables, and charts.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1.General Information about Respondents

Head of sampled households in each water point were used to answer the questions that assess different aspects of their water point. As female are more responsible and aware of water collection and usage of a family female household heads are preferred as possible.

Table 7: Sex, Educational Background, Source of Income and Family Size

Variables	Options	No of respondents	Percentage (%)
Sex of respondent (household head)	male	144	32.6
	female	298	67.4
	Total	442	100
Educational background	Illiterate	234	52.9
	Read and write	80	18.1
	Primary school	115	26
	Secondary school and above	13	3
	Total	442	100
Source of income	Farming	434	98.2
	Government employee	2	.5
	Daily labour	6	1.3
Family size	1 to 4	143	32.4
	5to 7	276	62.4
	8 and above	23	5.2
	Total	442	100

More than half of the sampled populations are illiterate (53%) who cannot read and write while only 3% had high school and above education (Table 7). As expected the main source of income of the population is farming (98.2%). Mixed farming system is common in the study area. The survey revealed that only 1.8% of the households are engaged on income sources other than agriculture (government employee and daily labour). Size of the family of households is one of the factors that determine the amount of water offered and number of

water points to be constructed. Based on the household survey, 62% of the sample households had between 5 to 7 family members per household. Only 5% of the households had 8 and above family members. The average family size per household was found 5.17 or approximately 6 individuals per head.

4.2.Participation to Inception and Scheme Management

4.2.1. Community participation at woreda level

Community participation is the major factor determining the sustainability of water supply points.

Table 8: Community participation from project inception to scheme management

Community participation	No of respondents		Percentage (%)	
	Yes	No	Yes	No
Inception	134	308	30.3	69.7
Planning	411	31	93.0	7.0
Construction	428	14	96.8	3.2
Scheme management(post construction management)	154	288	34.8	65.2
Average community participation	282	160	63.8	36.2

As indicated in Table 8 above, the community participation was higher at planning and construction stage. About 93% and 96.8% of the respondents participated in the planning and construction, respectively. The participation of the respondents in project inception and scheme management was low. Only 30.3% and 34.8% of the respondents participated in the project inception and scheme management, respectively. These imply that communities are more active in labour requiring activities and decision making than those activities requiring technical skills.

Figure 6: Community participation and contribution (Aringo Kebele)

4.2.2. Participation in RWSEP and CARE interventions

The household survey result presented on table 9 below shows that, in absolute terms, there is no significant difference in community mobilization between those projects having different implementation approaches. These is due to the fact that though officially CARE is using NGO managed project approach the reality on the ground is not different from community managed project approach. The major difference is in the channeling of funds for construction. In CARE, the project itself procure and supply all necessary fabricated construction materials whereas in RWSEP funds are transferred through microfinance institutions (Amhara credit and saving institution) and communities are responsible for the procurement of materials through their elected representatives (WASHCOs).

Lack of cohesion between beneficiary communities and water committee has been identified as important factor affecting community participation in CMP implementation kebeles. Because communities perceive that there are benefits gained for being a WASHCO member; thus sole responsibility during construction relies on WASHCO members. Based on focused group discussion with WASHCO members, they also accept it is their responsibility as they expect such benefits before the election process and in fact they feel got benefits.

Table 9: Community participation RWSEP and CARE implementation kebeles

Community participation		RWSEP implementation kebele		CARE implementation kebele	
		No respondents	Percentage (%)	No respondents	Percentage (%)
Inception	Yes	79	30.5	55	30.1
	No	180	69.5	128	69.9
	Total	259	100	183	100
Planning	Yes	237	91.5	174	95.1
	No	22	8.5	9	4.9
	Total	159	100	183	100
Construction	Yes	249	96.1	179	97.8
	No	10	3.9	4	2.2
	Total	159	100	183	100
Scheme management	Yes	95	36.7	59	32.2
	No	164	63.3	124	67.8
	Total	159	100	183	100
Average community participation	Yes	165	63.7	117	63.9
	No	94	36.3	66	36.1
	Total	259	100	183	100

4.3.Community Contribution during Water Point Construction

Contribution of local communities in kind or in cash for the construction of water supply schemes is necessarily important to create sense of ownership in the community.

4.3.1. Community contribution at woreda level

Local material and labour are cheap resources for rural community living in Farta woreda (Table 10). Nearly 97.0% of the respondents contributed in labour and local materials for the construction of water points around their locality. This is due to the approach followed by service providers to mobilize the community. However, the contribution of the community in-cash was relatively small (45%). While it was 97% for both local material supply and labour.

Table 10: Community contribution at woreda level

Contribution	No of respondents		Percentage (%)	
	Yes	No	Yes	No
Labour	429	13	97.1	2.9
Money (in cash)	200	242	45.2	54.8
Supplying local materials	429	13	97.1	2.9

4.3.2. Community contribution by implementers: RWSEP and CARE

In both projects, community contribution is believed as one of the important factors for sustainability of water points. Communities can easily afford labour and local material supplies. Contributions by labour and local materials are relatively the same for both projects constructed by the two implementers. However, community contribution in cash was found to be small in CARE implementation kebeles (10%) while it was 70% in RWSEP implementation kebeles. This is because of the fact that in community managed project approach; upfront cash contribution for O&M is a prerequisite for construction of a water point for the community. The main focus in CARE projects is the contribution by locally available materials. According to interviewee with CARE Ethiopia North programme technical manager, except fabricated all construction materials in CARE implementation kebele are expected to be supplied by beneficiaries.

Table 11: Community contribution RWSEP vurses CARE implementation kebeles

Contribution	RWSEP implementation kebeles				CARE implementation kebeles			
	No respondents		Percentage (%)		No respondents		Percentage (%)	
	Yes	No	Yes	No	Yes	No	Yes	No
Labour	249	10	96.1	3.9	180	3	98.4	1.6
Money/in cash	182	77	70.3	29.7	18	165	9.8	90.2
Local material	250	9	96.5	3.5	179	4	97.8	2.2

In most water supply schemes implemented by CMP (24 of 41) Annex M, up front contribution is covered by WASHCO members as they perceive that they will be benefited

from training day per dime and during procurement process. This issue was overlooked by facilitators (woreda water supply staffs) to accelerate implementation rate.

4.4.Functionality of Visited Water Supply Schemes

Though water supply schemes identified as functional during 2011 inventory of Farta woreda in collaboration with CARE Ethiopia North Programme were considered for the study 7.2% of total water points visited were found as non-functional. From WASHCOs focused group discussion, these water points were not providing service for the last two years on average.

Table 12: Functionality of water points visited

Status	No of water points	Percentage (%)
Functioning	77	92.8
Not functioning	6	7.2
Total	83	100

Definition used during the inventory was that water points that were functioning for the last six months were identified as functional. The result on the above Table 12 is based on the definition that water points are defined as functional if communities used the water from the water point for drinking purpose. Two HDWs (Guatlay and Terbgoden) from CMP implementation kebele can bear water but users abandoned not to use water from this point sources because of quality problem. The rest four (one from CMP and three from CARE) are SPDs. In the case of SPDs the pipe materials are not in place due to theft. In addition technical problems are beyond WASHCOs capacity regarding the failure of main pipe that connects the storage tank and distribution point in CARE implemented SPDs. Based on field observation and WASHCOs group discussion, placing distribution points separate from storage tank was found as factor to contribute for the failure of SPDs constructed by CARE. This is because of the difficulty of fencing of such schemes as it covers large area.

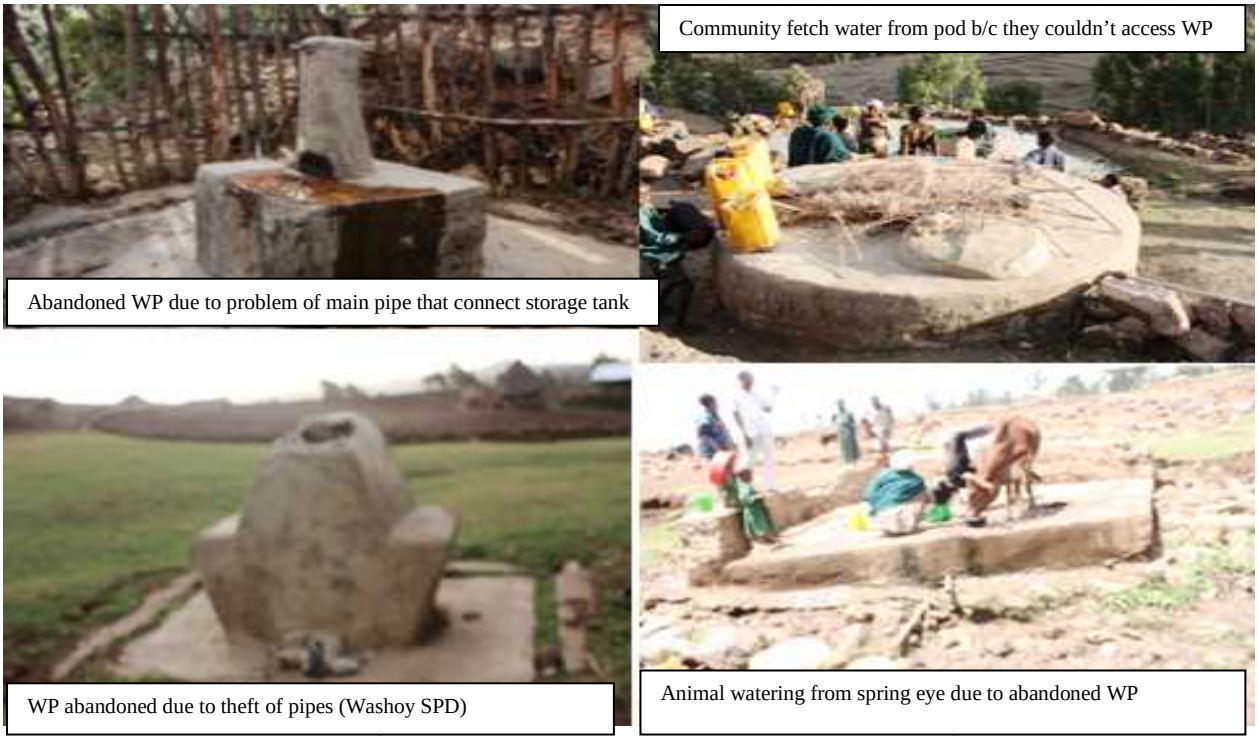

Figure 7: Abandoned spring developments

From the field visit HDWs are found more functional than SPDs. This is because of the fact that spare parts of HDWs are packed under the pump and are not exposed to external environment, while for SPDs though fast moving items are less; beneficiaries from this schemes experience frequent failure of faucets due to operational problem and it is also environmentally exposed. Beneficiaries of SPDs can access water even though faucets fail; for this reason WASHCOs do not take either appropriate maintenance or report on time to woreda water office. However, in case of hand dug wells if there is any system failure the water supply service interrupted. Therefore communities report to the woreda water resources development office for technical and spare part support as possible. In addition there is crowding as spring developments have higher yield.

4.5.Water Supply Service Level

The water supply service levels of rural water supply schemes were evaluated in accordance with national targets of quantity, quality, accessibility and reliability of water supply system.

4.5.1. Water usage

Amount of water beneficiaries can collect from improved sources is one of the factors to achieve targeted health benefits through provision of improved water supply sources. Daily water collection of sampled households in each day of a week was collected and summed up then average daily water collection per household was calculated as total water collected in a week divided by number of days per week. Figure 8, below shows the percentage distribution of beneficiary households with average amount of water collected per household per day.

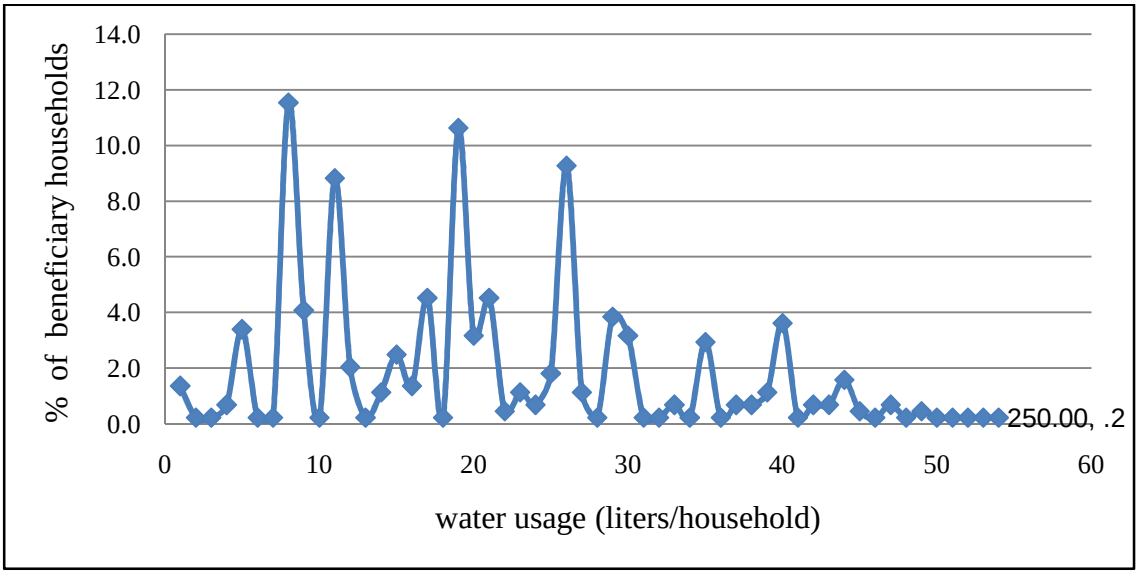

Figure 8: Percentage distribution household's daily water usage

Based on the household survey the mean average daily water collection from the water point per household is found to be 61.4 liters, while the daily average maximum and minimum is 250 and 21.43 liters respectively. The statistical analysis shows that 61% of households have average daily water usage below the mean (61.4 liters/household). Considering national estimate of 5 individuals per household only 24% of households met the national target of 75 liters per household.

Further computation was done to see the per capita water usage from improved water supply sources. The average daily per capita water usage is calculated as the average daily water

collection per household divided by number of individuals in a household. The per capita water usage is presented in figure (Figure, 9) below.

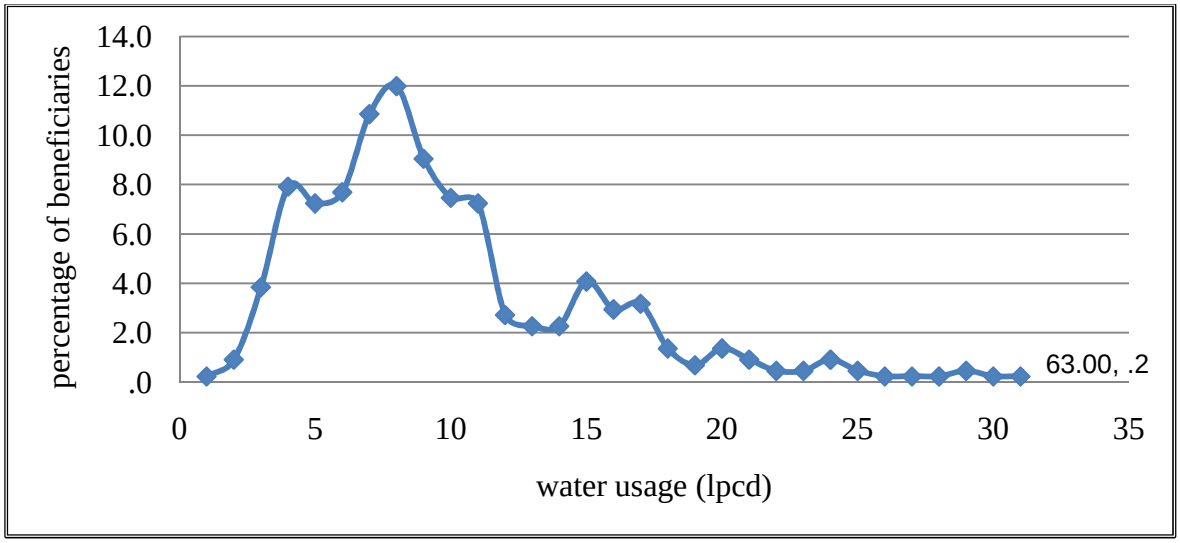

Figure 9: percentage distributions of average per capita water collection

The universal access plan targets to reach 15 lpcd of safe water supply for rural communities within 1.5 kilometer radius. Result from household survey show that the mean average per capital water collection from a water point was approximately 13 lpcd. The minimum and maximum per capital water collection was found 4 and 63 lpcd including additional water collection for animal watering and gardening. Only quarter (25.6%) of sampled beneficiaries had access to basic service level set by the UAP (15lpcd) regarding water quantity. This is nearly the same to percentage of household that met the minimum requirement at household level (24%). Little less than 3/4th (74.4%) of the beneficiaries did not meet the minimum basic service level. The first, second and third percentiles divides average per capita water usage at 9 lpcd, 11 lpcd and 15 lpcd respectively. The higher per capita water usage indicates households have been using water from the water point for additional purposes mostly cloth washing, animal in house watering and gardening (Table 13). From table 13 below, it is possible to say that, communities need water for other purposes beyond domestic water requirement like animal watering (16.7%), cloth washing (13.3%) and gardening (9.5%).

Table 13: Additional usage of water from the water point

Water use	No respondents		Percentage (%)	
	Yes	No	Yes	No
Cloth washing	59	383	13.3	86.7
Animal watering	74	368	16.7	83.3
Gardening	42	400	9.5	90.5
Small scale irrigation	4	438	0.9	99.1

Therefore during the designing water required for other purposes particularly animals must be considered unless alternative accessible sources are available. Though implementers inform users to apply the service level they need at the project inception (all key informant interviews) it did not become effective so far. The researcher experienced during his stay in the field that communities are not able to identify basic components of water requirement.

4.5.2. Water quality

Water quality test was not done due to time and resource limitation. According to the interview with COWASH regional team leader and CARE Ethiopia north programme technical manager there is no major chemical water quality problem in Amhara region.

4.5.2.1.Communities perception on water quality

Though the water quality analysis had not been done, assessment of community perception and sanitary inspection can say something about water quality (SNV, 2013). During the inspection of water points the physical water quality (taste, colour, odour, temperature and turbidity) of visited water points were found good except two water points (Guatlay and Terbgoden). Besides the inspection household survey were conducted on community's perception on the quality of water they fetch from the water point. It was found that about 21.5% of households encountered seasonal water quality problems (Table 14). Respondents

answered the water quality problem occurs most of the time in autumn and spring seasons due to surface water discharge and water shortage respectively.

Table 14: Community perception on the quality of water collected from the water point

Variables	Options	No respondents	Percentage
Is there water quality problem	Yes	95	21.5
	No	347	78.5
Type of water quality problem	Turbidity	72	75.79
	Temperature	1	1.05
	Colour	1	1.05
	Odour	15	15.79
	Taste	6	6.32
Season of water quality problem occur	Autumn	37	38.95
	Spring	37	38.95
	Summer	13	13.68
	Year round	5	5.26
Did the water quality problem reported to WASHCOs	Yes	95	100
	No	0	0
Causes of water quality problem	Site selection	5	5.26
	Toilet uphill of water point	3	3.16
	Water shortage	46	48.42
	Cracks	14	14.74
	No periodic disinfection	20	21.05

In addition communities complain that the water points are not periodically disinfected and cause odour problem. User of Kelati meda (ATA kebele) HDW water point complain that there is latrine uphill of the well. The researcher confirms this on scheme sanitary inspection. There is also water quality problem related to soil born insect/worm according to WASHCOs discussion in Mogesh and Amjaye kebele. Cracking of HDW head wall allows surface water to discharge the well which in turn affects water quality (Figure 10).

4.5.2.2.Scheme sanitary inspection

Regarding scheme sanitary inspection, five water points (4HDWs and a SPD) are found within ten meters from household latrine and near to latrines uphill of the well. In addition 15 water points (6HDWs and 9SPDs) are exposed to other sources of pollution (animals breading, cultivation and road). For more than half HDWs drainage channels are cracked and need cleaning. 17 HDWs found with cement slabs at the top of the well having less than two meter diameter (15 CARE and 2 RWSEP). While 26 HDWs (14 CARE and 12 RWSEP) have cracking problem of cement floor/ slab. Detail sanitary inspection results are depicted in the table below (Table 15 and 16).

Table 15: Hand dug wells sanitary inspection result

Sanitary issues	Frequency		Percentage (%)	
	Yes	No	Yes	No
Latrine within 10m of the well	4	63	6	94
Nearest latrine uphill of the well	4	63	6	94
Any pollution source within 10m of the well	6	61	9	91
Drainage absent or fault, allowing ponding within 3m of well	24	43	35.8	64.2
Drainage channel absent or cracked, broken or in need of cleaning	41	26	61.2	38.8
Cement slab less than 2m in diameter around the top of well	17	50	25.4	74.6
Spill water collect in the apron area	9	58	13.4	86.6
Cracks in the cement floor/slab	26	41	38.8	61.2
Hand pump loose at the point of attachment,	1	66	1.5	98.5
Well cover absent or unsanitary	1	67	1.5	98.5

In accordance with the interview with Farta woreda water supply coordinator, there is design variation among water supply schemes implemented by CARE and RWSEP. In case of, SPDs developed by RWSEP the distribution point is placed at the storage tank while it is separate

in SPDs developed by CARE. Though providing distribution point at the storage tank allows more faucets, the possibility of spilled water ponding is high. On the other hand placing distribution point separate from the storage tank avoids problems with spilled water ponding, but it provides only two faucets which possibly affect sufficient distribution. In addition it becomes difficult for fencing as it covers large area.

In case of HDWs, CARE used vertical deformed bar for cylinder production while in RWSEP cylinders are totally produced without vertical deformed bar. On the other hand CARE used only 4 to 4.5 quintals cement while it is 7 to 8 quintals in RWSEP. This is due to the approach followed by each project to be cost effective. According to Farta woreda water supply coordinator there is no problems detected due to such variations.

Table 16: Spring developments sanitary inspection result

Sanitary issues	Frequency		Percentage (%)	
	Yes	No	Yes	No
Collection/ spring box absent or fault	2	14	12.5	87.5
Masonry protecting the spring absent or fault	3	13	18.8	81.3
Backfill area behind the retaining wall absent or eroded	5	11	31.3	68.8
Spilled water flood the collection area	6	10	37.5	62.55
Fence absent or fault	8	8	50	50
Animals have access 10m of the spring	9	7	56.3	43.8
Latrine uphill and/or within 30m of the spring	1	15	6.3	93.8
Surface water collect uphill of the spring	6	10	37.5	62.5
Diversion ditch a above the spring absent or non functional	3	13	18.8	81.3
Other sources of pollution uphill of the spring	1	15	6.3	93.8
Outlet easy to access and operate for children and disabled	15	1	93.8	6.3
Provide convenient container placing	12	4	75.0	25
Sufficiently distributing the water (number of taps vs number of user)	13	3	81.3	18.8

Head wall of hand dug well cracked (Gedeminch (Aydie kebele) and Beregina (Embayko Kebele) HDW)

Figure 10: Cracked hand dug wells

4.5.3. Accessibility

Ensuring improved sources of water supply within a reasonable radius of collection from residence area result reduction of the time spent to collect water and allow females to participate in productive activities including education. In addition the amount of water used by household is affected by accessibility (WHO, 2011).

4.5.3.1.Time spent to collect water per capita per day

UAP targets 30 minutes round trip time to collect water from improved source for rural dwellers (WIF, 2011). Based on Statistical analysis users spent an average of 21 minutes per capita per day (mpcd) for round trip including time of queue, well below than the national target for rural water supply. Maximum and minimum time spent was 475(0.2%) mpcd and 1(4.3%) mpcd respectively. Nearly 80 percent (79%) of households meet the target set for time spent to collect water (30 minute round trip). Cutting points were found 5, 11 and 28 minutes for 25, 50 and 75 percentiles respectively (Figure 11). Based on field observation the increased in time spent to collect water is more related with time of queue due to water shortage. The times spent to collect water for additional use beyond domestic purpose also have significant effect on average time spent mpcd.

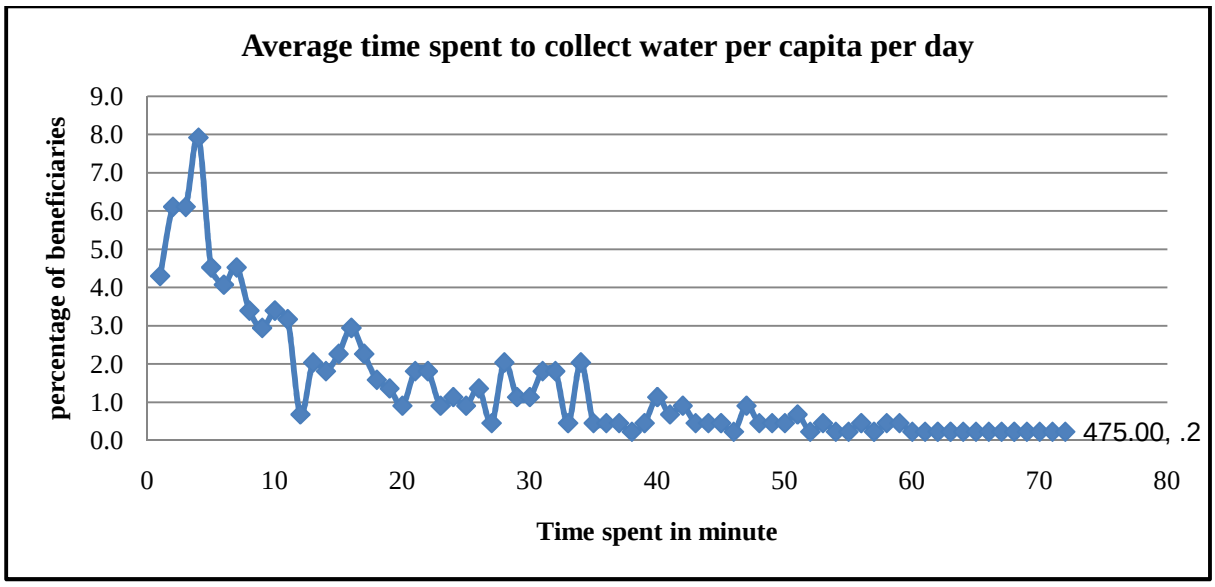

Figure 11: percentage distribution of average time spent to collect water per capita per day (round trip)

4.5.3.2.Number of households per water points

The trend line shows the number of households per water point was significantly decreased from 54 in 2003/2004 to 21 in 2009/2010 (Figure 12). Average number of households per water point was found to be 27.

Figure 12: Number of households per water point from 1996 to 2002 E.F.Y

Estimate by CARE Ethiopia North programme correspond with the above result. According to CARE (2011), mean number of individuals per water point decreased from 221 to 160 in

the same year. Therefore the national standard of 270 and 350 beneficiaries for hand dug wells and spring developments respectively (OWNP, 2013) were met.

4.5.3.3.Availability of service operator and users satisfaction

More than 87 percent of beneficiaries informed they have a person responsible for provision of water at the water point and open the water point two times a day (morning and afternoon) (Table 17).

Table 17: Availability of service operator and users satisfaction

	Options	No of respondents	Percentage
Availability of service operator responsible for water provision from the water point	Yes	386	87.3
	No	56	12.7
Daily frequency that service operator open the water point for the user	Once	56	12.7
	Two times	386	87.3
average duration of time that users can collect water once the water point is opened (morning or afternoon)	30 minutes	5	1.1
	One hour	13	2.9
	One hour and half	40	9
	Two hours	252	57
	Two hours and half	27	6.1
	Three hours	48	10.9
	Twenty four hours	56	12.7
users satisfaction on the service operator	Strongly not satisfied	5	1.1
	Not satisfied	1	0.2
	Fair	5	1.1
	Satisfied	4	0.9
	Strongly satisfied	427	96.6

Some water points do not have an operator because the water point is abandoned or yield of water point is low. In addition water points having higher yield (that exceed the household demand) mostly SPDs have not a service operator because beneficiaries feel there is no

problem in getting enough water. Hence beneficiaries can collect water for 24 hours. From the total sampled beneficiaries of visited water points having the service operator (87%) more than 96 percent are strongly satisfied.

Depending on the crowding, the type of water point and the season, beneficiaries can collect water from the water supply scheme from 1 hour to 24 hours a day. More than half of total surveyed populations (57%) collect water for 4 hours in a day (Table 17).

4.5.4. Service reliability

Water supply service reliability deals with the service provision in which beneficiary communities receive the designed service level without impairing of each indicator. According to SNV (2013), service reliability can be calculated as the number of months in a year the system serves the designed service level. For this study service reliability is measured using service interruption, water supply shortage and other proxies related with O&MM.

4.5.4.1.Service interruption

As indicated in the Table 18 below, nearly 40 percent of sampled beneficiaries answered there were service interruptions because of system failure (9.5%), drying of source (6.6%) or other reasons (23.5%). At the time of field visit most of HDWs were not working for two weeks and more because of accidental pump handle theft. Based on interviews with different beneficiaries the apex of pump handles are important for artificial silver jewelry. Besides the problem with pump handle, water service was interrupted due to lack of community cohesion. Some members of beneficiary households are willing to keep the water point during the night in rotation/shift and need to receive the service but part of beneficiary households do not agree. Thus pump attendants decide to interrupt the service until this

problem solved. Pump attendants take the pump head to their home since police men told pump attendants will be responsible if it is stolen.

Table 18: Water service interruption

Variables	Options	No respondents	Percentage
Service interruption since the water point commissioned to the users	Yes	175	39.6
	No	267	60.4
Average number of days in a year that the water supply service interrupted	Less than 30 days	122	69.71
	30 to 90 days	17	9.71
	90 to 180 days	14	8.00
	More than 180 days	22	12.57
Cause for water service interruption	System failure	42	24
	Drying of source	29	16.57
	Others	104	59.43

4.5.4.2.Water shortage

The construction of water supply schemes were at the driest period March to May when the ground water table is low and thus, the well is supposed to yield enough water throughout the year. However, 45.7% of beneficiaries of most HDWs face serious water shortage problem during those periods (Table 19). In these periods beneficiaries face problems like, shortage of water for cattle watering, limitation of domestic water consumption and travelling long distance to collect water from unimproved source, mostly a spring and/ or a river. 71.78 percent of beneficiaries having water shortage, access water from unimproved sources within 30 minutes round trip time (Table 19). This indicates that there are water potentials that can be possibly developed. As an intervention WASHCO members consulting with beneficiaries limit the amount of water to be offered for household during shortage.

As per the information obtained from WASHCOs group discussion lack of cohesion between user communities and WASHCOs in CMP implementation kebeles, water points were

completed before sufficient yield obtained. This indicates there is lack of appropriate supervision by overseeing institution basically woreda water supply staffs.

Table 19: Water shortage

Water shortage and its effect	Options	No of respondents	Percentage
Water shortage from the water point	Yes	202	45.7
	No	240	54.3
Season when shortage of water from the water supply point encountered	Spring	202	100
	Others	0	0
Problems community face during water shortage from the water point	Shortage of water for cattle watering	8	3.96
	Limit their consumption	95	47.03
	Travel long distance to collect water	17	8.42
	Forced to use unimproved sources	80	39.60
Alternative source of water supply during shortage of water from	Improved sources	5	2.48
	Unimproved wells	8	3.96
	Springs	139	68.81
	Rivers	50	24.75
Time spent for round trip to collect water from alternative sources	Less than 30 minutes	145	71.78
	More than 30 minutes	57	28.21

Interview with Farta woreda water supply coordinator, Technical manager of CARE project North programme and COWASH project regional team leader also confirm there are problems with supervisors who are responsible for supervision of sufficient well yield for targeted beneficiaries. The observation during the field work also showed that, staffs from the woreda water office were not fulfilling their responsibilities appropriately. The problem with supervision is rampant in CMP implementation kebeles. Close supervision by implementing agency minimise the risk in CARE implementation kebeles. From the experience of CARE technical manager they found empty well while 1.5meter water column was reported. Woreda

water supply staffs complain that the per dime rate given for woreda staff members by the government of Ethiopia and RWSEP/COWASH could not enable them to appropriately fulfill their duties.

Besides the problem with supervision, population forecasting has not been done. According to COWASH project regional team leader population forecasting has not been done for currently implemented technologies (hand dug wells and spring developments). On the other hand though the population forecasting has been done the population growth rate is over than expected (technical manager of CARE Ethiopia North programme). Regarding the design water depth in principle from 2 to 3meter water column should be stored in a well with diameter of 1.25 meter within 12hours to fit the pump (interview with COWASH project regional team leader and technical manager of CARE Ethiopia North programme). In reality, since there is decrease in crowding, hand pumps have been fitted if 1meter water column is stored in 1meter diameter well (Farta woreda water supply coordinator). However, the decrease in crowding is also associated with the sparse settlement situation in rural areas. But Farta woreda water supply coordinator mentioned it is important if 1.5 meter water column is stored. Significant amount of water loss from HDWs during stroke and appropriate picking factor for such losses was not considered during designing.

Effects of environmental degradation and climate change are also important (COWASH project regional team leader and technical manager of CARE Ethiopia North programme). WASHCO members informed in focused group discussions that water points were proving reliable service for the first 2 to 3 years after commissioned. But with time ground water table decreased which in turn affects the well yield and communities were forced to use unimproved sources for cooking and domestic hygiene and sanitation. Decrease in pump,

efficiency if fast moving items were not maintained on time, also decreases the yield of the well.

According to interview with CARE Ethiopia North programme technical manager, water shortage due to decrease in ground water table will be important factor until measurable impacts obtained from current watershed management activities. To improve problems of water shortage due seasonality, CARE, have been providing shallow wells equal distance to a number of HDWs.

4.5.4.3.Water tariff and community perception

Water supply schemes are easier to construct than maintain. To ensure a water supply scheme provides the appropriate service quality in a sustainable way, appropriate financial resources that support ongoing operation and maintenance activity must be set.

Table 20: Water tariff and community perception on the tariff level

Variables	Options	No of respondents	Percentage (%)
Water tariff set	Yes	156	35
	No	286	65
User pay for the water as per the tariff	Yes	156	100
	No	0	0
Payment system	Reactive	6	4
	Monthly	150	96
Amount paid per month	Up to 50 cents	97	62
	1 birr	45	29
	2 birr	9	6
	3 birr	5	3
User perception on the tariff	Very cheap	137	88
	Cheap	9	6
	Fair	5	3
	Expensive	5	3

Based on the household survey result (Table 20) only 35 percent of beneficiaries answered the water tariff is set and they are paying accordingly. From focused group discussion with WASHCOs even the water tariff collected is not totally meant for operation and maintenance but half of it is for the water guard (service provider). Of the total beneficiaries that pay for the water more than half (62%) pay 50 cents and nearly 30 percents (29%) pay 1 birr. 88 percent of users perceive that the water tariff is very cheap. This poor water tariff collection is related with multi dimensional factors.

4.5.4.4.Willingness and ability to pay

Table 21: Willingness to pay for operation and maintenance

Variables	Options	No of respondents	Percentage (%)
User perception on the service quality if the tariff level increase/if set	Increased	442	100
	Not increased	0	0
Willingness to pay if tariff increase/tariff set	Yes	442	100
	No	0	0

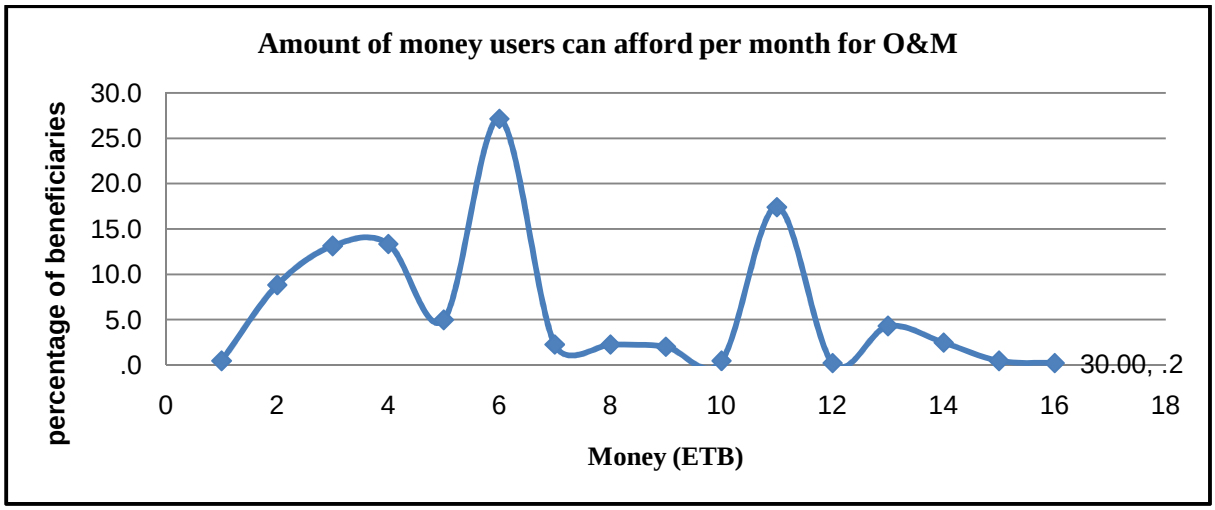

Figure 13: Ability to pay for operation and maintenance

All beneficiaries participated for the survey agreed that increase in tariff level/ setting water tariff will increase the service quality they get from the water supply scheme and are willing

to pay for the water tariff (Table 21). From the statistical analysis the average amount of money users can afford is 6 Ethiopian birr (70%) per month. While the maximum and minimum is 30 birr and 50 cent respectively (Figure 13). However, focused group discussion with WASHCO members, though communities are willing to pay for the water during the WASHCO meeting and interview with external body they are resistant as the WASHCOs tried to collect appropriately. This implies WASHCO members are not able to force the community to pay for the water as it will affect their social relationship. Communities using from CMP implemented water supply schemes complain that they would like to use up front contribution saved at WASHCOs ACSI account if any system failure occurs.

4.5.5. Summary of water supply service quality/level

The revised UAP sets the targets to reach 98 percent access to a potable water supply source yielding minimum 15 liters per person per day within 1,5 km radius from a single household for rural communities at the end of 2015 (WIF, 2011).

Table 22: Summary of water supply service quality/level

Indicators	Score (%)	
	Sub indicators (%)	Indicator (%)
1. Quantity		**25.6**
2. Quality (community perception)		**78.5**
3. Accessibility		**91.87**
3.1.Time spent to collect water	79	
3.2.Crowding	100	
3.3.Availability of service operator and users satisfaction	96.6	
4. Reliability		**57.35**
4.1.Water service interruption	60.4	
4.2.Water shortage	54.3	
Average score of water supply service quality		**63.33**

The average water supply service quality rendered by functioning rural water supply schemes is depicted in the Table 22 above. Based on researchers experience on the field, the target access to improved water source within 1, 5 km is achieved. Result from assessment of water usage in rural communities show that only 1/4th of rural communities met the minimum basic quantity of water set by the UAP. The average water supply service quality is 63.33 percent, considering all four basic indicators (Table 22).

4.5.6. Comparative analysis of water supply service quality

Both projects considered for this research highly mobilize the local communities in the construction of rural water supply schemes.

Table 23: Water supply service quality: CARE and RWSEP implemented water points

Indicators	**CARE**	**RWSEP(CMP)**
Quantity	**28%**	**24%**
Maximum	46 lpcd	63 lpcd
Minimum	5 lpcd	4 lpcd
Mean	13.5 lpcd	12.5 lpcd
Quality	**75.8%**	**81%**
Accessibility	**91.05**	**86.4%**
Time spent to collect water(mpcd)	85%	75%
Maximum	149mpcd	475mpcd
Minimum	1mpcd	1mpcd
Mean	17.5mpcd	23mpcd
Availability of service provider and users satisfaction	97.1%	97.8%
Reliability	**56.45%**	**57.95%**
Water supply shortage	52.2%	55.7%
Water supply service interruption	60.7%	60.2%
Average water supply service quality	**62.83%**	**62.34**

lpcd=liters per capita per day, mpcd=minutes per capita per day

Analysis of data collected from beneficiary households of visited water points, found that there is no significant difference in average water supply service quality between CARE

(NGO managed project) and RWSEP (community managed project) implementation kebeles (Table 23). However, beneficiaries in CARE implemented water points have better average water usage (13.5 lpcd) than RWSEP (12.5 lpcd). Increase in average water usage in CARE implemented water points are attributed from the close supervision of implementer particularly during planning and construction processes. Besides close supervision of implementer, woreda water supply staffs are more interested in activities provided by CARE as they receive better per dime rate when supervising the works in the field.

4.6.Accountability and Transparency of Water Committee

Community management is the prevalent model for operation and maintenance of rural water supply schemes in Farta woreda. Therefore community cohesion within the community and with WASHCOs is important to be effective.

Table 24: Accountability and transparency of water committee

Variables	Options	No of respondents	Percentage
Communities participate on WASHCOs meeting	Yes	296	67.0
	No	146	33.0
WASHCOs report an audit report and other accomplishments to user communities	Yes	159	36.0
	No	283	64.0
Users perception about the responsiveness of WASHCOs in accomplishing their duties	Very poor	70	16.0
	Poor	180	41.0
	Fair	80	18.0
	Good	110	25.0
	Very good	1	0.2
Any incentive(in kind or in cash) given to WASHCOs for their time spent as water committee	Yes	0	0
	No	442	100

Nearly 67 percent of beneficiaries participate when there is a WASHCO meeting. Communities complain that WASHCO members are not transparent (64%). In addition only

25 percent of households participated in the survey perceived that WASHCOs are accomplishing their duties (Table 24).

In both RWSEP/COWASH and CARE implementation kebeles, communities are responsible for O&MM. In accordance with focused group discussion with WAHCOs in visited water points, WASHCO members elected by beneficiary communities based on; trust by the community, level of education, active initiation in social activities and gender. WASHCO members are composed of chair person, secretary, store keeper, supervisor and hygiene and sanitation supervisor. In CARE implementation kebele, there are 7 WASHCO members including 2 pump attendants or care takers and on average 4 are males and 3 females. While in RWSEP/COWASH, WASHCO members are 5 on average 3 are males and 2 females and 1 pump attendants or care takers either from WASHCO members or from the community. Including pump attendants or care takers as WASHCO member in CARE implementation kebele enable them to work in coordination with WAHCO members and there is no separation of responsibilities.

WASHCO members received training from 3 to 5 day on average. In RWSEP/COWASH the training includes artesian supervision during construction as they are responsible for all processes including procurement. Pump attendants or care takers need refreshment training as they forgot more technical skills learned with time. Especially, in RWSEP/COWASH project since there is only one pump attendant or care taker per water point.

Based on focused group discussion, shifting of WASHCO members to newly build water supply schemes near to their locality is found. Beneficiaries are not replacing those because there is no one willing take responsibility as they feel previous members got benefits in training.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1.Conclusion

In this study, the water supply service quality rendered by functioning rural water supply schemes in Farta woreda has been evaluated using water quantity, quality, and accessibility and reliability indicators. Further comparisons were made on water supply service quality provided by rural water supply schemes in different implementation approaches. Determinant factors affecting the functionality and level of service were identified.

Generally, community managed project approach achieved substantial results in community participation, creating sense of ownership and women empowerment. Communities contribute up front contribution. All communities using water points implemented by CMP approach saved more than 530ETB in ACSI WASHCOs account. At least 2 of 5 WASHCO members in CMP approach are females. In CMP approach funds are channeled directly to the community through ACSI. Though it is tried to build more capacity among WASHCOs, strength sense of ownership and facilitate implementation rate of rural water supply schemes the overall result targeted to be achieved through community procurement is negative. Due to beneficiary communities' loose trust on WASHCO members, greater responsibility to construct water supply scheme lies on WASHCO members. As a result WASHCOs complete the construction before sufficient yield is gained, and communities are experiencing water shortage problem during the driest season (mid March to mid May).

On the other hand CARE using NGO managed project approach also achieved good results in community participation, women empowerment and sense of ownership as communities contribute all necessary local material. On average 3 of 7 WASHCOs are women. WASHCO members are composed of 2 pump attendants or care takers, secretary, chair person, hygiene

and sanitation promoter, supervisor and store keeper. In accordance with the interview with technical manager of CARE, the project reached 40% in kind community contribution. Thought upfront contribution is not must in this approach; communities start to save upfront contribution by their willingness. Moreover, WASHCOs collect flat rate water tariff once and change it in to small business (sheep breeding, women association's sale sugar and other fabricated goods to beneficiary households and giving the income for loan with interest rate). CARE also trained two local artisans from each kebele and support pump attendants/or care takers in operation and maintenance. Close supervision of the communities and woreda water staffs by CARE staffs enable beneficiaries to access sufficient water relatively.

The evaluation of water supply service quality showed that though the improved water supply access coverage increases, the level of service obtained did not meet the national target. Based on the average score of four indicators water service quality was found 63.33%. Water usage in liters per person per day was found the worst to meet the national target (only 25.6% of beneficiaries met the standard). Although, water supply schemes are completed during the driest season owning the national target (access 15lpcd of potable water within 1.5km collection distance) there is water shortage time to time and WASHCOs are forced to restrict the quantity of water collected by households. Shortage of water during the spring season occurs due to:

- Poor monitoring and supervision of woreda staffs during construction,
- Design problem (water depth, population forecast and picking factor for water loss during stroke),
- Lack of community cohesion during construction (well digging),
- No consideration of other uses of water beyond domestic purpose,
- Lack of training about ongoing running costs,

- Provision of water points though it doesn’t yield sufficient water
- Decrease in pump efficiency
- Environmental degradation and climate change

Besides the above listed factors, absence of clear guide lines and regulation on operation and maintenance management affect communities’ willingness to take operation and maintenance activities by themselves. External support has been given for communities during scheme failure. However, there is no clear guideline that distinguishes to what extent of scheme failure that external support has been offered or should be covered by the community, beyond rough assumption of community responsible for minor maintenance. Though communities collect money for O&M in CARE implementation kebele, they used the saved money for other social celebrities as there water points do not encounter failure problem so far. As per discussions with WASHCOs they perceive that there is no reason to collect water tariff and enforce communities to pay if water supply systems are functioning well. Further WASHCOs feel that saving more money before system failure encounter will loosen their social relationship.

5.2.Recommendations

Based on the research finding the following recommendations are drawn to achieve rural water supply service quality set by the Universal Access Plan:

- At the designing stage of rural water supply schemes there should be appropriate population forecasting, consideration of water usage beyond domestic purpose and appropriate picking factor should be established for water losses during stroke in case of hand dug wells.
- During designing the probable number of youth in the beneficiary communities who will got marriage and establish house should be considered.
- For community management model to be effective, clear guidelines and regulations must be established on the extent of operation and maintenance activities that should be covered by beneficiary communities.
- Based on the experience from payment system in rural Ethiopian Orthodox Church followers for spiritual service and interview with beneficiaries, rural communities are more willing to contribute in kind than in cash. This is also reflected on the household survey result of community contribution during construction. Therefore considerations must be given to in kind payment system as alternative for water tariff collection. For example, WASHCOs can collect cash cereals from beneficiaries on annual basis.
- Though procurement of construction materials by WASHCOs improve sense of ownership and facilitate implementation rate, WASHCOs still need external support in the artesian contracting and procurement process from woreda water resources development office. Further it affects the sense of ownership and participation of beneficiary communities during construction. Therefore, appropriate measure should be taken on direct channeling of funds for the community.

- The intervention done by CARE through training of two local artisans in each kebele to support pump attendants or care takers in operation and maintenance management should be strengthen.
- To avoid domestic water supply shortage during the driest season CARE has been trying to provide a shallow well for some clustered hand dug wells so that communities can use the shallow well when hand dug wells dry. This should be adopted by other implementers in the woreda.
- Activities done by communities in CARE implementation kebeles to cover the operation and maintenance cost should be strengthened and scaled up.
- In CARE implementation kebele local communities are required to supply all construction materials (sand, gravel, paddle etc) except fabricated. Based on the interview with Farta woreda water supply coordinator communities collect poor quality construction materials which in turn affect the quality of construction. Therefore, appropriate supervision should be strengthened during construction.
- COWASH have annual budget for rehabilitation of rural water supply schemes. Such ongoing external supports beyond capacity building should be adopted by other implementers in the woreda.
- In case of CMP implementation kebeles, beneficiary households are required to open an account and save upfront contribution in ACSI for future operation and maintenance before water point construction. In most cases WASHCOs are not drawing from this account for minor maintenance, but communities feel that they were betrayed by WASHCOs and are not willing to pay for water tariff. To avoid these there should be annual reporting and auditing on the status of WASHCOs account for the user households.

- Private sector involvement looks still poor; though there are local artisans participated during construction. Artisans were complaining on the fee they received and there are problems with construction quality if they are building water points for the community where they are not belonging. Therefore considerations must be given on the artesian payment and controlling of construction quality.
- Spare part supply chain is one of the factors that determine the water point functionality. In the woreda there is no well stoked private or government spare part supplier. There are private owned construction material shops but they have not spare parts for water supply schemes due to the fact that the spare parts are not available alone on the market. Therefore government should work giving special attention on either option for spare part importing or means to fabricate by local metal industries like defense engineering.
- To be beneficiaries of researches and other monitoring programmes, agreed definitions of functionality and possible indicators for the assessment of rate of functionality should be developed at national level.
- As the per dime rate was found as motivating factor for woreda water resources development staffs in fulfilling their duties, All the projects and /or approaches in WASH improvement should use similar and reasonable per dime rate.
- There is shortage of human resources working on water supply in the woreda. Only 5 of total 13 staffs have educational background on water. Therefore considering this issue, the concerned body should recruit adequate staff members and answer questions with frequent staff turnover.
- WASHCO members, pump attendants and care takers need refreshment training as they have been forgetting technical skills and to keep them active. In addition

WASHCOs of visited water points recommend a sort of training should be given for the general community to convince the concept of paying for water.

- Focusing only on the accelerated implementation of the ambitious UAP through construction of new water supply schemes will put all efforts naught. Therefore due consideration should be given for monitoring of the service provision by water supply schemes already implemented.
- Number of water points implemented in a given area cannot tell about the level of water supply service being achieved. Water supply service needs to be measurable beyond plans and reports on its achievement. Therefore, further studies recommended to:
    - ✓ Evaluate communities economic characteristics and appropriate financing mechanisms for ongoing O&M with in a specific community,
    - ✓ Track possible factors that affect rural water supply schemes sustainability and functionality for a set of technology options and set basic and measurable indicators of sustainability-functionality and
    - ✓ Evaluate water supply service quality across various areas, approaches, technology options, and socio-cultural settings.
    - ✓ Compare water consumption, need and service criteria given by various organizations.

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Appendix

Annex A: Sample calculation of water points in CMP approach implementation kebeles

S.no	Kebele	HDW	SPD	Total	Calculated Sample	Actually Surveyed
1	Amjaye	2	0	2	0.00	0
2	Argedidm	1	4	5	0.00	0
3	Aringo	11	1	12	3.45	4
4	ATA	13	1	14	4.02	4
5	Awuzet	18	2	20	5.74	7
6	Aydie	14	2	16	4.59	5
7	Buro Kanton	9	1	10	2.87	4
8	Embayko	7	4	11	3.13	2
9	F/Kuskuam	11	2	13	3.72	4
10	Gasay	1	0	1	0.00	0
11	Girbi	9	0	9	0.00	0
12	Iyvaniva	11	0	11	3.17	3
13	K/Dingay	1	0	1	0.00	0
14	Kanat	5	0	5	0.00	2
15	Maynet	10	0	10	2.88	3
16	Medeb Gubida	1	0	1	0.00	0
17	Megendi	8	1	9	0.00	0
18	Moksh	8	4	12	3.42	4
19	Qualay Dangores	13	1	14	4.02	5
20	Workin	5	1	6	0.00	0
21	Wowa Megera	7	1	8	0.00	0
22	Wukro	2	0	2	0.00	1
	Total	167	25	192	41.00	48

Annex B: Sample Calculation of water points CARE implementation kebeles

S.no	Kebele	HDW	SPD	Total	Calculated Sample	Actually Surveyed
1	Addeder	6	1	7	0.00	0
2	Amjaye	13	5	18	8.51	9
3	Atikena	7	4	11	5.56	6
4	Debelima	9	0	9	0.00	4
5	Denquora	4	3	7	0.00	0
6	Deremo Askum	5	2	7	0.00	0
7	F/Kuskuam	9	1	10	4.05	3
8	G/Mechawocha	1	3	4	0.00	0
9	Gentegna	15	0	15	5.49	0
10	Jarashikra	4	1	5	0.00	0
11	Kanat	8	0	8	0.00	2
12	Limado	1	6	7	0.00	0
13	M/Mariam	2	3	5	0.00	0
14	M/ Tsion	0	4	4	0.00	0
15	Medeb Gubida	6	0	6	0.00	0
16	Qualha	2	6	8	0.00	0
17	Sahirna	14	1	15	5.88	6
18	Simina	3	0	3	0.00	0
19	Wukro	13	1	14	5.51	5
20	Zemiha	2	2	4	0.00	0
	Total	124	43	167	35.00	35

Annex C: Distribution of water point by years of construction

Years	1996	1997	1998	1999	2000	2001	2002	Total
Frequency	5	10	17	14	16	13	8	83
Percentage (%)	6	12	20	17	19	15	10	100

Annex D: Distribution of water point by implementer and type of technology

RWSEP		CARE	
Hand dug well	Spring developments	Hand dug well	Spring developments
39	9	28	7

Annex E: Questionnaire for Household Survey (users of water point)

General Objectives and Confidentiality:

The purpose of the study is to generate relevant information on level of service rendered by functioning water supply schemes. The research is conducted for partial fulfillment **MSc. Degree in Water Supply and Environmental Engineering, Addis Ababa University, Institute of Technology, Civil and Environmental Engineering Department.** It is expected that different rural water supply sectors, governmental and nongovernmental organizations, policy makers and other responsible bodies will make the finding of this study as background information to improve the conditions of the rural community with regard to safe, suitable and sustainable rural water supply schemes. The study is conducted only for academic purpose and be sure that the information you provide will only be used for this research. Your full support and willingness to respond to questions is very important for the success of the study. Therefore you are kindly requested to answer all questions and give reliable and complete information on the issues.

Identifications:

1. Name of interviewer_____
2. Date of interview_____
3. Name of kebele _____Village/Got _____
4. Questionnaire identification number_____

Background information:

1. Sex of the respondent: ☐Male ☐Female
2. Educational level: ☐Illiterate ☐First cycle (1-4 grade) ☐second cycle (5-8 grade) ☐High school complete ☐Preparatory ☐Diploma and above
3. What is your major occupation? ☐Farming ☐Government employee ☐daily labour ☐Petty trade ☐Specify, if other_____.
4. Any source of income additional to your major income_____
5. How many family members you have in your house including you_____.
6. What is your main source of water supply? ☐Hand dug well ☐protected Springs

Water service level/quality, users' satisfaction, participation and community commitment towards operation and maintenance cost:

1. Have you participated in the development of the water supply scheme? ☐Yes ☐No
2. If your answer for 'Q1' is 'Yes'

   2.1. At which development stage you have participated? Inception ☐Project inception ☐Planning ☐Construction ☐Post construction/scheme management

   2.2. What was your contribution for the provision of water supply scheme? ☐Labour ☐Money (in-cash) ☐Local material ☐Specify, if other_____.
3. If your answer for 'Q1' is 'No', what is your reason for not participating? ☐Not asked ☐Lack of awareness ☐Not lived here before ☐Everything done by implementing agency ☐Specify, if other_____.
4. How much water do you or your family collect on average each day in a week from the water point? Amount and time

Day / Material used for water collection		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Pots								
Jeri-cans in litter	5							
	10							
	15							
	20							
	30							
	35							
	40							
Total								

5. For what purpose do you use the water from the water supply scheme in addition to domestic uses? ☐Washing cloth ☐Animal watering ☐Gardening ☐Small scale irrigation ☐Specify, if other_____.
6. Was there any shortage of water from the water point you are collecting? ☐Yes ☐No
7. If your answer for 'Q6' is 'Yes',

   7.1. In which season was the shortage of water of the scheme mostly occur? _____.

   7.2. What problem was occurred due to shortage of water from the water point? _____.

   7.3. Where do you collect water for domestic consumption? _____.

   7.4. How long the alternative supply sources take? _____.

8. How far is the water point from your house?

   ☐ Below 500m ☐ 500 to 1000m ☐ 1000 to 1500m ☐ Beyond 1500m

9. Time you take for the round trip to collect water from the water point? minute____.
10. Average time you wait to get water from the water point? minute_____.
11. Is there a person responsible for service provision? ☐ Yes ☐ No
12. If your answer for 'Q11'is 'Yes',

    12.1.1. How many times a day the water point open for beneficiaries? _____.

    12.1.2. For How many hours beneficiaries collect once it is opened? _____.

    12.1.3. What is your satisfaction about the responsiveness of service operator?

    ☐ Strongly not satisfied ☐ not satisfied ☐ fair ☐ satisfied ☐ strongly satisfied

13. Do you think the water you are getting from the water point has quality problem?

    ☐ Yes ☐ No

14. If your answer for 'Q13' is 'Yes',

    14.1. What type of water quality problem you observed or tasted? _____.

    14.2. When was the problem started? _____.

    14.3. Have you told the problem to the WASHCOs? ☐ Yes ☐ No

    14.4. What do you think the reason for the problem? _____.

15. Has there been any service interruption from the water point? ☐ Yes ☐ No
16. If your answer for 'Q15' is 'Yes',

    16.1. How many days a year was the service interrupted? _____.

    16.2. What was the main reason for the service interruption? ☐ System failure

    ☐ Drying of the source ☐ Specify, if other_____.

17. Was tariff set for the water you collect from the water point? ☐ Yes ☐ No
18. If your answer for 'Q17' is 'Yes', do you pay for water you collect from the water supply point as per the tariff? ☐ Yes ☐ No
19. If your answer for 'Q18' is 'Yes',

    19.1. How do you pay for it? ☐ Reactive ☐ monthly tariff ☐ pay as you fetch

    19.2. If your answer is 'monthly tariff' or 'pay as you fetch', how much do you pay per month on average or per container you use to fetch?_____.

    19.3. What is your perception on the tariff level? ☐ Very cheap ☐ Cheap ☐ Fair ☐ Expensive ☐ Very expensive

19.4. Do you think increase in the tariff level or set water tariff, will increase the service level you gain from the water point? ☐ Yes ☐ No

19.5. If your answer for 'Q19.4' is 'Yes', are you willing to pay if the tariff increased or set? ☐ Yes ☐ No

19.5.1. If 'Yes' how much can you afford to pay_____?

19.5.2. If 'No', why_____?

19.6. If your answer for '19.4' is 'No', why_____?

20. If your answer for 'Q17' is 'No', why don't you pay? ☐ I can't afford
☐ Betray by WASHCOS ☐ No one responsible for collection
☐ The service is not continuous ☐ Specify, if other_____.
21. Was there any promotional activity regarding the use of clean and potable water, hygiene and sanitation? ☐ Yes ☐ No
22. Do you have regular meeting with water committee? ☐ Yes ☐ No
23. Do WASHCOs report an audit report on financial usage of the money collected from user fee and other activities accomplished? ☐ Yes ☐ No
24. Do you perceive that WASHCOs are discharging their duties appropriately? Yes No
25. If your answer for 'Q24' is 'No', what do you think is the reason they fail to fulfill their duties? _____.
26. Is there any incentive given for WASHCOs to compensate for their time spent as a water committee? If yes what is it_____?

Annex F: Household Questionnaire Translated in to Amharic Language

<u>በፋርጣ ወረዳ የሚገኙ የገጠር መጠጥ ዉሃ አዉተሮች የሚሰጡት የአገልግሎት ደረጃ ምዘና ውድ የጥናቱ ተሳታፊዎች፣ የዉሃ አዉታሩ ተጠቃሚዎች</u>

የዚህ መጠይቅ አላማ በወረዳዉ በአገልግሎት ላይ የሚገኙ የገጠር መጠጥ ዉሃ አዉታሮች የሚሰጡትን የአገልግሎት ደረጃ ምዘና ለማድረግ አስፈላጊ የሆነ መረጃ ለማግኘት ነዉ። የተለያዩ ሴክተር መስሪያ ቤቶች፣ መንግስታዊ እና መንግስታዊ ያልሆኑ ድርጂቶች፣ፖሊሲ ቀያሾች እና ሌሎች በኃላፊነት የሚገኙ አካላት በገጠሩ ማህብረተሰብ ያለዉን የመጠጥ ዉሃ አቅርቦት የሚገኝበትን ሁኔታ ከአገልግሎት ቀጣይነት እና ለመጠጥ ካለዉ ምቾት በመነሳት የጥናቱን ዉጤት የአቅርቦት ሁኔታዉን ለማሻሻል እንደ መነሻ ሊጠቀሙበት ይችላሉ። እርሰዎ የሚሰጡት መረጃ በአዲስ አበባ ዩኒቨርስቲ ሲቭል እና አካባቢ ምህንድስና ትምህርት ክፍል ስር የሁለተኛ ዲግሪ ማሟያቸውን ለሚሰሩት <u>ለአቶ መብት ምትኩ</u> እንደ ዋና ግብአት ሆኖ ያገለግላል። መረጃውም ለትምህርት አገልግሎት ብቻ የሚውል ሲሆን ለጥናቱ መሳካት ለሚያደርጉት ትብብር ከወዲሁ ከልብ አመሰግናለሁ።

i. መጠይቅ የሚያደርገዉ ሰዉ ስም_____.

ii. መጠይቅ የተደረገበት ቀን_____.

iii. የቀበሌ እና መንደር/ጎጥ ስም_____.

iv. የመጠይቅ ወረቀቱ መለያ ቁጥር_____.

I. አጠቃላይ ግለሰባዊ መረጃ

1. ፆታ፡ ☐ወንድ ☐ሴት
2. የትምህርት ደረጃ፡ ☐ያልተማረ ☐መፅሃፍ እና ማንበብ ☐ከ1ኛ እስከ 4ኛ
   ☐ከ5ኛ እስከ 8ኛ ☐ሁለተኛ ደረጃ ☐መሰናዶ
   ☐ዲፕሎማ እና ከዛ በላይ
3. እራሰዎን እና ቤተሰብዎን በምን ስራ ያስተዳድራሉ?
   ☐በግብርና ☐የመንግስት መስሪያቤት ☐የቀን ሰራተኛ
   ☐አነስተኛ ንግድ ☐ሌላ ካለ ይጥቀሱ_____.
4. ከዋናዉ የመተዳደሪያ ስራ በተጨማሪ የገቢ ምንጭ ካለዎት ይጥቀሱ_____.
5. እራሰዎን ጨምሮ በቤት ዉስጥ የሚኖሩ የቤተሰብ ብዛት ስንት ናቸዉ? _____.
6. ለቤት ዉስጥ ፍጆታ የሚጠቀሙበት የዉሃ ምንጭ ምንድን ነዉ?
   ☐እጅ ጉድጓድ ☐የጎለበተ ምንጭ

II. የአገልግሎት ደረጃ፣የተጠቃሚዎች እርካታ፣ተሳትፎ እና ተነሳሽነት

1. የዉሃ አዉታሩ ሲሰራ ከቤተሰበዎ አባል ዉስጥ የተሳተፉ ነበሩ? ☐ነበሩ ☐አልነበሩም
2. ለጥያቄ ቁጥር “1” የሰጡት መልስ “ነበሩ” ከሆነ፣

2.1. የትኛዉ የዉሃ ስራ ሂደት ላይ ነዉ የተሳተፉት? ከአንድ በላይ መመለስ ይቻላል

☐ሃሳብ በማምንጨት ☐የስራ ዕቅድ ላይ

☐የግንባታ ስራ ላይ ☐የዉሃ አዉታሩ አያያዝ

2.2. የመጠጥ ዉሃ አዉታሩ እንዲሰራ በምን ነበር ያገዙት? ከአንድ በላይ መመለስ ይቻላል

☐በጉልበት ☐በገንዘብ ☐በአካባቢዉ ያሉ የግንባታ ቁሳቁስ በማቅረብ

☐ሌላ ካለ ይጥቀሱ_____.

3. ለጥያቄ ቁጥር “1” የሰጡት መልስ “አልነበሩም” ከሆነ ለምንድን ነዉ ያልተሳተፉት?

☐አልተጠየቅኩም ☐የግንዛቤ እጥረት ☐ከዚህ በፊት እዚህ አልኖርም ነበር

☐እያንዳንዱ ነገር የተሰራዉ በአስፈጻሚ ኤጀንሲዉ ነዉ

☐ሌላ ምክንያት ካለዎት ይጥቀሱ_____.

4. በሳምንት ዉስጥ ከዉሃ አዉታሩ በአማካይ በእያንዳንዱ ቀን ምን ያህል ዉሃ ይቀዳሉ? ስንት ጊዜ ይመላለሳሉ?

ቀን		ሰኞ	ማክሰኞ	ረቡዕ	ሐሙስ	ዓርብ	ቅዳሜ	እሁድ
የዉሃ ዕቃ								
እንስራ								
ጀሪካን	10							
በሊትር	20							
	30							
	40							
ድምር								

5. ከዉሃ አዉታሩ የሚያገኙትን ዉሃ ከቤት ዉስጥ ፍጆታ በተጨማሪ ለምን አገልግሎት ይጠቀሙታል? ☐ልብስ ለማጠብ ☐ለከብቶች መጠጥ ☐ለጓሮ አትክልት ☐ለመስኖ
6. እየተጠቀሙበት ካለዉ የዉሃ አዉታር የዉሃ እጥረት ተከስቶ ያዉቃል?

☐ያዉቃል ☐አያዉቅም

7. ለጥያቄ ቁጥር “6” የሰጡት መልስ “ያዉቃል” ከሆነ፣

7.1. የዉሃ እጥረቱ ያስከተለዉ ችግር ካለ ችግሩ ምንድን ነዉ?_____.

7.2. ከዉሃ አዉታሩ የሚገኘዉ የዉሃ እጥረት የሚከሰተዉ በየትኛዉ ወቅት ነዉ?_____.

7.3. እጥረት በተከሰተበት ጊዜ ለቤት ዉስጥ ፍጆታ የሚጠቀሙት ከየት ነዉ?_____.

7.4. እጥረት ሲከሰት የሚጠቀሙበት የዉሃ ምንጭ በአማካይ ምን ያህል ጊዜ ይፈጃል?__.

8. የዉሃ አዉታሩ ከመኖሪያ ቤተዎ ምን ያህል ርቀት አለዉ? ☐ከ500ሜትር በታች

☐500ሜትር ☐1000ሜትር ☐1500ሜትር ☐ከ1500ሜትር በላይ

9. ከዉሃ አዉታሩ ዉሃ ቀድቶ ለመልስ በአማካይ ምን ያህል ጊዜ ይፈጅበዎታል?_____.

10. ከዉሃ አዉታሩ ተራ ለመጠበቅ የሚወስድበዎ ጊዜ በአማካይ ምን ያህል ነዉ?_____.

11. የዉሃ አገልግሎት ለመስጠት ኃላፊነት የወሰደ የጥበቃ ሰራተኛ አለ? ☐አለ ☐የለም

12. ለጥያቄ ቁጥር "11" የሰጡት መልስ "አለ" ከሆነ፣

12.1. የዉሃ አዉታሩ በቀን ስንት ጊዜ ለተጠቃሚዎች ይከፈታል?_____.

12.2. አንድ ጊዜ ሲከፈት ለስንት ሰዓት ይቆያል?_____.

12.3. የጥበቃ ሰራተኞችዉ የሚሰጧችሁ አገልግሎት ምን ያህል አረኪ ነዉ?

☐በጣም አያረካም ☐አያረካም ☐ምንም አይልም ☐ያረካል ☐በጣም ያረካል

13. እየተጠቀሙበት ያለዉ የመጠጥ ዉሃ አዉታር የዉሃ ጥራት ችግር አለበት ብለዉ ያስባሉ?

☐አለበት ☐የለበትም

14. ለጥያቄ ቁጥር "11" የሰጡት መልስ "አለበት" ከሆነ፣

14.1. ምን አይነት የጥራት ችግር ተመለከቱ ወይም አጣጣሙ?_____.

14.2. የዉሃ ጥራቱ ችግር የተከሰተዉ መቼ ነበር?_____.

14.3. ችግሩን ለዉሃ ኮሚቴዎች ነግረዋቸዉ ነበር?_____.

14.4. የዉሃ ጥራቱን ችግር ያመጣዉ ምን ይመስለዎታል?_____.

15. የዉሃ አዉታሩ አገልግሎት መስጠት ከጀመረ ጀምሮ የአገልግሎት መቋረጥ ተከስቶ ያዉቃል?

☐ያዉቃል ☐አያዉቅም

16. ለጥያቄ ቁጥር "15" የሰጡት መልስ "ያዉቃል" ከሆነ፣

16.1. አገልግሎቱ በአመት ለምን ያህል ቀን ተቋረጧል?_____.

16.2. ለመቋረጡ ምክንያቱ ምን ነበር? ከአንድ በላይ መልስ መስጠት ይቻላል።

☐የዉሃ አዉታሩ ብልሽት ☐የዉሃ ምንጩ መድረቅ

☐ሌላ ካለዎት ይጥቀሱ_____.

17. ከዉሃ አዉታሩ ለሚያገኙት የዉሃ አገልግሎት ክፍያ ተመን አለዉ?☐አለዉ ☐የለዉም

18. ለጥያቄ ቁጥር "17" የሰጡት መልስ "አለዉ" ከሆነ፣ ከዉሃ አዉታሩ ለሚያገኙት ዉሃ ክፍያ ይከፍላሉ? ☐እከፍላለሁ ☐አልከፍልም

19. ለጥያቄ ቁጥር “18” የሰጡት መልስ “እከፍላለሁ” ከሆነ፣

19.1. ክፍያውን እንዴት ይፈጽማሉ? ☐ብልሽት ሲያጋጥም ☐በወር ክፍያ ☐ስንቀዳ

19.2. መልሰዎ “ወራዊ ክፍያ” ወይም “ስንቀዳ” ከሆነ በአማካይ በወር ወይም በሚቀዱበት የዉሃ እቃ ስንት ይከፍላሉ?_____.

19.3. በክፍያዉ መጠን ያለዎት አስተያየት ምንድን ነዉ? ☐በጣም ርካሽ ነዉ

☐ርካሽ ነዉ ☐መጠነኛ ነዉ ☐ዉድ ነዉ ☐በጣም ዉድ ነዉ

19.4. ወራዊ የክፍያ መጠኑ ቢጨምር ከዉሃ አዉታሩ የሚያገኙትን የዉሃ አገልግሎት ደረጃ ይጨምረዋል ብለዉ ያስባሉ? ☐ይጨምረዋል ወይም ☐አይጨምረዉም

19.5. ለጥያቄ ቁጥር “19.4” የሰጡት መልስ “ይጨምረዋል” ከሆነ፣ የክፍያ ተመኑ ቢጨምር ለመክፈል ፍቃደኛ ነዎ?☐ነኝ ☐አይደለሁም

19.5.1. መልሰዎ “ነኝ” ከሆነ፣ ምን ያህል ይከፍላሉ?_____.

19.5.2. መልሰዎ “አይደለሁም” ከሆነ፣ ለምን?_____.

19.6. ለጥያቄ ቁጥር “19.4” የሰጡት መልስ “አይጨምረዉም” ከሆነ ለምን_____.

20. ለጥያቄ ቁጥር “17” የሰጡት መልስ “አልፈጽምም” ከሆነ፣ ለምንድን ነዉ ክፍያ የማይፈጽሙት?

☐አቅሜ ስለማይፈቅድ ☐ለመሰብሰብ ሃላፊነት የወሰደ ሰዉ ስለሌለ

☐በሙስና ስለሚጨበረበር ☐አገልግሎቱ ቀጣይነት የለዉም

☐ሌላ ምክንያት ካለዎት ይግለጹ_____.

21. ንፁህ እና ሊጠጣ የሚችል ዉሃ እንድትጠቀሙ፣ የጤና ጥበቃ ዘዴ እና የግል ንጽህና ጥበቃ ስልጠና ተሰጥቷችኋል? ☐ተሰጥቶናል ☐አልተሰጠንም

22. የዉሃ ኮሚቴዎች በሚጠሩት ስብሰባ ይሳተፋሉ? ☐እሳተፋለዉ ☐አልሳተፍም

23. የዉሃ ኮሚቴዎች አጠቃላይ የስራ ክንዉን እና የወጪ ገቢ ሪፖርት ለተጠቃሚዉ ማህበረሰብ ያቀርባሉ? ☐ያቀርባሉ ☐አያቀርቡም

24. የዉሃ ኮሚቴዉ ስራዉን በአግባቡ እየተወጣ ነዉ ብለዉ ያስባሉ? ☐ነዉ ☐አይደለም

25. ለ “ተቁ24” የሰጡት መልስ “አይደለም” ከሆነ፣ እንዳይወጣ ያደረገዉ ምክንያት ምን ይመስለዎታል? _____.

26. የዉሃ ኮሚቴዎች በኮሚቴነት በመስራት ለሚያባክኑት ጊዜ ከማህበረሰቡ የሚያገኙት ጥቅማ ጥቅም ይኖራል? ካለ ይጥቀሱ_____.

Annex G: Observations Check List (Hand dug wells)

1. Location: name of kebele_____ Name of the Village/Got_____.
2. Date of observation_____ Scheme type _____.
3. GPS reading: X- coordinates _____Y- coordinate _____Altitude _____.
4. Year of construction_____.
5. Other faculties available

   ☐ No additional facilities at all ☐ Animal troughs

   ☐ Washing stand ☐ Irrigation system

   ☐ Shower room ☐ Guard house

   ☐ Others, _____.
6. Scheme Sanitary Inspection

Sanitary Issues	Yes	No
Is there a latrine within 10 m of the well?		
Is the nearest latrine uphill of the well?		
Is there any source of other pollution within 10 m of the well (e.g. animal breeding, cultivation, roads, industry, etc)?		
Is the drainage absent or faulty, allowing ponding within 3 m of the well?		
Is the drainage channel absent or cracked, broken or in need of cleaning?		
Is the cement/slab less than 2 m in diameter around the top of the well?		
Does spilt water collect in the apron area?		
Are there cracks in the cement floor/slab?		
Is the hand pump loose at the point of attachment, or for rope-washer pump: is the pump cover missing?		
Is the well-cover absent or unsanitary?		

7. Out let of water point:

Outlet condition	Yes	No
Is it easy to access and operate for children and disabled?		
Does it provide convenient container placing?		
Is it sufficiently distributing the water (number of taps Vs no. of users?)		
Is queuing observed?		

8. Is catchments rehabilitation done? ☐ Yes ☐ No
9. Is there any detectable physical water quality parameter

   ☐ Turbidity ☐ Temperature ☐ Colour ☐ Odor ☐ Test

Annex H: Observations Check List (spring development on spot)

1. Location: name of kebele_____ Name of the Village/Got_____
2. Date of observation_____ Scheme type _____
3. GPS reading: X- coordinates _____Y- coordinate _____Altitude: _____.
4. Year of construction_____.
5. Other faculties available

   ☐ No additional facilities at all ☐ Animal troughs

   ☐ Washing stand ☐ Irrigation system

   ☐ Shower room ☐ Guard house

   ☐ Others, _____.
6. Scheme Sanitary Inspection

sanitary Issues	Yes	No
Is the collection/spring box absent or faulty?		
Is the masonry protecting the spring absent or faulty?		
Is the backfill area behind the retaining wall absent or eroded?		
Does spilled water flood the collection area?		
Is the fence absent or faulty?		
Can animals have access within 10 m of the spring?		
Is there a latrine uphill and/or within 30 m of the spring?		
Does surface water collect uphill of the spring		
Is the diversion ditch above the spring absent or non-functional?		
Are there any other sources of pollution uphill of the spring (e.g. solid waste)?		

7. Out let of water point:

Outlet condition	Yes	No
Is it easy to access and operate for children and disabled?		
Does it provide convenient container placing?		
Is it sufficiently distributing the water (number of taps Vs no. of users?)		
Is queuing observed?		

8. Is catchments rehabilitation done? ☐ Yes ☐ No
9. Is there any detectable physical water quality parameter

   ☐ Turbidity ☐ Temperature ☐ Colour ☐ Odor ☐ Test

Annex I: Interview Guide for Amhara region COWASH Team Leader

1. What are the main objectives of the regional COWASH office regarding to rural water supply?
2. What supports does the regional COWASH office provide for woredas in rural water supply provision?
    - ✓ Planning
    - ✓ Construction
    - ✓ Post construction
3. What are the basic features of community managed project approach (CMP) and how it matters with:-
    - ✓ Community contribution and sense of ownership
    - ✓ Construction quality
    - ✓ Service quality (quantity, quality, accessibility and reliability)
4. Is there any water point inventory done by your office? How frequent is it? What are the criteria's to define the status of a water point and what lessons are learned from the previous inventory?
5. What are the major factors affecting the planned rural water supply service quality and scheme sustainability identified by your office? What are the strategies your organization using to alleviate such problems and ensure rural water supply scheme sustainability?
6. How do you evaluate the functionality and sustainability of rural water supply schemes(spring development on spot and hand dug well)
7. How is the operation and maintenance of water points addressed in your approach? What kinds of training communities receive in order to maintain the water points?
8. How are the availability, accessibility and affordability of spare parts organized? What are the problems regarding to spar parts supply chain and what are inventories done by your office?
9. What do you suggest to improve the water supply service quality and sustainability in rural water supply in general and your implementation approach in particular

Annex J: Interview guide for NGOs

1. What are the main objectives of your organization regarding to rural water supply?
2. Which implementation approach/modality does your organization using for rural water supply provision? Is your implementation approach standardized? What are basic features?
3. What is your planned service quality for rural water supply?
    - ✓ Quantity
    - ✓ Quality

- ✓ Accessibility
- ✓ Reliability and how do you monitor it?

4. What are the institutional support given for rural communities/WASHCOs during
   - ✓ Project inception
   - ✓ Planning
   - ✓ Construction
   - ✓ After construction
5. Is there any water point inventory done by your organization? How frequent is it? And what are your criteria to define the status of a water point? Example what is your definition of functionality? What lessons learned from the previous inventory?
6. What are the major factors affecting planned rural water supply services quality and scheme sustainability identified by your organization? What are strategies your organization using to alleviate such problems and ensure rural water supply scheme sustainability?
7. How is the O&M of the water points addressed in your approach? What kind of capacity building do the communities receive in order to maintain the water points?
8. How is the availability and procurement of spare parts organized? What types of problems are related to the supply chains of spare parts?
9. What kind of suggestions do you have to improve the O&M of the water points?

Annex K: Focus Group Discussion for (WASHCOs)

Section 1: Respondents' identification

Name of the village/got _____Name of the water supply scheme_____

Type of the water supply scheme_____ Year of construction_____

Name of present members of WASHCos and/or caretaker and their respective positions

Water committee

- ✓ Composition, Legal recognition, Election process
- ✓ Gender participation
- ✓ Basic activities/responsibilities
- ✓ Issues related with accountability and transparency

Section 2 Water service quality

1. Quantity
2. Quality(any quality problem encountered your water point)
3. Accessibility(Crowding, distance, service provision time(frequency and duration))
4. Reliability(interruption, shortage and service continuity)
5. WASHCos intervention on water service problem

Section 3: operation and maintenance and Procurement of spare parts

6. Are there local artesian, pump attendants and care takers and guard?
7. How was the procurement of construction materials undertaken? Where were the materials procured from?
8. How often has the water point required maintenance? What kind of maintenance was required? How long did it take to maintain the water point during its last breakage?
9. How is the O&M taken care of? What kind of external support is required for the O&M? How would you run it all by yourselves?
10. What type of O&M related training has the WASHCos/caretaker received? How would you evaluate the training?
11. How is the procurement of spare parts undertaken? Where are the spare parts procured from? How would you evaluate the quality of the spare parts available in the market?

Section 4: Financial sustainability

12. What kind of knowledge does the community/caretaker have on the costs of different spare parts?
13. How much money is saved in the WASHCos account? How much do you pay per month on average? How do you see the adequacy of the saved money for purchasing necessary spare parts in case of break-downs?
14. Who is responsible for covering the costs of O&M? Why?
15. What kind of solutions would you suggest in order to lengthen the operational life time of the water point?

Annex L: Human resource of Farta woreda water resources and development office: water supply department

S.no	Job title	Sex	Level of education	Field of study
1	Coordinator	Male	BA. Degree	Economics
2	Water supply professional	Female	10+3	Water supply
3	Water supply professional	Female	10+3	Water supply
4	Water supply professional	Female	10+3	Water supply
5	Mechanic	Male	10+3	Electro-mechanic
6	Electrician	Male	10+3	Electro-mechanic
7	Hand pump attendant	Male	10+3	Crop production
8	Tap worker	Male	10+3	Purchasing
9	Tap worker	Male	10+3	Paint and design
10	Water engineer	Male	BSc. Degree	Water resources and irrigation management
11	Water engineer	Male	BSc. Degree	Water resources and irrigation management
12	Pump attendant	Female	10+3	Electro-mechanic

Annex M: Average per capita per day (lpcd) * Up front contribution for operation and maintenance Cross tabulation