

Assessment of Customer's Satisfaction on Water Supply Service Delivery in Bahir Dar City, Ethiopia

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ABSTRACT

Understanding consumer satisfaction levels for drinking water can contribute to improvements in water service quality and water management. The aim of this study is to assess the consumers' satisfaction on water supply service in Bahir Dar city, Ethiopia. The representative households were selected by stratified followed by systematic sampling techniques. The data was collected from 351 representative households using questionnaires and semi-structured interviews. The collected data was coded, edited and entered into STATA (Statistical analysis software) version 14.2 for further statistical analysis. Chi-square test and order logistic regression were conducted. The chi-square test indicated that relatively males were more satisfied than females. Customers with the educational status of having secondary and above educational level were relatively unsatisfied. Similarly, customers who had their own houses were more satisfied than customers who got house from the rent of individuals and agencies, while customers having low and middle income were significantly more satisfied than customers having high-income levels. Results from the order logistic regression indicated that total customer satisfaction had a significant relation with continuity of water supply, water pressure and scheduling of water service. The result also indicated that most customers were not willing to pay additional payment for the existing satisfaction level but customers were willing to pay more if there was a significant improvement in its overall customer services, particularly on the three least rated satisfaction drivers continuous water supply, water pressure and scheduling of water service.

Keywords: Customer Satisfaction; Water Supply; Service Delivery.

1. INTRODUCTION

Water is fundamental to human development and well-being. It is also critical to the achievement of other development objectives such as adequate nutrition, gender equality, education and poverty. Access to safe water and sanitation is also a human right, as recognized in 2010 by the United Nations General Assembly. However, governments around the world face significant challenges in managing their water resources effectively and billions of people are still without access to safe water and adequate sanitation [1], [2], with a majority of these numbers in Sub-Saharan Africa and South Asia [3]. Population growth, urbanization and changing lifestyles as a result of economic growth are key drivers of these challenges [4], [5]. Factors like topography, sources of water reserve and distribution systems are some of the causes of low water services [6]. Africa's urban population is projected to be triple by 2050 [7]. People in these rapidly growing cities need safe, convenient and reliable water supplies. However, access to adequate water and sanitation is low in many countries in Africa resulting in high incidence of infectious diseases that reduce vitality and economic productivity of the increasing population [8]. Ensuring universal and affordable water supply is a central objective of every government. An efficient water supply sector plays a primary role in ensuring this objective [9]. Access to safe and reliable water supplies has received increased government attention in Ethiopia [10]. However, urban water supply is still a common problem in the country. In most developing countries, including Ethiopia, infrastructure services are provided by state-owned organizations [11]. Due to the monopolistic nature of these organizations, there is no or little inclination to ensure consumer satisfaction. The requirements and

satisfaction of customers are low on priority in government-owned organizations, mainly due to the lack of professional approach in customer services [12]. In service giving organizations, customer satisfaction and quality of services hold the central place [13]. Customer satisfaction measurement enables an organization to undertake proper evaluation and identify the key drivers that enhance its customer satisfaction [14] and it is defined as the fulfillment and gratification of the need for a stated good or service [12]. The study of customer satisfaction has prime importance to encourage the performance of organizations that provide essential services such as water supply. People as customers are more concerned about the quality of service being provided by the water utility managers [13], [15]. Any water supply system should take into consideration the level of the service, which directly affects the water prices policy and the sustainability of the service [16]. A few of the attributes that lead to higher consumer satisfaction include reliability of water supply at the appropriate pressure, good quality water, timely and accurate bills, responsiveness to general inquiries and resolving complaints, ease of obtaining new connections, convenience of bill payment process, appropriate customer care behavior, regular information updates regarding services as well as good office ambiance [12].

Research findings indicates that there is a direct relationship between willingness to pay and the customer's satisfaction. Customers' willingness to pay water rates was determined based on their overall satisfaction with the services offered [14], [17]. Understanding customer satisfaction and willingness to pay to water service is very important to improve the service quality according to customers' interests. A better understanding of the delicacy of water, willingness to pay an amount and their influencing factors could eventually help to better frame water resources conservation policies and their enactment [18]. Therefore, this research aims to assess the customer satisfaction level in water service and their willingness to pay their charge to water service in Bahir Dar city, Amhara region, Ethiopia.

This research was conducted to assess the residential customer satisfaction in public water service in Bahir Dar city, Ethiopia. Basically, the focus of this study was to answer the following research questions such as: What is the level of customers' satisfaction for water services received in Bahir Dar city, Ethiopia? and What is the level of customer's willingness to pay for water provision based on their overall satisfaction? This study is expected to increase the knowledge and up to date information about the satisfaction level of customers in water service delivery in Bahir Dar city, Ethiopia and it will also indicate areas in which customers are not satisfied. Therefore, the study could serve as a working document to policymakers and non-governmental organizations in the water sector. Moreover, the finding will further serve as reference material and it opens a new avenue for future investigation in the area.

2. RESEARCH METHODOLOGY

2.1. Population and Sampling technique

Since a complete listing of customers in the survey area was not available, stratified and systematic sampling techniques were utilized. Thus, representative households were demonstrated by four different centers namely; Shumabo sub-city, Hidar 11 sub-city, Sefenselam sub-city and Minilik second sub-city. Representative customers were identified systematically using their bile numbers in every four centers with appropriate allocation. The researcher used the sample size determination formula, which is developed by Yamane (1967:886), to determine the sample size for the study.

$$\begin{aligned} n &= N / (1 + N(e)^2) \\ &= 43834 / (1 + 43834(0.05)^2) \\ &= 397 \end{aligned}$$

Where -n = the sample size,

N = the population size

e = confidence level of the study to be at 95%

From a total of 43,834 households, 397 representatives were taken as a sample. Systematic random sampling technique was employed to appropriately allocate the household representative from each center and Figure 1 shows the sample distribution in each center.

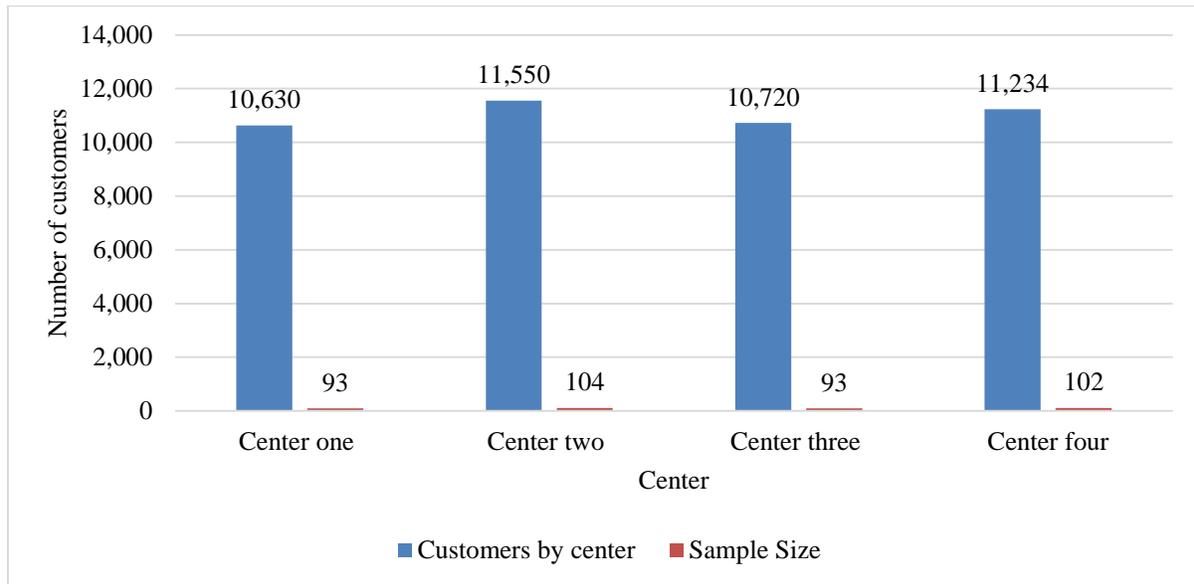


Figure 1. Sample distribution

2.2. Data types , sources of data and data collection instruments

To address the objectives of the study, the study employed a primary data collection mechanism. To collect primary data from the respondents, the researcher used close-ended questionnaires. This enabled the researcher to capture direct answers from the respondents. The questionnaire consists of three sections: (a) demographic characteristics of respondents, (b) customer satisfaction rating of the services and (c) billing and willingness to pay. Besides this, a semi-structured interview was conducted to support the results obtained from the questionnaire.

2.3. Model specification

The paper used logistic regression technique to develop customer satisfaction model basing from the fact that both dependent and independent variables are categorical. A chi-square test was used to indicate how well the logistic regression model fits the data. Thereafter, logistic regression coefficients were estimated using the following likelihood ration.

Statistical Model :

$$\begin{aligned}
 \text{Logit} (Y) &= \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 \\
 &= \alpha + \sum_1^8 \beta_iX_i
 \end{aligned}$$

Y = Satisfaction, X₁ = Courtesy of staffs, X₂ = Schedule of Water, X₃ = Water Color, X₄ = Billing accuracy, X₅= Water Smell, X₆ = Water test, X₇ = Water pressure, X₈ = Water continuity

2.4. Method of data analysis

After collecting the data, it was coded, edited and entered into STATA (Statistical analysis software) for further statistical analysis. The data was presented by tables and figures to give a condensed picture of the data. Chi-square test was employed to see whether there is a significant satisfaction difference or not between different groups. In addition, the order logistic regression method was conducted to find the determinant factors that affect the total satisfaction of customers.

3. RESULTS AND DISCUSSIONS

3.1. Demographic characteristics of respondents

3.1.1. Demographic characteristics of categorical variables

The number of questionnaires returned was 351 (88.5%) out of the 397. The demographic characteristics of respondents to the questionnaire are presented in Table 1. From a total of 351 representatives of households, 247 (41.88%) are females and 204 (58.12%) are males.

Table 1. Demographic characteristics of categorical variables

Characteristics		No (%)
Sex	Female	247 (41.88%)
	Male	204 (58.12%)
Marital Status	Couple	267 (76.07%)
	Single	84 (23.93%)
Educational Level	No school at all	51 (14.53%)
	Primary level	114 (32.48%)
	Secondary level	46 (13.11%)
	Tertiary	140(39.89%)
Monthly income Level	Low	84 (23.93%)
	Medium	240 (68.38%)
	High	27 (7.69%)
Major Occupation	Governmental Employer	138 (39.32%)
	Private Employer	37 (10.54%)
	Self-employed	64 (18.23%)
	Retired	79 (22.51%)
	Others	33 (9.40%)
House ownership	Privately Owned	237 (67.52%)
	Rent from House Agency	40 (11.40%)
	Rent from individual	74 (21.08%)

Among these 267(76.07%) were couple, while 84(23.93%) were single. The educational level of representative of households was, 51 (14.53%) can't read and write; 114(32.48%) had primary educational level, 46(13.11%) had secondary educational level and 140(39.89%) had tertiary educational level. While the income level of the respondents was low for 84 (23.93%), medium for 240 (68.38%) and high for 27 (7.69%). Among the respondents the majority 138 (39.32%) were governmental employees, 37 (10.54%) were private employees, 64 (18.23%) were self-employers. 237 (67.52%) representative of households had their own house, 40 (11.40%) were living in rental house from agencies and 74 (21.08%) were living in rental house from individuals.

3.1.2. Demographic characteristics of continuous variables

From Figure 2, the mean family size of the respondents was 4.97 with standard deviation 1.68. According to the Ethiopian welfare monitoring survey in 2015, this result was higher than the regional average (4.6) and lower than the national average (5.16). Representative of households lived in Bahir Dar for an average of 17.39 years. The mean age of the respondents was 44.03 with standard deviation 6.46. This indicates that respondents were mature to understand the questionnaires.

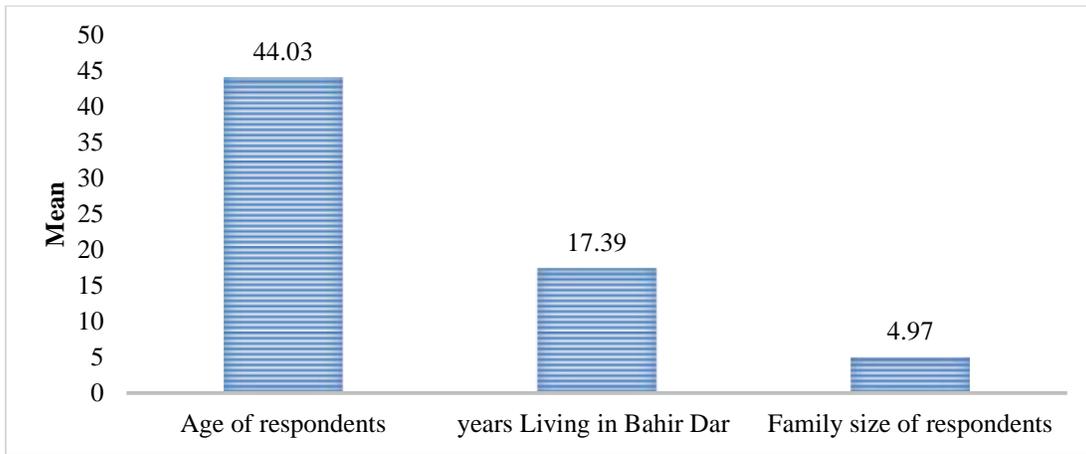


Figure 2. Mean of age, year of living in the city and family size of respondents

3.2. Overall customers’ satisfaction of public water service in Bahir Dar city

The data about continuity of water recorded only 23.65% of the customers were satisfied (2.28% very satisfied and 21.35% satisfied), 29.06% were neutral, while 18.23% and 29.06% were dissatisfied and very dissatisfied respectively. For the accuracy of billing, 43.33% were satisfied (13.42% very satisfied and 29.91% satisfied); while 28.21% were neutral, 24.19% were dissatisfied and 4.27% very dissatisfied. The smell attribute recorded 56.15% satisfaction level (33.36% very satisfied and 22.79% satisfied), with 29.63% neutral 13.63% dissatisfied and 0.57% very dissatisfied, while only 10.53% (2.28% very satisfied and 8.25% satisfied) were satisfied with the pressure of water supplied, 60.11% (35.60% dissatisfied and 24.51% very dissatisfied) and 29.34% were neutral. Color and appearance recorded 67.24% satisfaction level from the respondents (27.61% very satisfied and 39.63% satisfied), while 16.84%,14.50% and 1.42% were neutral, dissatisfied and very dissatisfied respectively.

Similarly, the test of water recorded, and it was found that there is about 62.17% satisfaction level (22.54% very satisfied and 39.63% satisfied), while 27.60,8.52 and 1.72 were neutral, dissatisfied and very dissatisfied respectively. Schedule of water supply records only 21.36% satisfaction level (4.56% very satisfied and 16.80% satisfied), 22.51% were neutral, while 32.48% and 23.65% were dissatisfied and very dissatisfied respectively. 43.33% (14.56% very satisfied and 28.77% satisfied) were satisfied with the courtesy of staff, 28.49% were neutral, and while 18.51% were dissatisfied and only 9.67% were very dissatisfied. From the above results, it can be concluded that customers were less satisfied with continuity of water, water pressure and schedule of water this result was supported by the result of interviews and the findings of [11] found that customer satisfaction is significantly affected by reliability, responsiveness, competence, access, courtesy, communication, assurance, tangibility and customer understanding.

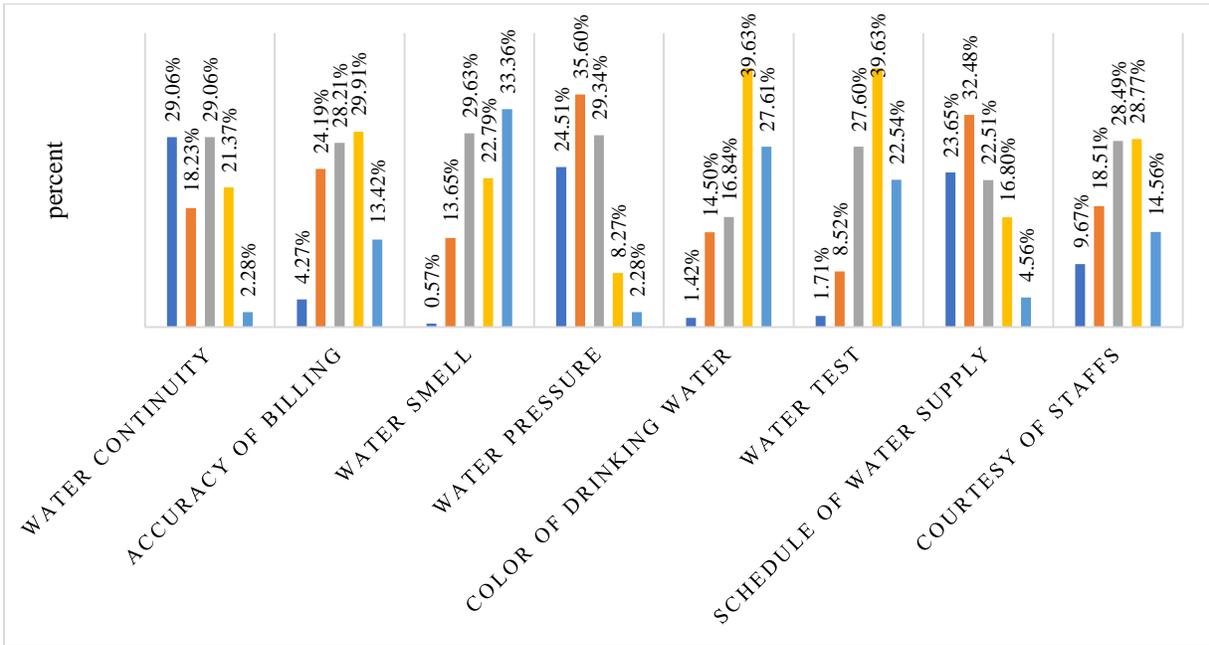


Figure 3. Overall customer satisfaction

3.3. Customer satisfaction by center

Customers’ overall satisfaction about the service area was analyzed to determine the areas with high and low satisfaction in Figure 4. Hidar-11 service area recorded the highest overall satisfaction, with 30.77% satisfaction (3.30% very satisfied and 27.47% satisfied) with 47.25% dissatisfied (46.15% dissatisfied and 1.10% very dissatisfied) and 21.98% neutral, while Minilik second service area recorded the least overall satisfaction of 4.30% (0 % very satisfied and 4.30% satisfaction) and the highest dissatisfaction rate of 92.48% (25.81% dissatisfied and 66.67% very dissatisfied), with 3.23% neutral. Shumabo service area had 17.50% overall satisfaction (0% very satisfied and 17.50% satisfied) with 57.50% dissatisfaction (48.75% dissatisfied and 8.75% very dissatisfied) and 25.00% neutral. While Sefene-selam service area had 16.09% overall satisfaction (0% very satisfied and 16.09% satisfied) and 55.18% dissatisfaction (48.28% dissatisfied and 6.90% very dissatisfied) with 28.74% neutral.

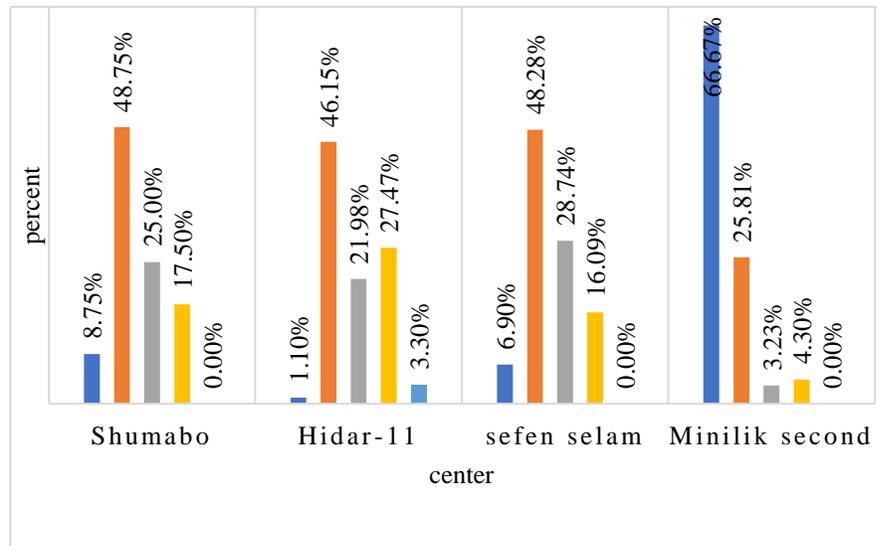


Figure 4. Customers' satisfaction by center

3.4. The relationship between demographic characteristics and overall satisfaction of respondents

Table 2 illustrates the chi-square test for demographic characteristics with overall satisfaction level of customers. 48 (23.53%) male customers and 12(8.16%) female customers were satisfied by the existing service (Table 2). Even though the satisfaction level of both groups was low, statistically there was significant satisfaction difference between male customers and female customers. Customers with the educational status of having primary and lower level education were significantly more satisfied than customers having secondary and above educational level. Similarly, customers who had their own houses were more satisfied than customers who lives in rental houses. Customers having low and middle income were significantly more satisfied than customers having a high-income level.

Table 2. Chi-square test for demographic characteristics with overall satisfaction

Demographic characteristics		Very Unsatisfied (%)	Unsatisfied (%)	Neutral (%)	Satisfied (%)	Very Satisfied (%)	P-value
Sex	Male	21(14.29)	89(60.54)	25 (17.01)	12(8.16)	0.000	P=0.00
	Female	55(26.96)	58(28.43)	43(21.08)	45(22.06)	3(1.47)	
Marital status	Couple	63(29.60)	102(38.95)	51(19.10)	46(17.23)	3(1.12)	P=0.208
	Single	13(15.48)	43(51.19)	17(29.24)	11(13.10)	0(0.000)	
House ownership	Privately Owen	55(23.21)	93(39.24)	45(18.99)	44(18.57)	0(0.000)	P=0.024
	Rent from agency	4(10.00)	19(47.50)	10(25.00)	5(12.30)	2(5.00)	
	Rent from individual	17(22.97)	35(47.30)	13(17.57)	8(10.81)	1(1.35)	
Monthly income	Below 25000 Birr	16(19.05)	28(33.33)	19(22.62)	21(25.00)	0(0.00)	P=0.002
	2500-5000 Birr	46(19.17)	110(46.83)	47(19.58)	34(14.17)	3(1.25)	
	Above 5000	14(51.85)	9(33.33)	2(7.41)	2(7.41)	0(0.000)	
Major occupation	Gove. Employee	40(28.99)	64(46.38)	19(13.77)	13(9.22)	2(1.45)	P=0.060
	Non-Gove. Employee	9(24.32)	14(37.84)	7(18.92)	6(16.22)	1(2.70)	
	Self-employ	8(12.50)	29(45.31)	15(23.44)	12(18.75)	0(0.00)	
	Retired	15(12.50)	26(32.91)	20(25.32)	18(22.78)	0(0.00)	
	Others	4(12.12)	14(42.42)	7(21.21)	8(24.24)	0(0.00)	
Education level	No school at all	6(11.76)	23(45.10)	13(25.49)	9(17.65)	0(0.00)	P=0.00
	Primary level	30(26.32)	28(24.56)	28(24.56)	27(23.68)	1(0.88)	
	Secondary level	18(39.13)	13(28.26)	10(21.74)	5(10.87)	0(0.00)	
	Tertiary level	22(15.71)	83(59.29)	17(12.14)	16(11.43)	2(1.43)	

3.5. Odds ratio for overall satisfaction

The odds ratios in Table 3 show that the overall customer satisfaction of water service in Bahir Dar city is influenced by water continuity, water pressure and scheduling of water service (p=0.00). This result is in line with different findings for instance [19] say reliability and responsiveness are rated by customers as very important. The finding of [11] also indicates that access, reliability, communication were some of the factors that customer satisfaction was highly dependent on. From the total of 397 respondents about 351 were involved for this data survey. This is 88.4% of targeted sample size. Sample size used to run logistic analysis is satisfactory. [20] and [21] recommended sample size for logistic regression analysis not to be less than 100 otherwise the result will be misleading. A minimum of 50 cases per independent variable is recommended.

According to the table above the estimated model becomes:

$$Logit(Y) = 2.819 + 1.087X_1 + 3.621X_2 + 0.7107X_3 + 0.945X_4 + 1.119X_5 + 0.992X_6 + 2.268X_7 + 2.168X_8$$

Where;

Y = Satisfaction, X₁ = Courtesy of staffs, X₂ = Schedule of Water, X₃ = Water Color, X₄ = Billing accuracy, X₅= Water Smell, X₆ = Water test, X₇ = Water pressure, X₈ = Water continuity

From the model it can be seen that, all eight variables are positively related to customers’ service satisfaction because of positive sign and the odds ratio for Courtesy of staffs, Schedule of Water, Water Smell, Water pressure and Water continuity is greater than 1.

Table 3. Odds ratio for overall satisfaction

	Odds Ratio	Std. Err.	Z	P>z	95% Conf.	Interval
Courtesy of staffs	1.087	0.0714567	1.27	0.204	0.955607	1.236488
Schedule of Water	3.621	0.4705406	9.9	0.000	2.806539	4.671034
Water Color	0.710	0.1016185	-2.39	0.017	0.536439	0.940019
Billing accuracy	0.945	0.1274535	-0.42	0.675	0.725467	1.230914
Water Smell	1.119	0.1468161	0.86	0.392	0.865233	1.447106
Water test	0.992	0.1561143	-0.05	0.961	0.728979	1.35068
Water pressure	2.268	0.4006567	4.63	0.000	1.60412	3.206238
Water continuity	2.168	0.3102164	5.41	0.000	1.638033	2.870058
Constant	2.819	1.327				

3.6. Customers’ willingness to pay

Customers’ willingness to pay water rates was determined based on their overall perception of satisfaction with the services offered. The result of Figure 5 revealed that (19.37%), (31.05%) and (33.90%) respondents were not willing, poorly willing and fairly willing, respectively; while only (10.83%) and (4.84%) respondents were willing and very willing to pay respectively and this finding is similar with [14]. The result from the interview also indicates that customers were willing to pay more if there is a significant improvement in its overall customer services, particularly on the three least rated satisfaction drivers continuous water supply, water pressure and scheduling of water service.

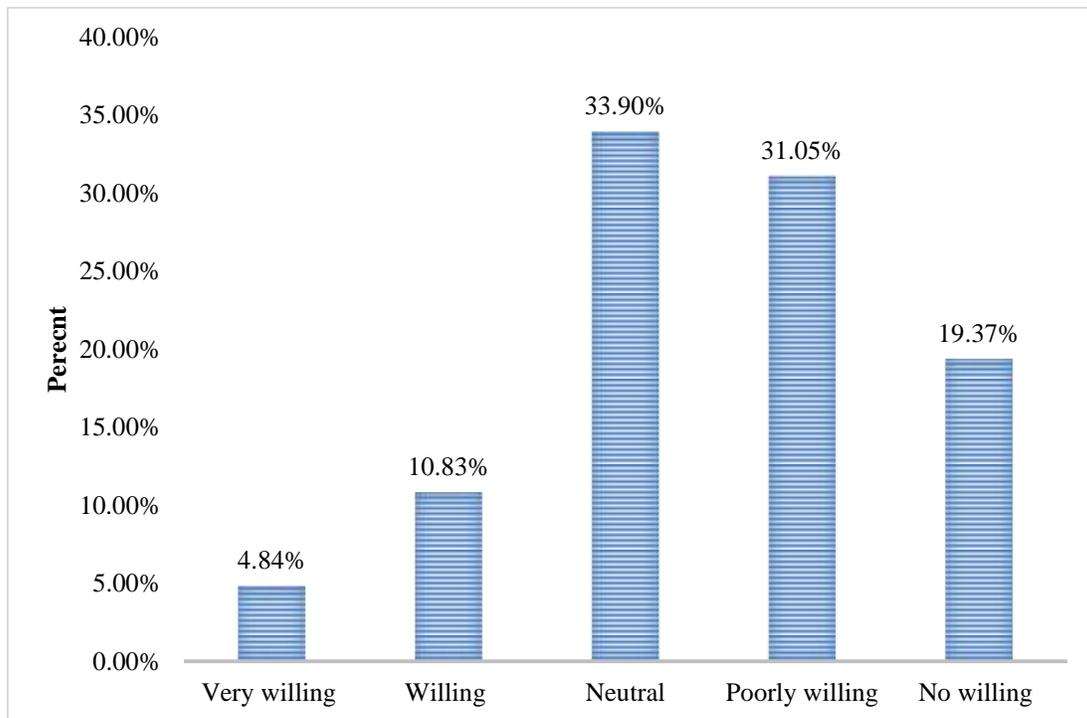


Figure 5. Customers' willing to pay on overall satisfaction

4. CONCLUSIONS AND RECOMENDATION

The study of customer satisfaction has prime importance to encourage the performance of organizations that provide essential services such as water supply. The aim of this study was to assess the consumer satisfaction level of water service in Bahir Dar city. The result from the percentage data indicated that customers had high satisfaction with water smell, water test and appearance or color of water whereas customers were less satisfied by continuous water supply, appropriate water pressure and scheduling of water service. Customers in Hidar-11 had high satisfaction whereas customers in Minilik second had less satisfaction, so this indicates that the satisfaction level in the city was not equal. From the chi-square test it can be concluded that relatively males were more satisfied than females. Customers with primary and lower levels were significantly more satisfied than customers having secondary and above educational level. The order logistic regression indicated that overall customers' satisfaction was a significant relation with continuity of water supply, water pressure and scheduling of water service. The result also indicated that most customers were not willing to pay additional payment for the existing satisfaction level but customers were willing to pay more if there was a significant improvement in its overall customer services, particularly on the three least rated satisfaction drivers continuous water supply, water pressure and scheduling of water service. This study recommends that to improve customers' overall satisfaction, the water management body should focus on continuous water supply, water pressure and scheduling of water service. The future study will entail on industrial and commercial customers of Bahir Dar city.

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