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## Challenge of Water Supply and its Impact on Service Delivery in Debre Tabor Town; The Case of Kebele 01

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### Abstract

The availability of adequate and safe water is very important for the development of each nation. However the rapid growth in urbanization is highly increasing population number have generally affect water occurred with cut corresponding expansion of when utilized water in developing countries including Ethiopia. The general objective of the study is to assess the challenge of water supply and its impact on service delivery in Kebele 01 of Debre Tabor town. The target populations of the study were 8429. By considering time and money the study took total sample size of 69 of household heads from the total of 8429. For collecting necessary information interview and questionnaire were employed. The information obtained from respondents was analyzed by employing some statistical technique such as: table, percentage, graph and charts. According to the study the major obstacles for water supply is shortage of water resource and design problem of pipe network, high population density, lack of skilled man power, shortage of finance, management problem, and shortage of water tanker. Finally, the study suggest a recommendation to the concerned body to ensure sustainable water supply provision; the water supply and development office must fulfill skilled man power, using alternative source of water power, primate active participation of stakeholder and develop human resource.

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### Keywords

Water supply, water supply service, water quantity, water quality, Sanitation.

### Introduction

Water supply is a vital natural resource which is essential for a multiple purpose. It has many use includes, drinking and other domestic uses, industrial cooling, power generation, agriculture (irrigation), transportation, and waste disposal [4]. It is the most important natural resource and is a vital for all life on earths. The well-being and development of our society is dependent on the availability of water. This most precious resource is some time scarce some time abundant and is always very un evenly distributed both in space and time [9]. It covers 71% of the earth surface water supply in urban

centers is again one of the crucial for the economic as well as social welfare development for both developed and developing countries in the world. 884 million people in the world do not have access to improved sources for drinking water. While access in rural area is usually significantly lower than in urban area, the increase in the use of improved drinking water sources is barely keeping up with the urban population growth [14]. The actual water supply coverage in town of developing countries in African town is particularly is very low while compared to demand [13]. This is also true for Ethiopia. Access to safe potable water in the year 2000 for urban area was 72% and if Addis Ababa is excluded

the figure become much worse, 38% [3] Ethiopia has long been characterized by limited access water supply and sanitation. Water is an environmental factor that is essential for most processes in the environment and also indispensable to human development and well-being. All most all millennium development goals (MDG) is used by united nation are directly connected to water as a source. Enough water supplies are essential to human and other life form even though it provides organic nutrient. Access to water supply has improved over the decades in almost every part of the world. But approximately one billion people lack safe water. The significance of water to human and other biological system cannot be over emphasized and there are numerous scientific and economic facts that water shortage or its pollution can cause several diseases, in productivity and death of living species [8].

Access to safe drinking water supplies and sanitation services in Ethiopia are among the lowest in Sub-Saharan Africa. Access to safe potable water for urban areas was 91.5 per cent, while the access to potable water in rural Ethiopia is about 68.5% (within 1.5 km) in the year 2010. Systems are however frequently broken and not functioning with poor arrangements for maintenance and repair. Access to sanitation facilities is reported to be 56%. Despite this high figure for sanitation in the country, latrines are virtually non-existent in rural communities with defecation taking place in fields, bushes or along drainage ditches. Hand washing practice is reported as 7% and open defecation is about 15%. Poor hygiene practices continue to cause illness contributing to poverty in rural areas. Water and sanitation-related diarrheal disease is among the top three causes of all deaths in Ethiopia, and Amhara region is one of the regions that have faced this life threatening challenge for many years [11]

## **Objective of the study**

### **General objective**

The main objective of the study was to assess the challenges of water supply and its impact on services delivery in Debre Tabor Town in case of Keble 01.

### **Specific objective**

The specific objectives were:-

To examine the existing water supply situation in the study area

To assess the factor that affect water supply in the study area

To assess the impact of shortage of water supply on health problem

### **Research question**

Based on the specific objective of this study the following question were prepared.

What is the existing of water supply and services delivery of the study area?

What are the factor that affects water supply and in the study area?

What are the impacts of shortage of water supply on health problem?

## **Description of the study area**

### **Location**

The study area is found in the administrative boundary of Debre tabor town, south Gondar zone, Amhara regional state, Ethiopia.

The relative location of the study area lies at east of hiruy Abaregay kebele, south of Selamiko kebele, southwest of kebele02 and northwest of kebele03 and north of Eyesus kebele. Whereas its absolute location lies at 11° 50'40" to 11° 52'0" N latitude and 38° 0'40" E longitude.

### **Topography**

The topographic nature of the study area would be characterized by ups and downs of the land scope, when compare to other "kebele" in the town, it is promenade land features in the way of corrugate and undulating and characteristics of terrain surface[7].

### **Climate and vegetation**

In the study area the climate is under warm and temperature climate / locally named woyina degas / climatic zone of Ethiopia. The town is significant amount of rain fall during the summer season. The temperature is 15°C and amount of rain fall is 1553.7 millimeters per. The type of vegetation in the study area is dominated by large tree [1].

**Social Economic Condition of the Study Area**

In the study area different economic activities is under taken. These activities are land craft, trade and governmental workers.

Among these economic activities the majorities of the societies is engaged in trade activities from the town on economic activities are very important from the town in order to survive their life and bring socio economic development [2]

**Population**

The total populations of kebele 01 were 27,817 among this 13,997 and 13,820 males and females respectively. And the total households of the study area are 8,429. Among these 4,185 is man, while the remaining 4,241 women [6].

**Research Metrology**

**Research Design**

In order to undertake this study the study used a mixed research design approach. There for the nature of data which was used were both qualitative and quantitative types of data. Qualitative types of data were used to gather detail information through interview and observation. But quantitative data were collected through the use of questionnaires.

**Sampling Technique**

The sampling technique used to this study was used simple random sampling techniques. The use of simple random sampling techniques was the populations have equal chance of being including in sample to each population.

The purpose of this study “kebele01” water supply and services select purposively from Debre Tabor Town of South Gondar administrative zone. The reason why the study selects the kebele is in this “kebele” there is shortage of water supply and services as compared to other kebele.

**Sampling Size**

For this particular study, the study purposely selects kebele01 as the study area from the existing various kebele in Debre tabor town. There were 8429 household

from those 69 respondents as a sample size by simple random sampling from the total household by using the formula [5].

$$n = \frac{N}{1 + N(e)^2}$$

where n = sample size

N = total household

e = level of precision (0.15) = 85% confidential level

l = constant

$$n = \frac{8429}{1 + 8429(0.12)^2}$$

$$= \frac{8429}{1 + 8429(0.0144)} (= 1 + 121.3776)$$

$$= \frac{8429}{122.3776} = 68.89 \approx 69$$

The study was selected a sample by using simple random sampling, so the sample size was 69 household.

**Data Sources and Method of Data Collection**

The data source for this study were both primary and secondary data sources

**Primary Data Sources**

Primary data sources are used to get first-hand information about the challenges of water supply and services delivery in Debre Tabor Town particularly” kebele01”. Municipality administrators, water supply protection officers, kebele administer, as well as selects household heads were used as a primary sources of data. Such data were collect by using the following method of data collection.

**Interview**

In this primary data collection method question were asked a face to face situation to collect information for further investigation on the bases of the information gained from the respondents. Semi-structured and structured interview were employed in order to become free to arrange the form, order, and timing of question. Interview purposely conducted with form Debre Tabor

town water supply and sewerage services office 4 person were used and the interviewee were purposely.

From this two person to response that the major cause of water supply interruption is the breakdown of pipe line during road construction and the remaining two is to response population density, shortage of finance, source of water were the major factor that affect water supply and services.

### **Observation**

The observation method was the most commonly used technique of collecting primary data. The main advantage of this method is that subjective bias was eliminated and information obtained under this method related to what is currently happening.

It would employ to observe water supply challenge at the household level in the town. It is not about what people would write or what they said. But it is what they do. Thus these method were carried out through personal observation in the field by preparing checklist which would designed by generated data to assess the problem.

### **Questionnaires**

In order to collect valuable information for the issue under study. This study employed questionnaire survey as a vital data acquisition method. The questionnaire was prepared in English language and translated to the local language (Amharic) of the respondents for simplicity and precision purpose and also was again translated back to English language for the purpose of analysis.

Generally 69 sample household heads were request kindly to fill the questionnaire made aware of about the purpose of the study and confidentiality of the questionnaire before starting to answer the question. The questionnaires consist of both open and close ended question.

### **Secondary Data Sources**

The secondary data source for sources for this study were collect from different sources of published and un published materials for the sake of easy and more clarity about review of related literature, data analysis and statement of the problem and also background of the problem. This source of secondary data includes book, newspaper, journals, articles, thesis report, project documentaries and other related document.

### **Method of Data Analysis**

After gathering the data the study used both qualitative and quantitative method data analysis. In the qualitative method the existing situation of the problem were organized, summarized and explained by using feasible words. The study used quantitative methods to analysis the numerical and statistical data. The quantitative data were analyzed and interpret by using numerical analysis to compare and contrasts also explain the personal and socio-economic factor of the sample. The study use table, graph chart and percentage as a method of data analysis.

### **Data Analysis and Interpretation**

#### **Socio Demographic Characteristics of Respondent**

The major socio demographic characteristics of the respondents includes sex, age, marital status, occupation, educational level and other

#### **Sex Distribution**

Sex structure is one of the demographic factors that affect the socio-economic activity of the respondents. As a result, this study identified the sex structure of the respondents as follow.

Both male and female respondents were participated in the survey. Majority of the respondents male which account 56.5% and 43.5% of them were female.

#### **Age Distribution**

Age structure also one of the demographic component's which can determine water supply in the area. According to (AMAADS, 2008) Age distribution is classified in the following ways. The following table describes the distribution of household heads by their age in frequency and percentage respectively.

Table 1; show that about 57% of respondents were found within the age group of between 22-34 these age groups economically active age population and the other 22% of age group are categorized between 35-44 which involves economically active population. Furthermore about 15%, 4%, and 3% of the respondents are grouped the age of under 21, 45-54 and 55-64 respectively. Generally most of the respondents are economically active population so it is important to participate in economic and social aspects and supposed to consume more water.

### **Marital Status of Sampled Respondents**

Like other demographic characteristics and social institution, marriage is highly influential living condition of the respondents.

According to table 4.2, 45% of the household heads reported that they get married and 39.1% of the respondents that they are single in the study area. The remaining 13% and 2.9% of the respondents are divorce and widowed respectively.

### **Respondent by Occupation**

Occupation refers to types of activity in which respondents or groups were engaged from or in. The following figure describes respondents in per

The result of figure 3, show that the greater number sample respondents 36.23% were merchant, and 31.9%, 15.94 % and 15.94% civil servant, Farmer, daily laborer respectively. Majority of respondents were merchants.

### **Educational Level of Respondents**

Education plays an important role in improvement of human life as well as to make life sample.

As table.3, indicates that all respondents can read and write. Therefore, it is good opportunity to create awareness on management of water supply and service delivery in the study area. The table show 43.4% that the educational level of respondent on read and writes. And the remaining 20.28%, 11.59% and 24.63% sample respondents comprises primary education, secondary education and diploma and above respectively.

### **Data Analysis Related to Water Supply**

#### **Water Supply Situation**

The majority of human uses require fresh water. 97% of the water on the earth is salt water and only 3% is fresh water. Source of supply is pre requests for meeting our water needs in the future. The location extend and quality of natural surface water and ground water sources and water sources derived from varies water management practices must be determined the past.

Natural water sources have been considered almost exclusively by those to principle water stock the river, lakes, oceans, streams and aquifers will have to

supplement by other non-traditional source of water supply such as discharge from waste water treatment plants. Urban form water flow and irrigation return flow ([https://en, Wikipedia. Org /wiki/ water resource](https://en.wikipedia.org/wiki/water_resource), 8.10 am 25/05/09 E.c). Respondents were asked to indicate source of water supply.

As indicated in the above figure 4, majority of respondents use private pipe water as the main source of water supply which accounts 55.1% the remaining respondents use water from public tap, stream accounts 23.2% and 20.3% respectively.

#### **Average Water use per day per Household**

Human being cannot live without water for long period of time. This indicates that human being needs water every day to accomplish their day to day activities but the use of water by human being is varying in volumes.

Based on the data presented in the table 4, 40% of respondents consume an average water category between 11-20 Jarrcan per day for each households, while 19%, 19% and 15% of respondents consume an average water category between 1-10 Jarrcan, 21-30 Jarrcan and above 30 Jarrcan per day for each households respectively.

#### **Shortage of Water Supply Situation**

The data which was gathered through questionnaire in relation to shortage of water supply situation is presented and analyzed as follow.

Based on the data presented in the table 5, 85.5% of sample house hold head were faced a shortage of water supply and the remaining 14.5% sample house hold head did have not a shortage of water supply. According to the interview from Debre Tabor Town water supply and sewerage service shortage of water supply occurred because of high population density, management problem are the major challenges and obstacles in the supply of water to the society.

#### **Water Supply Interruption**

Currently water supply interruption is one of the major problem of Debre Tabor town, it hinder the investment and development of town. According to Debre Tabor town water supply and sewerage service office report the main cause of water supply interruption are problem of electric power and break down of the main pipe line during road construction.

In table 6, 87% of sample respondents answered that there is water interrupt while 13% of the respondent answered that they did not faced water interrupt in the study area. According to Debre Tabor town water supply and sewerage service office report the main cause of water supply interruption are problem of electric power and break down of the main pipe line during road construction.

### **Water supply coming per week in the household**

Water is at the origin of life on the earth. The well-being and development of our society is dependent on the availability of water. This indicates that human being needs water every day to accomplish their day to day activities but the use of water by human being is varying in volumes.

As table 7, implies out of sampled of household reads 42% asserted that water is coming for twice a week, 32% asserted three times a week, 13% asserted that water is coming for above three times a week and 12% of respondent reveals that water is coming for once a week.

### **Factor Affecting Water Supply**

Safe and reliable water supply is certainly of prime importance for community health. However successful implementation of safe water and effective sanitation program in developing countries is not a simple process because of the problem associated with protection of water resource, changing in people behavior in collecting and using and expanding of eateries (WHO, 1999).

As table 8, show that out of 69 sample respondents 42% said that high population growth is the main factor that affect water supply in the study area, while 36%,19%, and 3% said that shortage water at the source, shortage of finance and other are factor that affect water supply in the study area respectively. According to interview from Debre Tabor town water supply and sewerage service of factor affecting water supply is shortage of water supply and design of pipe network, high population density, shortage of finance and inefficient organizational structure. The data which is collected through interview from the water supply office of the kebele 01 by researcher also show that there are factor that affect water supply and service delivery of the kebele include: shortage of finance, inefficient organizational structure, low involvements of the communities and inadequate operation and maintenance the like are major challenges

and became obstacles in the supply of water to the society.

### **Cause of Existing Water Supply Shortage**

The major problem related to water supply and service is the imbalance between population growth and the available water. This is due to shortage of water tanker, shortage of finance and inefficient organizational structure. In addition to problem related with distribution are related with design problem of pipe network due to lack of skilled man power and the like are the major challenges and obstacles in the water supply to the society.

The data collected through interview from Debre Tabor town water supply and sewerage service office, the causes for the shortage of water supply and distribution also supports the idea of the respondents. According to their explanation the major problem related to water supply is the imbalance between population growth and the available water. This is due to shortage of water tanker, shortage of finance and inefficient organizational structure. In addition to problem related with distribution are related with design problem of pipe network due to lack of skilled man power.

### **Impacts of Water Supply and Distribution Inaccessibility**

It is impossible to have a clean and safety environment without water. Water is necessary in promoting personal hygiene and cleaning the environment. We use water to clean ourselves, our clothes, our dishes, our cars and everything else around us. Without an adequate and wholesome water supply, health cannot be maintained. Thus, inaccessibility of improved potable water supply influences everybody's health, wellbeing, life expectancy, education and social development. In the above table 9, the majority of the respondents about 82% reported that, they faced health problems caused by both water-washed diseases (these are risks of overall water scarcity) and risks arising from waterborne infections. These comprise diseases linked to a lack of water for personal hygiene and risks arising from compromised water sources pertain to viable pathogens or their toxins not being completely removed in the treatment process, thereby causing an excess burden of infectious diseases like Guardia, Typhoid, Ameba, typhus, cholera and the like. The remaining 18% reported that they have not ever encountered any water-washed and water borne diseases.

**Table.1** Distribution of respondents by age group

Age group(year)	Number of respondents	Percentage
Under 21 year young & adult	10	15
22-34 year Adult	39	57
35-44 year Adult	15	22
45-54 year Adult	3	4
55-64 year Adult	2	3
65 and above Old	---	---
Total	69	100%

Source: field survey, 2017.

**Table.2** Distribution respondent by marital status

Marital status	Sample respondents	Percentage
Single	27	39.1
Marriage	31	45
Divorced	9	13
Widowed	2	2.9
Total	69	100%

Source: field survey, 2017

**Table.3** Educational level of respondent

Educational level	Frequency	Percentage
Read and write	30	43.4
Primary education	14	20.28
Secondary education	8	11.59
Diploma and above	17	24.63
Total	69	100%

Source: field survey, 2017

**Table.4** Average water use per day per households

Water use per day	No of respondent	Percentage
1-10 Jarrcan	15	19
11-20 Jarrcan	26	40
21-30 Jarrcan	13	19
Above 30 Jarrcan	15	19
Total	69	100%

Source: filed survey, 2017

**Table.5** Respondent’s response on the shortage of water supply situation of the study area.

Item	Respondent	Frequency	Percentage
Is there shortage of water supply in your kebele?	Yes	59	85.5
	No	10	14.5
	Total	69	100%

Source: filed survey, 2017

**Table.6** Frequency of water supply interruption

Item	Respondent	Frequency	Percentage
Is there water supply interruption in your kebele?	Yes	60	87
	No	9	13
	Total	69	100%

Source: filed survey, 2017

**Table.7** Frequency of Water Supply Coming per Week

Item	No of days per week	frequency	Percentage
How many times did you get water per week?	Once a week	8	12
	Twice a week	29	42
	Three times a week	22	32
	Above three times a week and above	10	14
Total		69	100%

Source: filed survey, 2017

**Table.8** Show that Factor Affecting Water Supply

Item	Frequency	Percentage
High population growth	29	42
Shortage of finance	13	19
Shortage of water at the source	25	36
Other	2	3
Total	69	100%

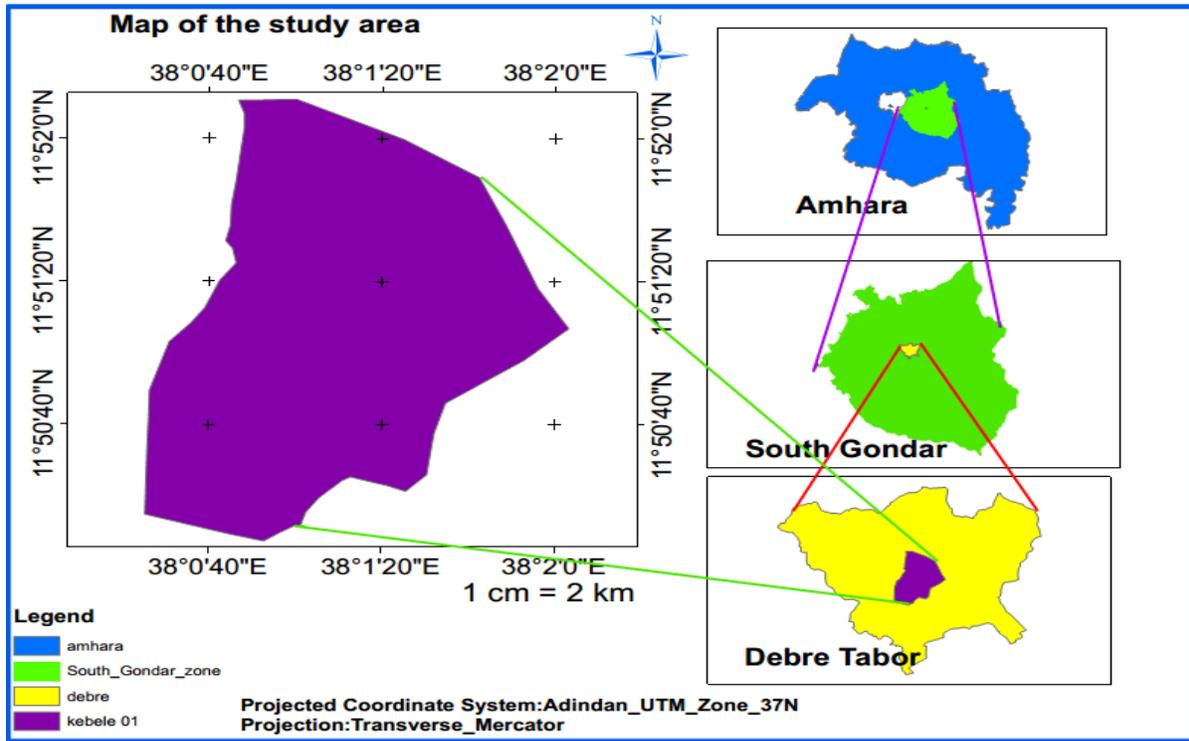
Source: filed survey, 2017

**Table.9** Samples Household’s Response Water Related Health Problem

Item	Respondent	Frequency	Percentage
Have you and your families have been faced any water related health problem?	Yes	56	82
	No	13	18
	Total	69	100%

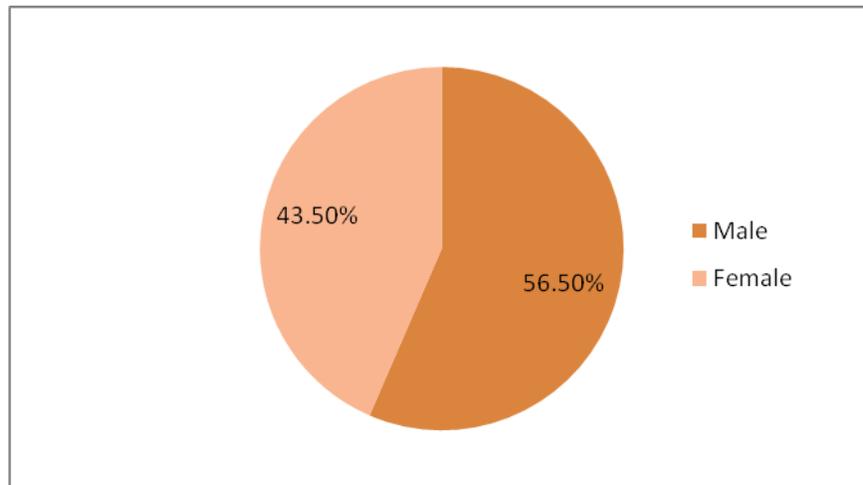
Source: filed survey, 2017

Fig.1 Map of the study area



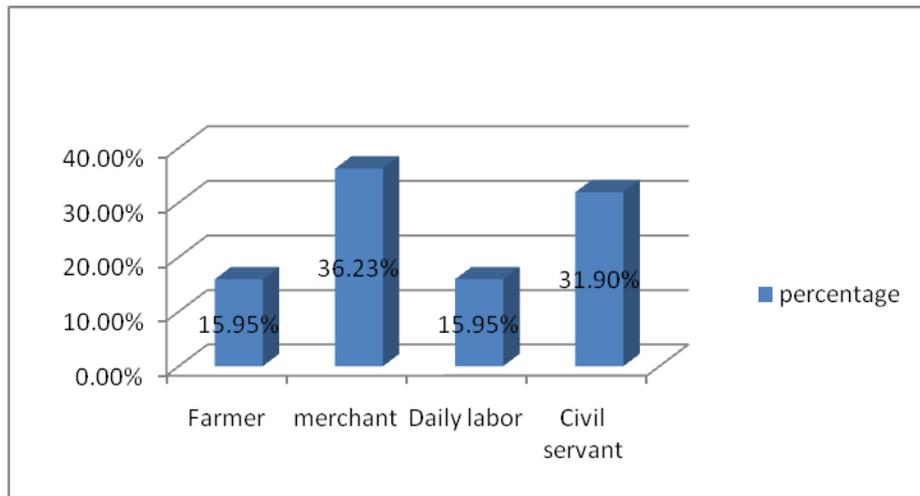
Source, GIS and Remote sensing Lab room (2017)

Fig.2 Sex distribution of the respondents



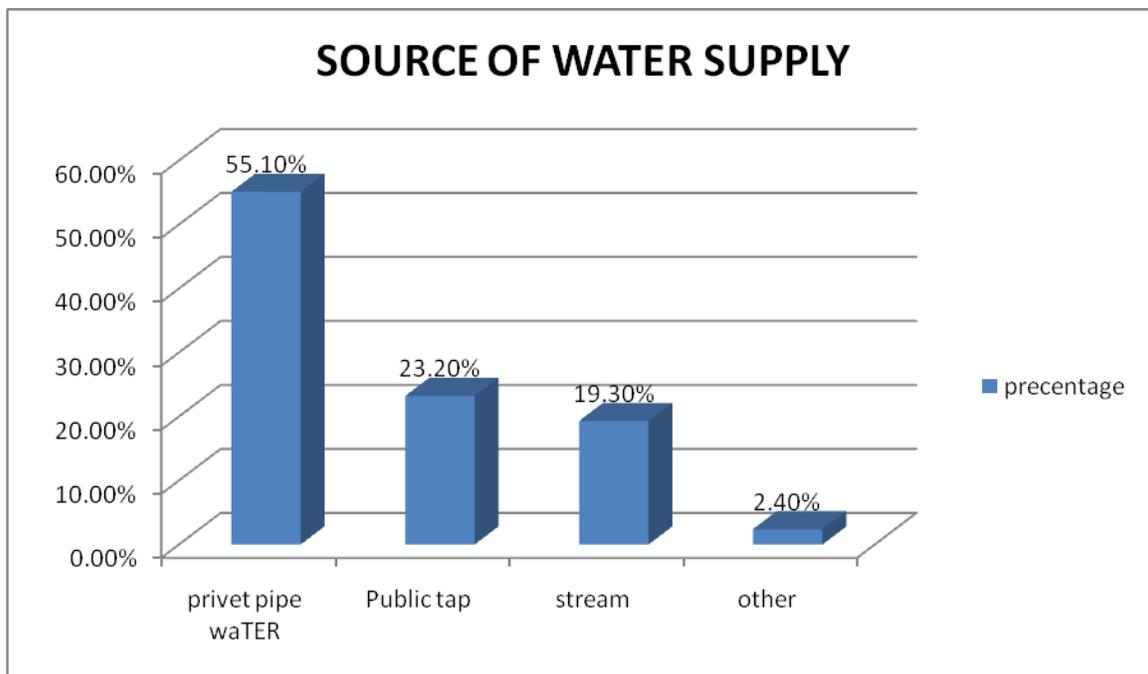
Source: field survey, 2017.

**Fig.3** Distribution of respondents by occupation



Source: field survey, 2017

**Fig.4** Show that source of water supply



Source: field survey, 2017

In any part of the world, the availability of adequate and safe water is very important for the development of each nation. However the rapid growth in urbanization is highly increasing population number have generally affect water occurred with cut corresponding expansion of when utilized water in developing countries including Ethiopia. The future growth of population with unplanned settlement indicates that traditional as well as modern (pipe) water source is now found inadequate in

the study area. As a result of demand and supply of water show variation in the study area. Water shortage is the major problem in the existing system. The main or dominant factor of shortage of water supply of the study area are high population density, shortage of finance, lack of skill man power, inefficient organizational structure, management problem, lack of sufficient fund and inadequate operation and maintenance of the pipe networks.

However, the supply of water in general does not correspond to the high demand of the population. The existing pipes and taps neither sufficient water nor serve the whole population in the study area.

The study also indicates the majority of the population obtains water from pipe water. As the researcher concluded that pipe water supply is insufficient in the distribution process of the water. Finally, there are possible solutions to minimize water supply problem: adequate funding is required to improve access to water and sewerage system and energy in production consumption, awareness creation for the societies towards sustainable use of water, developing underground water and supplying water by water tanker vehicles.

### **Recommendation**

The study gives the following suggestion with hope that they may help to avoid the problem related to water supply in kebele 01.

The population of the kebele and demand for water are increasing rapidly, but sufficient water supply system is not yet achieved to solve such problem in the plan for the water supply improvement should be designed taking in to account the need for water.

The study forward the following recommendation

Water and sewerage office must distribute water to the society based on legal equity and educate the communities to reduce rapid population growth.

The water supply and development office must fulfill skilled man power and balance the demand and supply of population with existing of water in the area.

Promoting water development project to address the problem.

Primate active participation of stakeholders

Develop human resource

Generally, to solve the above all problems water supply office, government, municipality, community of the kebele, if possible NGOs have to find ways to supply continues sustainable and safe water for kebele 01.

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