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An Assessment of Urban Water Supply, Price & Management Challenges in Hiddi-lola, Oromia Regional state, Ethiopia

The case of Hiddi-lola Town.)

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Abstract: *The present study was conducted to assess the urban water supply, price, and management challenges in the Borena zone of Hiddi-Lola, Ethiopia. The researchers employed an explanatory, sequential research design. In addition to this, the instrument used to collect data was a self-administered questionnaire. Data was collected from households, employees, and key informants. Researchers deployed multiple-stage sampling. A field survey was administered to get data from HH, employees, and key informants. SPSS AMOS 26 was used for the data analysis. In the second part of exploring the literature view of this research, the researcher has implemented the "urban water supply theory." Based on the model and the SPSS AMOS 26 version, depending on the results of the ordinal questionnaire for quantitative and qualitative data, while interviews have been used for data analysis and narratives have been applied. Depending on the formula used for the thesis, the total population and the total sample size used in this dissertation are considered.*

Descriptive statistics of demographic variables indicate male and female responses are used as the controlling variables. The respondents are between 21 and 60 years of age. Therefore, in order to collect the required data in this study, the researcher distributed 144 questionnaires to a sample of households based on simple random sampling. From the distributed questionnaires, 139 were returned, and the remaining five were unreturned. To replace unreturned questionnaires, the researcher also distributed five questionnaires and got the required number of responses from sample households. ***Key words:*** *water supply, price, management challenges.*

1. INTRODUCTION

Water is the most important of all public services. It is the second most essential necessity of life after oxygen. The importance of water is not only attached to drinking but also to cooking, bathing, washing, and other economic activities. Where provisions for water and sanitation are inadequate, the diseases that arise from contaminated food, water, and hands are among the world's leading causes of premature death and serious illness. "All people, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs (Mar del Plata Water Conference, 1977).

The urban water sectors in many developing countries pose serious constraints to meeting the challenge of providing adequate water for all urban residents. Water supply shortages and quality deterioration are among the problems that require greater attention and action (UNICEF, 2004). Various strategies are always being developed to make water accessible to all inhabitants. However, due to insufficient structures coupled with rapid population growth and urbanization, the gap between demand and supply of water continues to widen (Kingo,2005).

This section clarifies the need for the study concerning urban water supply, price, and management challenges and their impact on the socio-economic development of the country. Lastly, the significance of the study section elaborates on who and how would benefit from the study, and the remaining part discusses the scope, discussion, and results of the dissertation.

1.1 SPECIFIC OBJECTIVES

1. To trace out the major constraints in providing water services to urban dwellers.

2. To examine the consequences of inadequate urban water supply challenges in Hiddi-Lola town.

3. To identify the existing status of water supply in the urban setting of Hiddi-Lola town.

4. To examine the financial, technical, and institutional factors that affect urban water supply and utilization facilities.

1.2 RESEARCH QUESTIONS

1. What are the major challenges in the provision of urban water supply in Hiddi-Lola town?

2. What are the impacts of inadequate water supply on the lives of urban dwellers?

3. What is the current status of urban water supply in Hiddi-Lola town?

4. How are the financial, technical, and institutional factors that affect urban water supply utilization facilities?

2 NEED OF THE STUDY

The provision of safe and adequate water is becoming a critical issue for urban dwellers (MoWR, 2022). The Ministry of Water Resources defines " adequate" water supply as 20 liters of water per person per day and accessible within a range of 0.5–1.0 km from a dwelling place. But the current level of per capita water consumption is below the adequate level set by MoWR (1996). In Ethiopia, the sources of nearly all of the domestic water in the urban areas can be generally said to be ground water or surface water.

Available information on the water coverage of the region revealed that most of the region's water supply is mainly through traditional dug wells (bore holes), unprotected springs, and rivers (ORSBoWMERD, 2006). Hence, to fulfill the water demand of households, women's and children's responsibilities include fetching water and spending an average of 2–3 hours per day fetching water from the sources. Unprotected water supply services and non-functional schemes are major, severe problems in the town. Without access to safe water, households depend on surface water sources such as unprotected springs, streams, and others.

Besides, factors affecting the continued use of the outcome of urban water supply projects in the context of limited resources are not adequately and systematically studied in the Hiddi-lola. Earlier studies conducted on water supply problems both at international and national levels focused mainly on rural areas and big cities. But in small and medium towns like Hiddi-Lola, not adequate research is yet carried out. Furthermore, Hiddi-Lola is one of

the border towns near Kenya with rapid urbanization, high population growth, a high business area due to its business potential, and a bridge to Borena for import and export.

It is also serving as an administrative and commercial center for the Borena Zone. On the other hand, the provision of urban infrastructure like water supply is clearly observed as a critical challenge in the town. These situations necessitated research work to look at the issues in the area closely and deeply in order to give a clear description of the problems from the perspectives of various urban dwellers and administrators.

3 Population and Sample

The study population would be Hiddi-Lola municipality households, which are found in Kebele 01 and 02. Hiddi-Lola town has two kebeles, namely 01 and 02, according to the Miyo district annual plan of 2006. According to Kothari C.R. (2004), clarified considerations needed in determining sample size. Since the total population (N) is less than 10,000, to determine the number of representative samples, the study employed the following formula for sample size computation: First alternative, For N ≥ 10,000, the researcher used the following formulas:

Where n is the desired sample size.

z = the standard normal variable at a required level of confidence (standard normal deviation).

p = the proportion in the target population estimated to have characteristics being measured.

q = 1-p

d = the level of statistical significance set.

The second alternative for N is ≤ 10,000.

For this study, given N = 1050, the researcher has used a 93 percent confidence level and a 7 percent margin of error, p = 0.5, q = 1-0.5 = 0.5, and a 93 percent level of confidence, Z = 1.81. The rationale behind using a 93% confidence level is that if the sample isthat if the sample is too large, it might become unwieldy, unworkable in practice, and may incur huge costs and waste resources, while if the sample isif the sample is too small, it might be unrepresentative. Furthermore, sample size might also be constrained by

available resources in terms of time, money, and the number of researchers. Since the target population is less than 10,000, the second alternative formula was applied.

= 0.819025/0.0049 = 167

Then, = 1050+167/1050=167*1050/1217=144 Where,

fn is the desired sample size when the population is less than 10,000.

n = the sample size when the population is greater than 10,000.

N is the estimated population size.

The total number of respondents from the two Kebele households would be 144; in addition, 2 from the municipality, 3 from the water and mine office, and 3 from the municipality water commute would be added. So, 152 respondents would be expected with key informants.

Table 3.1Sample Size of Each Kebele Households

Kebeles	Number of Household in the two Kebele	Required Sample Size from two Kebele
01	(545×144)|1050 = 75	75
02	(505×144)| 1050= 69	69
Total		**144**

3.1 Data and Sources of Data

The data type in this study consisted of both primary and secondary data. Being the main base for the study, primary data would be used in order to get reliable information on the assessment of water supply challenges in the study area through a well-structured questionnaire, interviews, and observation by the researcher. Secondary data, which is second-hand information, would be collected from different sources, including the Hiddi-Lola Town Municipality data base, proclamation, journals, the internet, and other related published and unpublished documents and reports. While collecting and using these data for the study, more consideration would be given to their time period, reliability, and relevance to the purpose of the study.

3.2 Theoretical framework

3.2.1 Urban water supply

It is impossible to have a clean and sanitary environment without water. Water is necessary for promoting personal hygiene and cleaning the environment. Without an adequate and wholesome water supply, health cannot be maintained. Water is essential for life. Man can live nearly two months without food but can live only three or four days without water. Safe drinking water is the birthright of all humankind, as much as clean air (Rao, 2002). while access to clean water can be considered one of the basic needs and rights of a human being. The health of people and dignified life is based on access to clean water (Korkeakoski, 2006; Alaci and Alehegn, 2009).

According to the WHO (2006), only 16% of people in sub-Saharan Africa had access to drinking water through a household connection (an indoor tap or a tap in the yard). Not only their poor access to readily accessible drinking water, but even when water is available in these small towns, there are risks of contamination due to several factors, like inappropriate waste disposal and a lack of water supply infrastructure such as pipe lines for water (Mengistu, 2008).

3.2.2 Historical Background of Water and Human Progress

The human search for pure water began in prehistoric times. Water was the root of human civilization, which sprang up only where an abundant water supply was available. These areas of civilization were those that flourished on the banks of the Nile, the Tigris, and the Euphrates, as well as in other countries like India and China. Throughout the centuries, the search for safe water kept pace with civilization. Some examples follow:

- **India-2000 B.C**

The Indians boiled and exposed the water to sunlight. They also dipped a piece of hot copper into the water seven times. In addition, they filtered and cooled it in an air vessel (Zeyede and Tesfaye, 2019).

- **Egypt-1450 B.C**

In ancient Egypt, siphons were used to clear water from jars after the Nile water was stored and the impurities settled to the bottom of the jar (UN-HABITAT 2003).

• **Greece-400 B.C**

Hippocrates, the father of medicine, asserted that rainwater should be boiled and strained; otherwise, it would smell bad and cause hoarseness (Hardin, 1968).

• **Ancient Rome**

The ancient Romans built notable water systems, some of which are still in use. Water was brought by gravity from mountain springs through great aqueducts to the cities crossing valleys (UN, 2002).

• **Europe 1800 A.D.**

The occurrence of epidemics in different parts of Europe also increased the demand for water purification. For example, in 1852, the city of London was requested by Parliament to filter its water through sand filters, and in 1892, the value of filtration was witnessed when an epidemic of cholera struck the citizens of Hamburg, Germany. They drank unfiltered water from the Elbe River. Just beyond the Elbe River, where the water supply was filtered, the residents of Altona remained healthy. In 1912, liquid chlorine was first applied to destroy disease-producing bacteria. Today, every large city chlorinates its water (WHO, 1996). So as cities, populations, and industries grew, the importance of safe water supply services became increasingly apparent.

3.2.3 Empirical Literature

This part presents the empirical literature on water supply challenges from international to local perspectives based on the global occurrence of water, water accessibility indicators, impacts of water accessibility, challenges in urban water supply, and alternatives to improve water supply challenges practices.

3.2.4 Global Occurrence of Water

Water is located in all regions of the earth. The problem is that the distribution, quality, quantity, and mode of occurrence are highly variable from one locality to another. Water is the most widely occurring substance in the world. Over 72% of the earth's surface is covered by water. This means that if the body of water were evenly distributed, it would cover the globe to an average depth of over 4 kilometers. Out of the 72% of the earth's

surface water, 97.2% is in the ocean, which is unfit for human consumption as it is too salty to be used for drinking and irrigation without desalination.

Desalination is too expensive to consider as a water purification method. Another 2% of the remaining water lies frozen in glaciers and in icecaps and is mostly unreachable. The tiny usable portion is about 0.8% of the total, which is neither evenly distributed nor properly used (WHO, 2004).

3.2.5 Water accessibility indicators

According to WHO (2004), they are basic indicators for measuring water accessibility. These Indicators show four paramount levels of water accessibility, which include optimal access, intermediate access, basic access, and no access. These are indicative of the level of water availability, which is a measure of the quantity available for use. Basically, they reflect the extent to which accessibility challenges such as time, distance, and affordability are formidable.

Table 3.2 WHO water accessibility indicator

Travel distance to collect water	***WHO standard***	**Average time spent to collect water**	**WHO standard**
Water supply through taps continuously	(Optimal access)	Water supplied through multiple taps Continuously	Optimal access
< 100m	Water supplied through multiple taps continuously	Within 5 minute	Intermediate Access
101-200m	Between 100 and 1000m	5-30 minutes	Basic access
201-500m			

5001-1000m	(Basic access)	30 minute-2hours	No access
1.2-2km(1.5km)	More than 1000m	2-4hours	
>2km(3km)	(No access)	>4 hours	

Source: Adopted from WHO (2023)

4 RESEARCH METHODOLOGY

To address the objectives of the study, the descriptive type of research would be applied primarily to examine the assessment of water supply, price, and management challenges. This descriptive method was selected because it allows the researcher to go through the sample, take a broad view of the population, and help assess the existing situation. It would be used to obtain information concerning the current stage of water supply challenges in Hiddi-Lola town and to describe what exists with respect to variables identified by the researcher.

For the purpose of this study, the researcher used both a quantitative and a qualitative (mixed) approach because it helped to get deeper information from triangulation data gathering via questionnaires, interviews, and observations. The quantitative data would be deduced from closed-ended questions, while the qualitative data would be extracted from open-ended questions about the water supply challenges. So the researcher would be using a mixed approach, or both qualitative and quantitative data collection instruments, to gather data and information from respondents. (Kothari 2004).

4.1Population and Sample

The study population would be Hiddi-Lola municipality households, which are found in Kebele 01 and 02. Hiddi-Lola town has two kebeles, namely 01 and 02, according to the Miyo District Civil Service and Good Government Office (2015). According to Kothari (2020), clarified considerations needed in determining sample size are the nature of the unites, the size of the population, the size of the questionnaire, the availability of trained investigators, the conditions under which the sample is being conducted, and the length of time for the completion of the study.

The study used the Kothari formula to determine the sample size. Since the total population (N) is less than 10,000, to determine the number of representative samples, the

study employed the following formula for sample size computation: First alternative, For N ⩾ 10,000, the researcher used the following formulas:

4.2 Data and Sources of Data

4.2.1 Observation

This method implies the collection of information by way of the investigator's own observation, without interviewing the respondents. The information obtained relates to what is currently happening and is not complicated by either the past behavior or future intentions or attitudes of respondents. This method is no doubt an expensive one, and the information provided by it is also very limited. As such, this method is not suitable for inquiries where large samples are concerned (Kothari 2004).

Non-participant observation is independent of the respondents' willingness to respond and, as such, is relatively less demanding of active cooperation on the part of respondents, as happens to be the case in the interview or the questionnaire method conducted to collect data. As a result, it helps the researcher collect data that is unbiased and represents respondents. This method would be used to observe the Miyo district water, mineral, and energy offices while they are doing their jobs.

4.2.2. Interview

The investigator follows a rigid procedure and seeks answers to a set of preconceived questions through personal interviews. This method of collecting data is usually carried out in a structured way where the output depends on the ability of the interviewer to a large extent (Kothari 2004).

Face-to-face personal interviews would be conducted with the head or vice head of the Miyo District Water, Mineral, and Energy Office and the expert that is directly related to the water supply departments. The interviews would be used to gather information that needs a detailed explanation. Interview questions would be both structured and unstructured and suitable for gathering appropriate information on the assessment of water supply challenges in the town.

4.2.3. Questionnaire

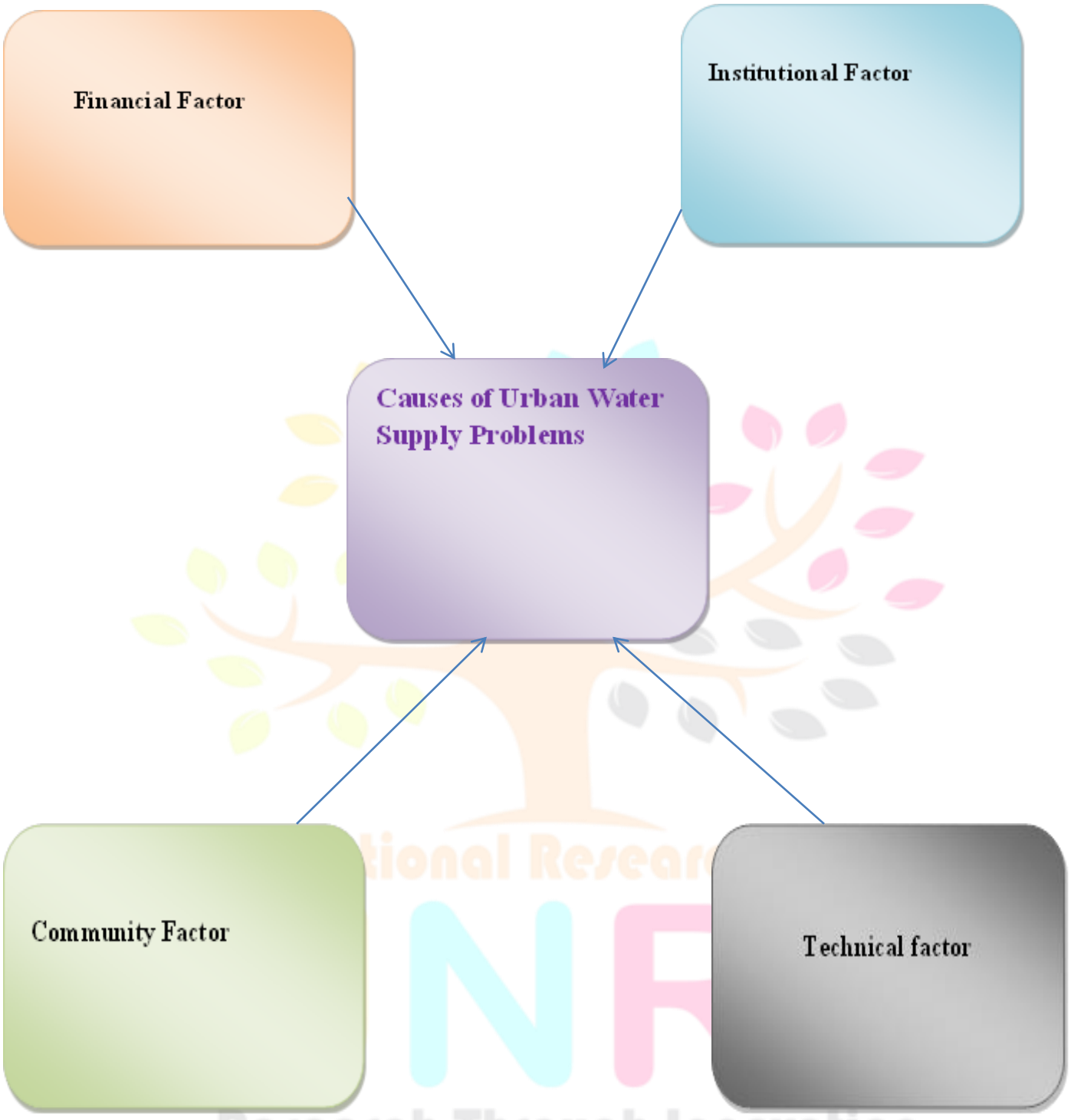
The questionnaire to be used must be prepared very carefully so that it may prove effective in collecting the relevant information (Kothari 2004). The questionnaires would be

prepared for the households that were selected from the town. Respondents who read and understood a self-administered, structured questionnaire will be distributed. The researcher will help illiterate respondents by reading questionnaire questions to them and filling in their responses or reflections on the questionnaire. The response helps to understand the opinion of each respondent about the assessment of water supply challenges around the study area.

4.2.4 Theoretical framework

The problems at UWS involve a number of issues that are internal and external to the community. These factors include community, technical, institutional, and financial factors. Therefore, based on the literature reviewed, the researchers develop a conceptual framework to assess problems at UWS in Miyo woreda.

Fig 1 Cause of urban water supply problems



Source: developed for this dissertation2024

5 Descriptive Statistics

This section elaborates on the proper statistical models that are being used to forward the study from data to inferences. The details of the methodology are given as follows:

Table 5.1 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Water supply	144	1	6	3.97	2.010
how many times per day	144	1.00	4.00	2.2500	1.04111
how much water per days	144	1.00	5.00	3.3472	1.23650
How far the water source is	144	1.00	3.00	2.2153	.88628
who is responsible for fetching water	144	1.00	4.00	2.4583	.66769
How do you transport water from sources	144	1.00	3.00	1.8889	.54338
How you drink unprotected water sources	144	1.00	3.00	1.3750	.61309
when did these hand pump water projects are constructed	144	1.00	5.00	3.0417	1.16400
how do you evaluate the construction quality of water supply in our area	144	1.00	3.00	2.4861	.81923
is/are there local technician/s that has have taken basic training to carry out repairs	144	1.00	2.00	1.6389	.48200
is/are adequate tools to carry out repairs	144	1.00	2.00	1.7222	.44947
is /are water committee in your kebele	144	1.00	2.00	1.5417	.50000
is/are committee well trained	144	1.00	2.00	1.5139	.50155
do the committee try to alleviate the problem of water supply services	144	1.00	2.00	1.6181	.48756
who financed the constructed water supply	144	1.00	4.00	2.2778	.97840
how was the payment made for water supply services	144	1.00	2.00	1.3542	.47993
who sets the water fees tariff	144	1.00	3.00	1.7500	.49473
water fees collected from beneficiary is enough	144	1.00	2.00	1.0694	.25510
who manages the water fees collected from users	144	1.00	3.00	1.2847	.52441
do committee have bank Account	144	1.00	2.00	1.1458	.35417
do you get receipts always for paying during services	144	1.00	2.00	1.9167	.27735
do you think that the scheme managers have capacity to manage the finance	144	1.00	2.00	1.5833	.49473
how do you see the adequacy of water sources since you start using	144	1.00	3.00	1.4653	.75645
how do you see the nature of technology operated and used by users	144	1.00	2.00	1.8611	.34704
how many times your water schemes breakdown	144	1.00	4.00	2.2153	1.06543
how you see availability of spare parts	144	1.00	2.00	1.9236	.26655
how do you see affordability of spare parts	144	1.00	3.00	1.8958	.48356
what is the reason for breakdown of spare parts	144	1.00	3.00	1.9722	.81029
do you get support from miyo woreda water desk	144	1.00	2.00	1.3403	.47546
miyon moreda water desk needs from government and other stakeholders	144	1.00	2.00	1.0833	.27735

Are there activities that you do regularly beside support of water committee	144	1.00	2.00	1.5903	.49350
do the users pay the water fees regularly	144	1.00	2.00	1.0972	.29729
Valid N (list wise)	144				

Source: field data, February 2024

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
sex	144	1.00	2.00	1.3125	.46513
religion	144	1.00	5.00	2.6736	1.41337
martial	144	1.00	4.00	1.9722	.93078
education	144	1.00	5.00	4.2292	1.13260
income	144	1.00	7.00	4.3681	2.09477
Valid N (list wise)	144				

Statistics

		sex	religion	martial	education	income
N	Valid	144	144	144	144	144
	Missing	0	0	0	0	0

Source: field data, February 2024

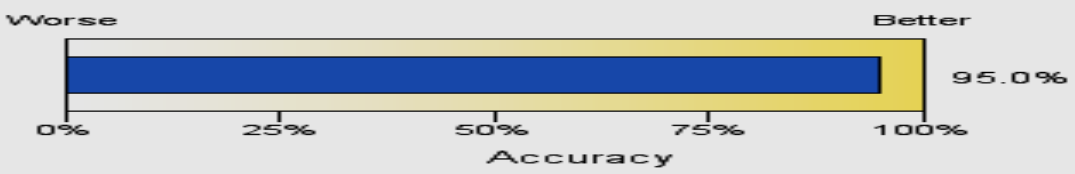
Descriptive statistics have been used to find the maximum, minimum, standard deviation, mean, and normal distribution of the data for all the variables in the study.

3.4.2 Accuracy

Model Summary

Target	Water supply
Automatic Data Preparation	On
Model Selection Method	Forward Stepwise
Information Criterion	-219.067

The information criterion is used to compare to models. Models with smaller information criterion values fit better.



Source: field data, February 2024

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
how many times per day	Between Groups	130.055	5	26.011	143.898	.000
	Within Groups	24.945	138	.181		
	Total	155.000	143			
how much water perdays	Between Groups	182.062	5	36.412	137.381	.000
	Within Groups	36.577	138	.265		
	Total	218.639	143			
How far the water source is	Between Groups	93.087	5	18.617	133.541	.000
	Within Groups	19.239	138	.139		
	Total	112.326	143			
who is responsible for fetching water	Between Groups	48.712	5	9.742	89.406	.000
	Within Groups	15.038	138	.109		
	Total	63.750	143			
How do you transport water from sources	Between Groups	22.071	5	4.414	30.231	.000
	Within Groups	20.151	138	.146		
	Total	42.222	143			
How you drink unprotected water sources	Between Groups	46.133	5	9.227	167.152	.000
	Within Groups	7.617	138	.055		
	Total	53.750	143			
when did these hand pump water projects are constructed	Between Groups	178.466	5	35.693	322.274	.000
	Within Groups	15.284	138	.111		
	Total	193.750	143			
how do you evaluate the construction quality of water supply in our area	Between Groups	53.239	5	10.648	34.385	.000
	Within Groups	42.733	138	.310		
	Total	95.972	143			
is/are there local technician/s that has have taken basic training to carry out repairs	Between Groups	26.289	5	5.258	104.650	.000
	Within Groups	6.933	138	.050		
	Total	33.222	143			
is/are adequate tools to carry out repairs	Between Groups	15.556	5	3.111	32.200	.000
	Within Groups	13.333	138	.097		
	Total	28.889	143			
is /are water committee in your kebele	Between Groups	30.533	5	6.107	161.518	.000
	Within Groups	5.217	138	.038		
	Total	35.750	143			
is/are committee well trained	Between Groups	28.146	5	5.629	99.262	.000
	Within Groups	7.826	138	.057		
	Total	35.972	143			
do the committee try to alleviate the problem of water supply services	Between Groups	29.410	5	5.882	177.100	.000
	Within Groups	4.583	138	.033		
	Total	33.993	143			
who financed the constructed water supply	Between Groups	108.251	5	21.650	104.329	.000
	Within Groups	28.638	138	.208		
	Total	136.889	143			

how was the payment made for water supply services	Between Groups	23.611	5	4.722	69.877	.000
	Within Groups	9.326	138	.068		
	Total	32.938	143			
who sets the water fees tariff	Between Groups	29.783	5	5.957	157.550	.000
	Within Groups	5.217	138	.038		
	Total	35.000	143			
water fees collected from beneficiary is enough	Between Groups	6.906	5	1.381	79.414	.000
	Within Groups	2.400	138	.017		
	Total	9.306	143			
who manages the water fees collected from users	Between Groups	36.910	5	7.382	421.534	.000
	Within Groups	2.417	138	.018		
	Total	39.326	143			
do committee have bank Account	Between Groups	17.004	5	3.401	502.838	.000
	Within Groups	.933	138	.007		
	Total	17.938	143			
do you get receipts always for paying during services	Between Groups	7.667	5	1.533	63.480	.000
	Within Groups	3.333	138	.024		
	Total	11.000	143			
do you think that the scheme managers have capacity to manage the finance	Between Groups	35.000	5	7.000	.	.
	Within Groups	.000	138	.000		
	Total	35.000	143			
how do you see the adequacy of water sources since you start using	Between Groups	75.671	5	15.134	339.329	.000
	Within Groups	6.155	138	.045		
	Total	81.826	143			
how do you see the nature of technology operated and used by users	Between Groups	15.489	5	3.098	246.631	.000
	Within Groups	1.733	138	.013		
	Total	17.222	143			
how many times your water schemes breakdown	Between Groups	139.286	5	27.857	166.850	.000
	Within Groups	23.040	138	.167		
	Total	162.326	143			
how you see availability of spare parts	Between Groups	7.226	5	1.445	67.994	.000
	Within Groups	2.933	138	.021		
	Total	10.160	143			
how do you see affordability of spare parts	Between Groups	16.454	5	3.291	26.740	.000
	Within Groups	16.983	138	.123		
	Total	33.438	143			
what is the reason for breakdown of spare parts	Between Groups	78.971	5	15.794	146.104	.000
	Within Groups	14.918	138	.108		
	Total	93.889	143			
do you get support from miyo woreda water desk	Between Groups	23.957	5	4.791	79.002	.000
	Within Groups	8.370	138	.061		
	Total	32.326	143			
Miyo moreda water desk needs from government and other stakeholders	Between Groups	7.667	5	1.533	63.480	.000
	Within Groups	3.333	138	.024		
	Total	11.000	143			

Are there activities that you do regularly beside support of water committee	Between Groups	18.017	5	3.603	29.583	.000
	Within Groups	16.809	138	.122		
	Total	34.826	143			
do the users pay the water fees regularly	Between Groups	8.906	5	1.781	65.837	.000
	Within Groups	3.733	138	.027		
	Total	12.639	143			

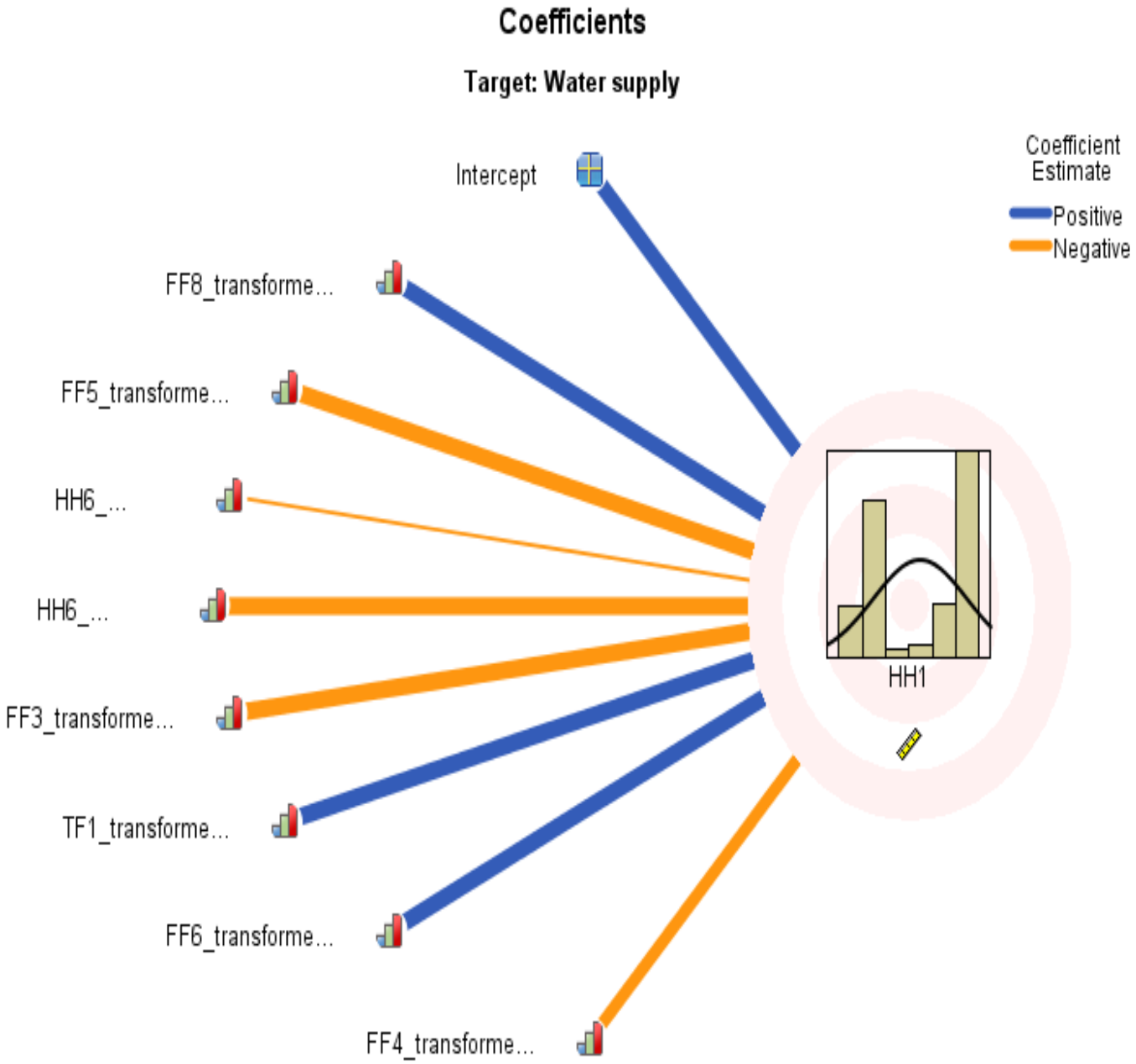
Source: Field data February 2024

The results show that the significance level is.000, which means the relationship, is highly significant, and therefore it is likely that there is a relationship between the variables in the population as well as the sample.

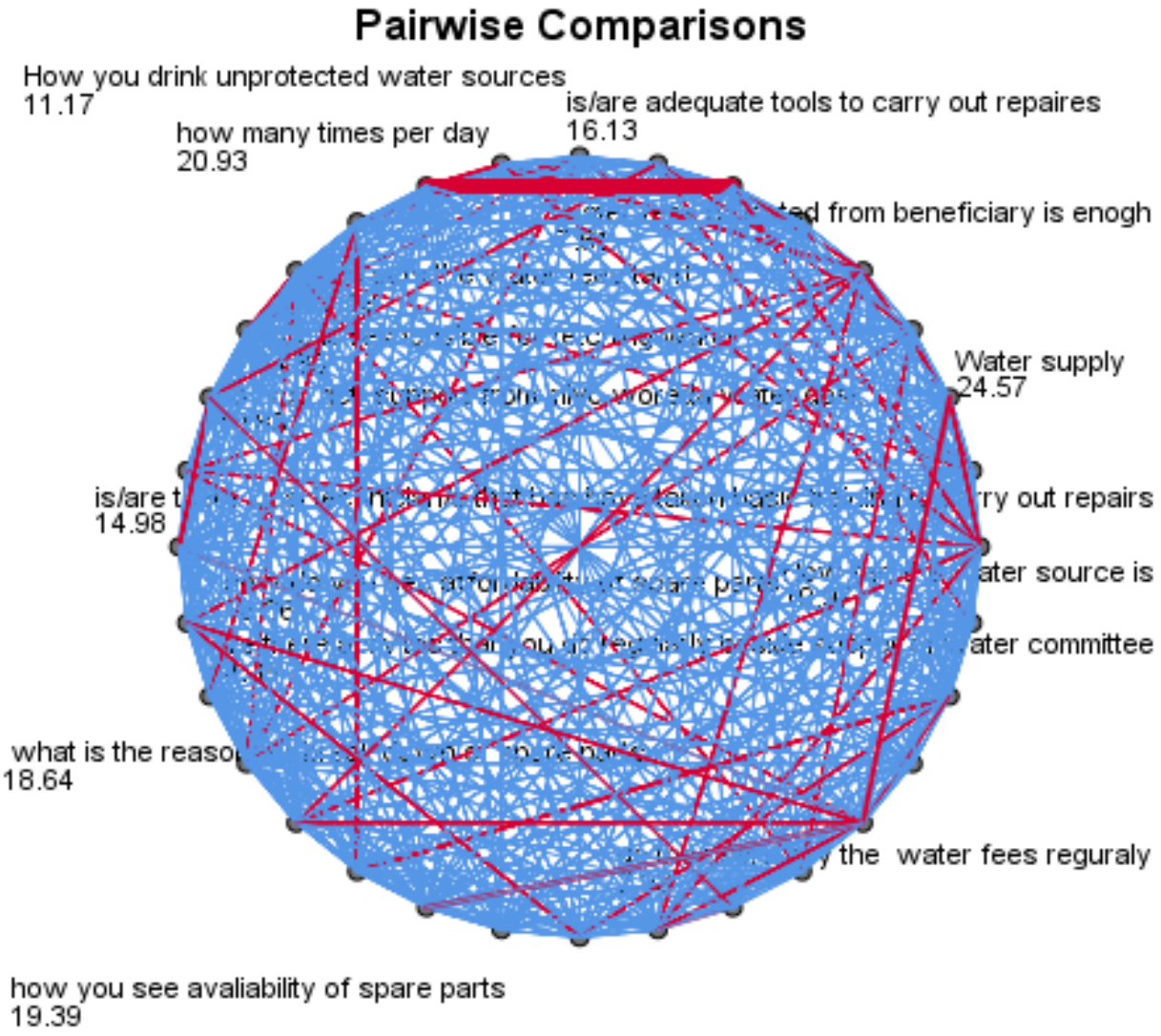
Effects

Target: Water supply

Source	Sum of Squares	df	Mean Square	F
Corrected Model	550.389	8	68.799	337.739
FF8_transformed	384.000	1	384.000	1,885.091
FF5_transformed	25.071	1	25.071	123.078
HH6_transformed	13.346	2	6.673	32.757
FF3_transformed	9.600	1	9.600	47.127
TF1_transformed	6.933	1	6.933	34.036
FF6_transformed	6.222	1	6.222	30.545
FF4_transformed	2.400	1	2.400	11.782
Residual	27.500	135	0.204	
Corrected Total	577.889	143		



A positive coefficient indicates that as the value of the independent variable increases, the means of the independent variable increases.



Nodes	Importance	Importance	V4	V5
FF4_transformed	0.0054	0.0054	water fees collected from beneficiary is enough	0.0054
FF6_transformed	0.0139	0.0139	do committee have bank Account	0.0139
TF1_transformed	0.0155	0.0155	how do you see the adequacy of water sources since you start using	0.0155
FF3_transformed	0.0214	0.0214	who sets the water fees tariff	0.0214
HH6_transformed	0.0298	0.0298	How do you transport water from sources	0.0298
FF5_transformed	0.056	0.0560	who manages the water fees collected from users	0.0560
FF8_transformed	0.858	0.8580	do you think that the scheme managers have capacity to manage the finance	0.8580

6. RESULTS AND DISCUSSION

Table 6.1 Demographic Variables

sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	99	68.8	68.8	68.8
	Female	45	31.3	31.3	100.0
	Total	144	100.0	100.0	

Religion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Protestant	40	27.8	27.8	27.8
	Orthodox	35	24.3	24.3	52.1
	Catholic	20	13.9	13.9	66.0
	Muslim	30	20.8	20.8	86.8
	Others	19	13.2	13.2	100.0
	Total	144	100.0	100.0	

Martial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	single	44	30.6	30.6	30.6
	married	80	55.6	55.6	86.1
	widow	20	13.9	13.9	100.0
	Total	144	100.0	100.0	

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	junior	9	6.3	6.3	6.3
	primary	5	3.5	3.5	9.7
	secondary	10	6.9	6.9	16.7
	college	40	27.8	27.8	44.4
	others	80	55.6	55.6	100.0
	Total	144	100.0	100.0	

income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	farming	20	13.9	13.9	13.9
	Government employees	20	13.9	13.9	27.8
	traditional gold mining	17	11.8	11.8	39.6
	daily labor	7	4.9	4.9	44.4
	pastoral	70	48.6	48.6	93.1
	others	10	6.9	6.9	100.0
	Total	144	100.0	100.0	

Source field data 2024

According to Table 6.1, the respondents' sex was represented by the demographic characteristics as male (68.8%) and female (31.1%). Catholic 13.2%, Orthodox 24.3%, and Protestants 27.8% are the findings for religion. Muslim: 20.8%; non-Muslim: 13.9% martial information30.6% of the population is single, 55.6% is married, and 13.9% is widowed. The

education level of the population is junior 6.3%, primary 3.5%, secondary 6.9%, college 27.8%, and others 55.6%. According to survey data, 13.9% of respondents work in farming, 13.9% are employed by the government, 11.8% are in traditional gold mine, 4.9% work every day, 48.6% are in pastoral work, and 6.9% are other.

Frequency Table 6.2

Water supply

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	un protected spring	15	10.4	10.4	10.4
	borehole	46	31.9	31.9	42.4
	pond	3	2.1	2.1	44.4
	river/stream water	4	2.8	2.8	47.2
	sand dug well	16	11.1	11.1	58.3
	hand pump	60	41.7	41.7	100.0
	Total	144	100.0	100.0	

how many times per day

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	once	44	30.6	30.6	30.6
	twice	40	27.8	27.8	58.3
	three	40	27.8	27.8	86.1
	morethan3	20	13.9	13.9	100.0
	Total	144	100.0	100.0	

how much water per days

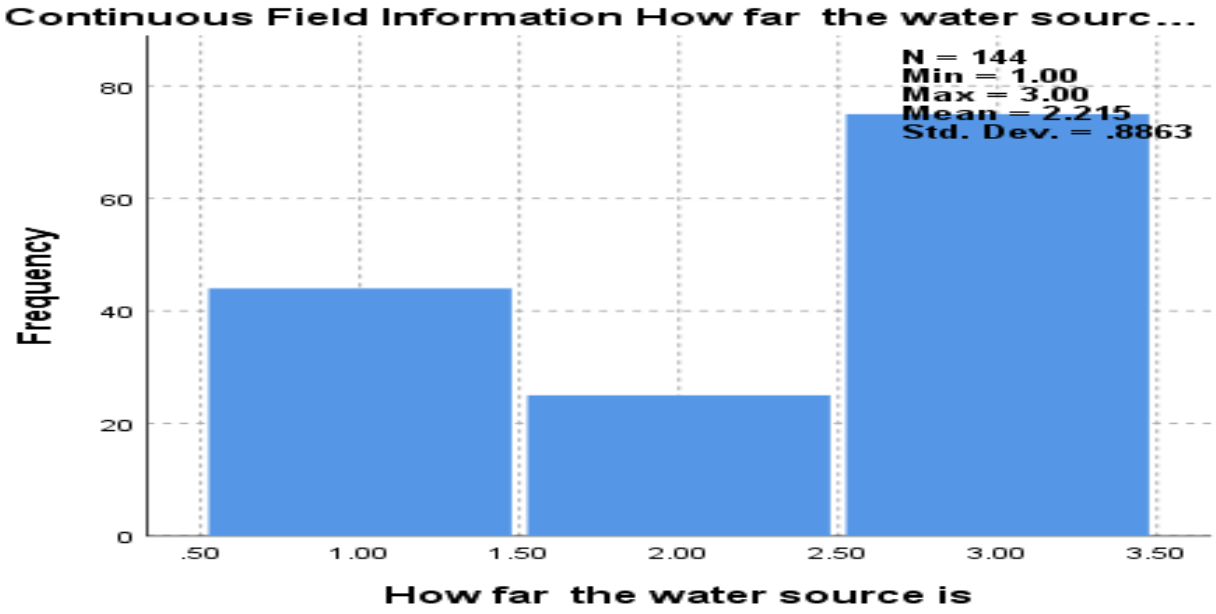
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5L	10	6.9	6.9	6.9
	6-10L	34	23.6	23.6	30.6
	11-15L	25	17.4	17.4	47.9
	16-20L	46	31.9	31.9	79.9
	greater than 20 L	29	20.1	20.1	100.0
	Total	144	100.0	100.0	

How far the water source is

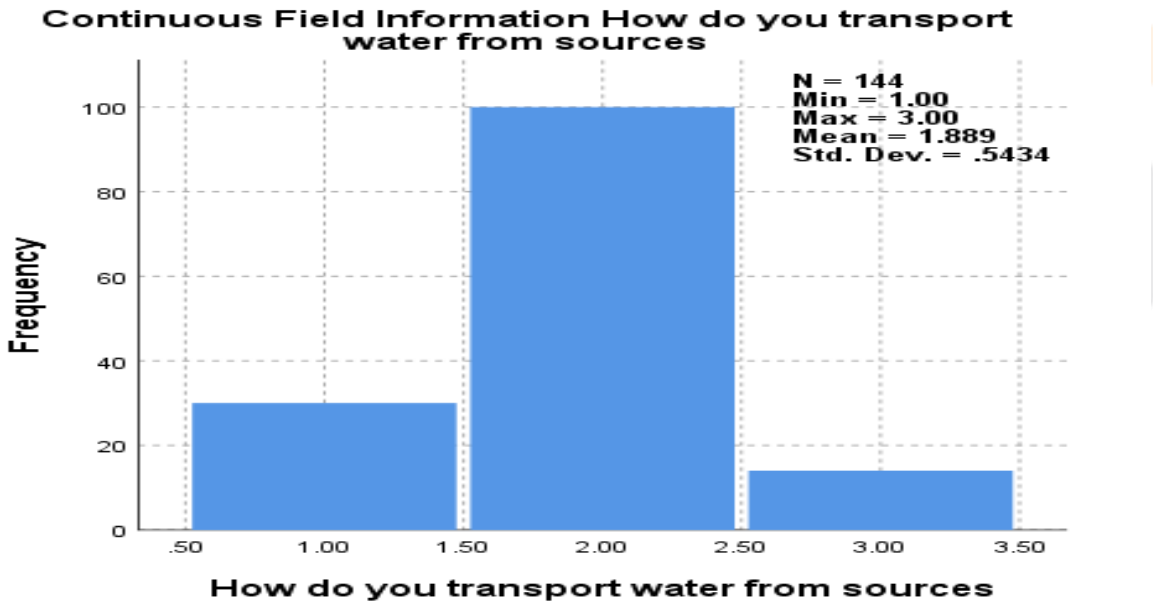
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-2 KM	44	30.6	30.6	30.6
	3-5 KM	25	17.4	17.4	47.9
	6-8 KM	75	52.1	52.1	100.0
	Total	144	100.0	100.0	

Table 6.2: Survey Findings on the Water Source from an Unprotected Spring 10.4% of the hole Pond 31.9 percent 2.1% water from streams and rivers 2.8% well-dug sand Hand pump: 11.1% 41.7%, the number of times for collecting water: 30.6%, twice, 27.8%, three times, and more than three times, 13.9% The daily water requirements for consumption are as follows: less than 5L (6.9%), 6–10L (23.6%), 11–15L (17.4%), 16–20L (31.9%), and

more than 20L (20.1%). The survey results indicate that the community's access to water is an issue, regardless of how far the water sources are from the residence (0–2 KM, 30.6%), 3-5 KM, 17.4%, and 6–8 KM, 52.1%).



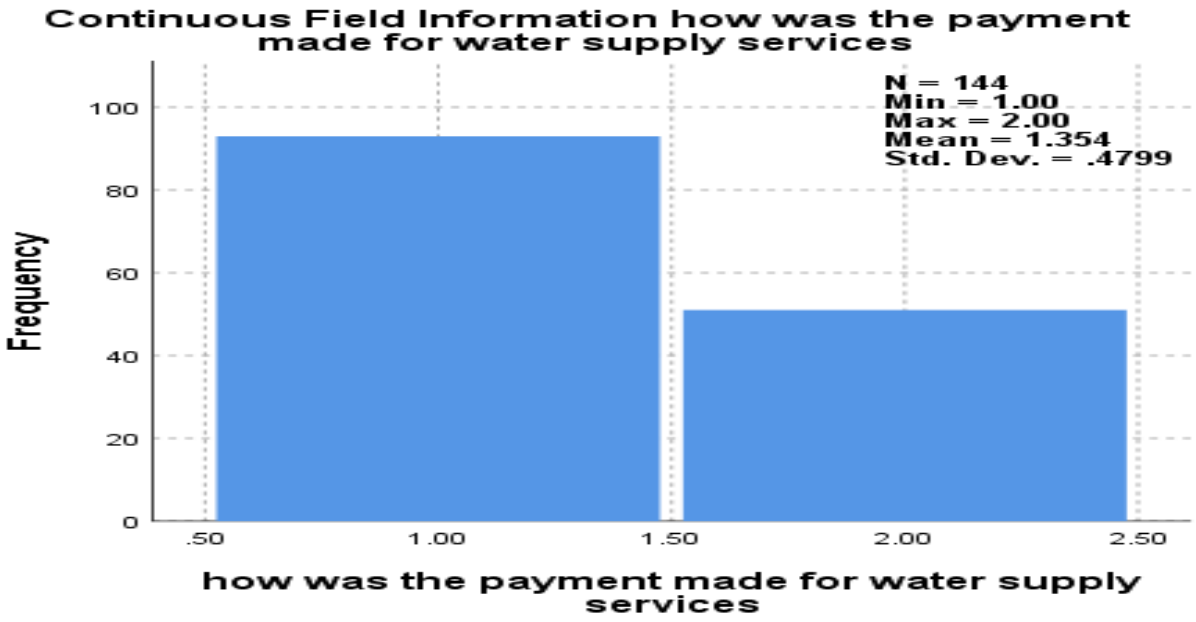
Results of the survey Table 6.2: Who gets water? Husband 2.8%, wives 55.6%, kids 34.6% and both wives and kids 6.9% How do you carry water from sources on your head (9.7%), back (20.8%), and domestic animals (69.4%)

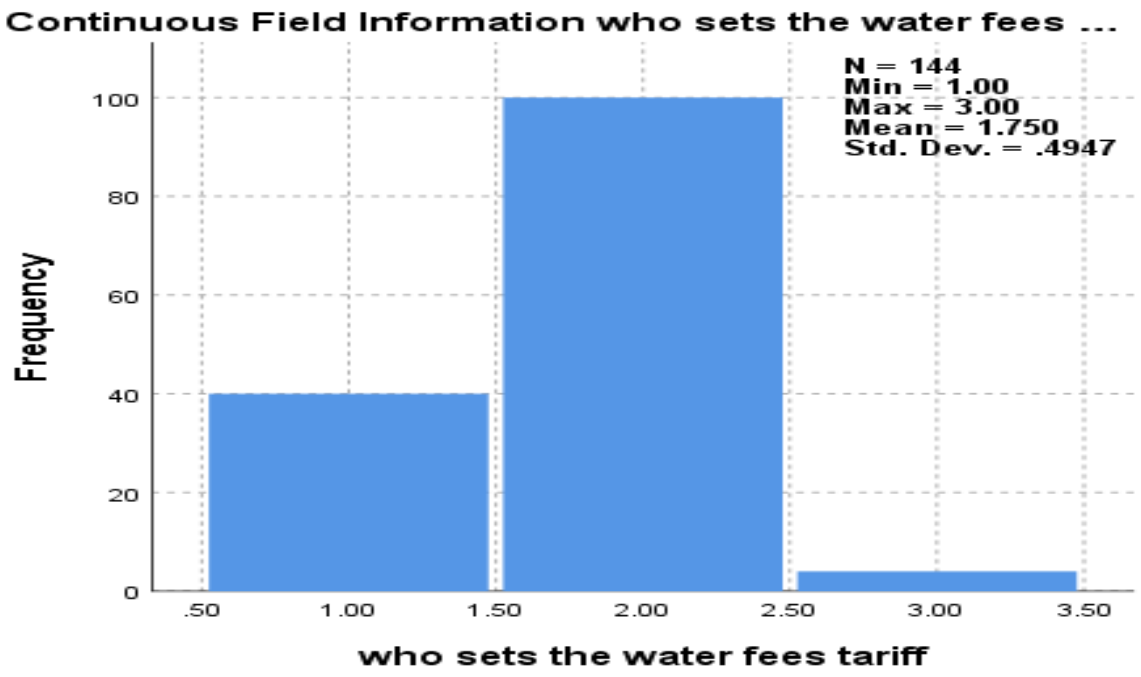


How you consume unprotected water depends on where it originates. Boiling before consumption, 69.4% Chemical disinfectants are used by 23.6%. 6.9% Between 1994 and

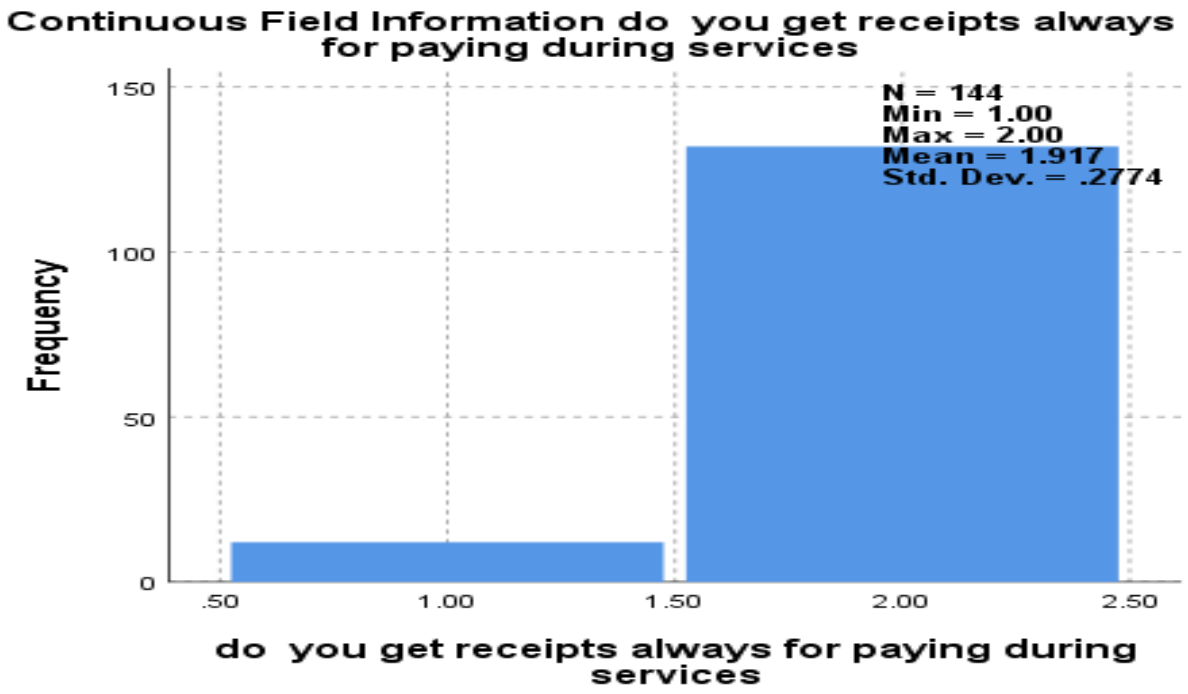
1996, 13.9% of these hand pump water projects were built; between 1997 and 2000, 16.7%; and between 2001 and 2004 27.8% from 2005 to 2006. 34.7% were unaware 6.9% How would you rank the local water supply's construction quality? 20.8%, excellent 9.7% is not very excellent. 69.4% of the area technicians are/are there technicians that have completed basic training to do repairs?

Indeed, 36.1%. No, 63.9% of the tools are insufficient to do repairs. Which parties financed the constructed water supply community 25%, government 34.7%, community and government 27.8%, and how was the payment made for water supply services on a daily basis as we fetch 64.6%, monthly 35.3%? 27.8%, no 72.2%, yes 45.8%, no 54.2%, is/are the committee well-trained yes 48.6%, no 51.4%, does the committee try to alleviate the problem of water supply services yes 38.2% no 61.8%?

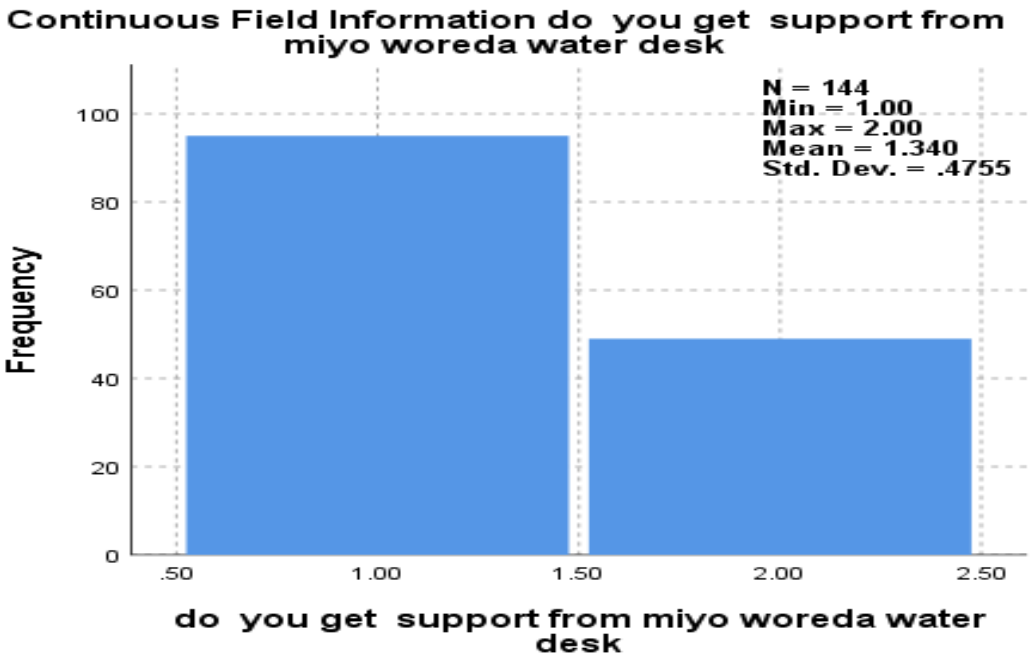




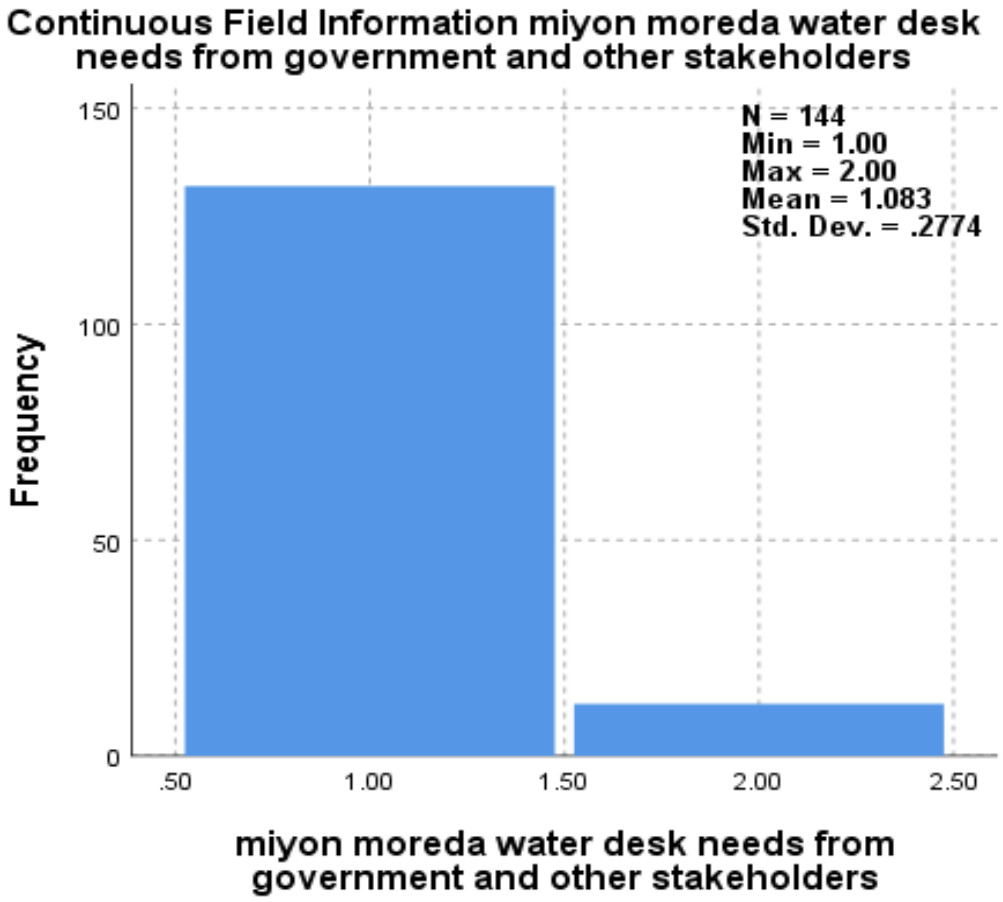
The water fee tariff is decided by who? NGO 2.8%, government 69.4%, and community 27.8%. Yes, 93.1% of the water fees collected from beneficiaries is sufficient; 6.9% is not. Who oversees the management of the user-paid water fees? Are committees in charge of bank accounts? Community: 75%; government: 21.5%; NGO: 3.5%. 85.4% say yes, while 14.6% say no. Do you receive receipts for payments made during services? 8.3% say yes; 91.7% say no.



Do you believe the scheme managers possess the necessary skills to oversee the finances? Sure, No, 41.7% 58.3, In your opinion, what is the nature of how users operate and use technology? 13.9%; not easy 86.1% of the sample How frequently do your water schemes malfunction at least once? Twice, 30.6% 34.7%, three times over17.4%, more than three 17.4 percent Regarding spare parts availability, what do you think? 7.6%, not available 92.6 % In what way do you think spare parts are affordable? 17.4%, costly 75.7%, I am not certain 6.9% What causes the malfunctioning of spare parts during construction? 34%, an issue with technology 34.75, design issue 31.3% of respondents said the Miyo Woreda Water Desk helps them. yes, 66%, no 34%



What the government and other stakeholders need to know about Miyo Waida Water Desk's fair budget allocation from the WADA administration 91.7%, administrative support at the zonal level, both technical and otherwise 8.3% Do you engage in any regular activities with the water committee's assistance? Do the consumers routinely pay the water fees? Yes, 41%, no, 59%. 90.3% say yes, 9.7% say no.



The study's primary conclusions are drawn in accordance with its central inquiries. The research has determined that the provision of water supply schemes and their applications presents a number of interconnected issues. The recipients' options for technology and site selection related to their water supply were restricted. Their involvement in the design of their water supply schemes was minimal. Such a circumstance gives rise to an issue in the research fields. It was discovered that collecting the operation and maintenance costs for the water supply in the research area was extremely challenging, if not impossible.

The nation's water resource management policy stipulates that rural areas are responsible for paying for the system's upkeep and operation. However, in every community that was examined, water is used without charge, endangering the long-term viability of the water supply points.

The survey additionally assessed the principal issues that have an impact on the sustainability of urban water supply points within the study area. The results of the

investigation indicate that a multitude of issues contribute to the unsustainability of water supply in urban areas. A number of these issues are listed below. Interestingly, all sites have user-managed water supply schemes, with a water committee overseeing the overall management of the water schemes.

However, the study discovered that because water committees lacked the necessary knowledge and training in the financial, technical, and general administration of their water points, they were unable to manage water supply points effectively. The main issues preventing water committees from effectively operating their water schemes are also the lack of operational instructions, a general lack of support, and their workloads. The majority of water supply stations are not well managed, according to the survey results. The reasons are as follows: users' low sense of ownership over the water schemes stemming from their dissatisfaction with the water supply—most of the time, there was either no water at all or a very small supply coming from their points—water points' inability to function properly, users' low participation, and low awareness.

Poor management of the water delivery schemes has also been exacerbated by inadequate training and support provided by community implementing agencies. The community has demonstrated a desire to pay user fees, which are too little for upkeep and operation, the survey also found. Water fees aren't sufficient to pay for operating and maintenance expenditures, nevertheless, due in part to issues with charge collection and management that are either inadequate or bad. Parts are expensive and sometimes even hard to find, which is another reason why users were unable to gather enough money to buy replacement parts.

The inability to obtain replacement parts at the community, woreda, and regional levels was the second significant technical problem impeding the sustainability of water supply schemes in the research area. The investigation also discovered that no implementing agency had guaranteed that spare parts would be available to communities and that spare parts were not stocked at any level. The regional water bureau and WWD did not set aside funds for replacement parts, and the woreda has no official private sector suppliers of high-quality replacement parts.

The study discovered that, since most of the issues were beyond the financial and technical capabilities of local technicians, the steps taken to repair and maintain the service

were almost nonexistent once the water schemes experienced severe breakdowns and no more maintenance without keeping the chance to construct a new one or any other no functionality problems.

The results of the survey have shown a number of reasons why the water plans are failing. The most significant contributing factors are poor operation and maintenance, which can be attributed to a number of problems, including a lack of user ownership, a weak support system, challenging access to spare parts, a shortage of toolkits and trained personnel, and users' incapacity to pay for these services. The absence or inadequate community support mechanisms provided by implementing agencies during the installation and handover of water schemes was one factor contributing to the inability of water delivery schemes to remain sustainable. In a similar vein, inadequate monitoring, supervision, and evaluation during the water scheme's construction as well as a lack of coordination amongst stack holders were discovered to be the causes of subpar installations and poor construction quality, which had an impact on the long-term viability of water supply schemes and/or subpar sector performance.

The study also found that the local government's (WWD) insufficient institutional capability was one of the primary barriers to improving the sustainability of water delivery schemes in the study area. The absence of capital and recurrent budgets for the water sector, a lack of competent workers, and a lack of transportation services were the key factors limiting community support at the woreda level to ensure the proper running of the water schemes.

Water supply strategies in the study region have typically concentrated on adding additional water supply points or expanding coverage, often without enough thought given to maintaining the existing water delivery networks. As proof of this, one of the implementing agencies provided communities with access to spare parts, gave them a budget that was mostly for recurrent expenses, and helped the community get ready to run their water schemes.

6.1 RECOMMENDATION

Water supply is a major issue in miyo woreda, which is broad and typically has 12 kebeles. The rural study area's water supply services were deemed unsuitable, non-applicable, and of low quality. the structure that governs how rural water supplies are

organized and managed. For this reason, the following suggestions are made in relation to the issue:

Eighty-six percent of the villages in the study area rely on unsafe water sources. Therefore, in order to protect the population from waterborne and water-related health issues, it is important to raise awareness among them and provide them with assistance in using unprotected water sources safely, such as by boiling them before using them and by providing chemical disinfectants. In addition, it's critical to clean and remove exposed water sources to reduce the growth of bacteria and other pathogens. In order to have actual water supply coverage, there should be a correctly assembled and updated inventory of current water supply service schemes, timely and spatial access to spare parts, and appropriate administration of the schemes within the study woreda.

For the programs to be successful and sustainable, all beneficiaries—women in particular—must be fully included from the beginning, during the ongoing water supply projects, and in post-construction administration. Thus, they must to be the guiding ideas for developing, carrying out, and overseeing initiatives related to rural water supplies.

As the lowest administrative level, the miyo woreda water desk is expected to provide short-term community support regarding the safe use of unprotected water sources, carry out research and design, carry out construction to improve the unprotected water sources as a long-term solution, and provide technical support to the water committee for water committee operation, maintenance, and other water supply scheme management. However, the office was unable to fulfill its obligations, so as a result:

The Miyo woreda water desk has to be staffed by qualified personnel. The office needs to be furnished with high-quality supplies, such as replacement components. Since the water committee typically manages its workforce poorly, outside assistance is needed to oversee and control the work of technical operators, especially when it comes to maintenance.

In general,

Sustainability requires the development of a culture of fair payment, which includes determining the foot-moment pricing of materials for a project area. Creating a sense of knowledge and ownership for the community helps with this. A crucial part in these advances is played by the following factors: Community-based organizations must actively and intelligently participate in rural water delivery initiatives from the outset. a focus on

education and awareness campaigns that target the community at large as well as committees. Participation at the project level of both traditional structures and local government It is crucial to support and encourage water services authorities' strong commitment to creating sustainable projects with sufficient cost recovery as it will play a significant role in future development.

Formalizing management arrangements needs to address the rural community level's lack of awareness of local government. The district and provincial levels should also assist this at the project level through more extensive intervention. A high-quality water supply service plan will benefit the study area because the marginalized community in it resides in rural areas and water is essential for both humans and animals.

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