Households' Affordability and Willingness to Pay for Water Services in Khan Younis City, Palestine

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Abstract— Willingness and affordability to pay for water services are significant factors in deciding the success and failure of water supply services. Due to the fact that households' willingness to pay for water services are too heavily influenced by specific circumstances, culture, and various social-economic factors, this study aimed at offering a comprehensive picture of the willingness and affordability of household to pay for water services in Khan Younis City. This may provide guideline for Palestinian policy makers to develop a successful water pricing. It also aimed at recognizing the factors that determine households' willingness to pay and assessing households' perception of the existing water supply situation and water problems.

To fulfill the aim of the study, the researcher used quantitative research method where a questionnaire survey was conducted. The questionnaire was distributed to 400 citizens in Khan Younis city. A pilot study was accomplished and thirty copies of the questionnaire were distributed to receive feedback to modify the form, and to make it easier for respondents to deal with it. SPSS software package was applied to identify the most relevant factors affecting household's affordability, and willingness to pay.

The results of the analyses indicated that income, water distribution schedule, water quality, water quantity, municipality services, marital status, water network maintenance, water continuity, techniques in the municipality to deliver citizen's complaint satisfaction, staff response speed about the delivered complaint in the suitable time were determinants for household customer's willingness to pay and had an effect on it. Furthermore, results revealed that satisfaction of households towards (water network maintenance, municipality service, available techniques in municipality to deliver citizen's complaint, staff response speed about the delivered complaint in the suitable time and water quality) was not good. Therefore, the municipality of Khan Younis city has to make improvements to raise its services quality. Also, analysis indicated that there were different reasons for not committing to pay water bills. The most important ones were low income with percent 20.5%, the bad quality of water with percent 25.2% and bad municipality services with percent 17.9%.

Based on the study findings, it is recommended that the municipality of Khan Younis city to make improvements to improve water quality. In addition the municipality and Coastal Municipalities Water Utility have to separate their presenting of services in order to make citizens have clear picture of their individual services and to motivate them to pay for improved water services.

Index Terms— Affordability and willingness to pay, water services, Khan Younis

I INTRODUCTION

Water service is basic human right. In Palestine today, it cannot be fully enjoyed. The near decade long blockade on Gaza, deny Palestinians the control over their water resources and prevent them from developing adequate water services [1]. The water in the Gaza Strip is critical for many reasons, among others the repetition of conflicts, the political instability, the lack of local available resources, the weak institutional framework, the dependency on external funding, and the difficulty to import materials and equipment.

Significant effort has been made to improve access to water worldwide in recent years [2]. Though, the situation is far from perfect, particularly in Gaza Strip. It is assumed to have adequate financial resources in order to generate a water supply system, preserve and progress the services. Accordingly, the users of the service must contribute to the cost of the improved service.

According to CMWU [3], the situation was worsening by the conflict in July - August 2014. It was clear that the operation has a devastating impact in terms of humanitarian consequences and in particular severe damages to water infrastructure has been extensive. Additionally, the damages to the energy generation and electrical supply system, has resulted in a significant reduction in water supply to the population as well as deterioration in the quality of water (salinity). With the continuous disruption to water services, the people in the Gaza Strip have been made vulnerable to an ever worsening humanitarian crisis due to the lack of basic service provision, an unfolding environmental disaster and the potential health-related risks that come along with it.

Consequently, water services were considered as an

economic good because it had price and prices were derived from tariffs and tariffs were advocated and formulated in line with the adopted water policy [4]. Water pricing is an effective strategy to manage water use. Transferring to a more suitable price scheme can regulate inefficient levels of domestic water use by varying household water demand. Developing countries are in need of more practical and effective water pricing methods since they usually suffer from insufficient water supply services and lack sophisticated and inclusive water pricing systems.

The factors that affect households' willingness to pay for improved water sources are too heavily influenced by specific circumstances, culture, and various social factors to be used outside of the specific scope of a study [5]. Due to the fact that people's attitude towards paying for water is a key factor in deciding the success and failure of water supply projects [6].

Further, most of the municipalities suffer from gathering water services costs since citizens do not pay their water bills. This crisis should be managed carefully to secure the water demand with a successful price. Therefore, any improvement process for the water supply service will increase the cost of this service since valuation of water service is the key component of an appropriate incentive for balanced and coordinated investment development in the different parts of the city. Hence, this study endeavors to examine some of the factors that affect households' willingness to pay for improved water services and to present their ability to pay for the improved water services in the city. This study sheds light on households' willingness and affordability to pay for water services in Khan Younis city to generate useful baseline information for policy makers to improve a successful water supply policy.

II Materials And Methods

The adopted methodology to accomplish this study is observational sectional approach, which is integrated to achieve the study objectives which were: measuring the ability and wiling to pay (WTP) for water supply service in the Khan Younis city and developing a water tariff model for municipal water departments in the Gaza Strip. A questionnaire was developed to the target group which was the customers of water supply in Khan Younis city. The strategy of this study has built on quantitative research method where the questionnaire survey was conducted. Consequently, in sight of the features of quantitative research method as a technique for easier and more precise thorough analysis, the questionnaire was chosen to identify the factors affecting household`s willingness and affordability to pay for water services.

As stated by the Palestinian Central Bureau of Statistics, the total number of household in Khan Younis city is 241,870, which means that 400 households is the sample. This sample is a random one, the questionnaire forms were distributed, filled and analyzed in Khan Younis city which has around 20 localities. Based on the review of related literature a questionnaire was established with closed and open-ended questions. The questionnaire was planned in the Arabic Language, as most of the target residents were unfamiliar with the English Language. In each questionnaire, a descriptive letter was involved to cover some moral considerations and to assist questionnaire filling. The questionnaire consisted of three sections. The first section was related to the social and the economic background of the respondent. The second section was about the current situation of water supply situation. The third section addressed the quality and quantity of the service, and the customers' satisfaction. The fourth part discussed the affordability of water consumption, etc. Moreover, the researcher distributed the organized questionnaire to panels of experts with experience in the same area of the research to obtain their notes on the questionnaire. After changing the questionnaire according to the commentaries of the experts and before distributing the final questionnaire on the entire sample, a pilot study is accomplished and 30 copies of the questionnaire are distributed. The questionnaire was designed to be administered as a structured interview. Respondents were drawn from localities where the final survey was expected to be conducted. At the end of this process, the modifications are discussed with the supervisor, adjustments and addition were introduced as well as the final form of the questionnaire was constructed then the questionnaire was finalized.

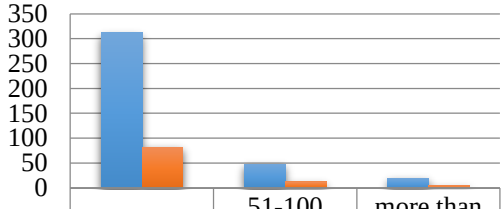
III Results And Discussion

A total of 400 households answered the questionnaire from different localities of Khan Younis city. Of all the sample population, 20 responses were dropped because some of them lacked the required information and others gave unreliable and inconsistent answers. Hence, only 380 questionnaires were used for this analysis. Regarding the social and economic aspects of Khan Younis community, 87.4 % were male respondents while 12.6% were female respondents. From the total of 380 sampled households, 74% were educated and the rest 26% were not. According to the survey findings, 91.6% of the respondents are married. The single respondents are 5%. This reveals that the married respondent is responsible for the water cost and consumption. The data about the respondents' age shows that the average ranges from 30 to above 40 years.

1. Cost of water paid from other resources per month

It is clear that 82.1% of the households paid 50 NIS for water from other resources per month. It is believed that they buy water not because of water shortage but because the water quality is low. They used the water in cooking, taking shower and washing as the municipality water is too salty. Figure 1 shows the percentage and the frequen-

cy of the cost of water paid from other resources per month.



	50 NIS	51-100 NIS	more than 100NIS
	cost of other water resources		
Frequency	312	48	20
Percent	82.1	12.6	5.3

Figure 1 Cost of water paid from other resources per month

2. Relationship between WTP and water quality satisfaction

Results revealed that satisfaction of 45.5% of the households is poor and 45.0% is average while just 9.5% is good. This result indicates that water quality is not good in Khan Younis city and needs improvements to raise its quality. Table 1 shows that water quality satisfaction affects the willingness to pay since the significance is 0.00. This result asserts that most households confirm whenever water they are getting has good quality, their WTP rates are getting higher. This result is confirmed by several research findings.

TABLE 1
One-way ANOVA for water quality satisfaction

Willingness to pay water bill monthly						
		Sum of Squares	df	Mean Square	F	Sig.
Water quality satisfaction	Between groups	9.08	2	4.54	11.36	0.00
	Within groups	150.67	377	0.40		
	Total	159.75	379			

It is noted while distributing the questionnaire that the majority of the households have willingness to pay instead of raising water quality since they buy water from other resources not because of water shortage but because of water bad quality. This result is confirmed by the result of the item number (32) in the questionnaire that shows that 64% of the respondents agree to pay more for water quality improvements. Reviewing literature that has identified some variables that have been used in previous studies corresponding an improved water quality that is linked to household's willingness to pay investigation, households were commonly found to be willing to pay higher for improved water quality from most of the studies. Cho et al. [7] study found that rural residents in Minnesota are willing to pay to improve their drinking water quality by reducing the iron and sulfate concentration in the water. However, willingness to pay is less for consumers that notice they are provided with good quality water.

In addition, Chi-square is done in order to test the effect of water quality satisfaction upon households' acceptance to pay more for water improvement and quality. The table below illustrates that 63.9%% of the households accepted to pay more for improvement, whereas 36.1 % of them did not accept to pay more for improving the services. Besides, chi- square test demonstrated that the significant value of the test is 0.02 which is less than 0.05, so it can be said that there is an effect of water quality satisfaction upon households' acceptance to pay more for water improvement and quality.

TABLE 2
Crosstabs for water quality satisfaction

If the municipality attend to raise water services price for improvement and quality, do you agree to pay more for this improvement		Water quality satisfaction			Total
		Good	Average	Poor	
Yes	Count	30	114	99	243
	% within Q_32- If the municipality attend to raise water services price for improvement and quality, do you agree to pay more for this improvement	12.3%	46.9%	40.7%	100.0 %
	% within Q_19- Water quality satisfaction	83.3%	66.7%	57.2%	63.9%
No	Count	6	57	74	137
	% within Q_32- If the municipality attend to raise water services price for improvement and quality, do you agree to pay more for this improvement	4.4%	41.6%	54.0%	100.0 %
	% within Q_19- Water quality satisfaction	16.7%	33.3%	42.8%	36.1%
Total	Count	36	171	173	380
	% within Q_32- If the municipality attend to raise water services price for improvement and quality, do you agree to pay more for this improvement	9.5%	45.0%	45.5%	100.0 %
	% within Q_19- Water quality satisfaction	100.0 %	100.0 %	100.0 %	100.0 %

TABLE 3
Chi-square tests for water quality satisfaction

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.807	2	.007

Likelihood Ratio	10.496	2	.005
Linear-by-Linear Association	9.385	1	.002
N of Valid Cases	380		

3. Relationship between WTP and water network maintenance satisfaction

Table 4 shows the values of one-way ANOVA and regression tests. They reveal that water network maintenance satisfaction affects the households' willingness to pay for water services, the significance value is 0.00.

TABLE 4
One-way ANOVA for water network maintenance satisfaction

Willingness to pay water bill monthly						
		Sum of Squares	df	Mean Square	F	Sig.
Water network maintenance satisfaction	Between groups	18.488	2	9.244	24.671	0
	Within groups	141.259	377	0.375		
	Total	159.747	379			

Results show that the respondents suffer from many problems in water networks. They do not mind to pay extra money in order to solve these problems and to make maintenance for their networks continuously. This correlates with the findings of the study that shows the satisfaction of the respondents towards water network maintenance satisfaction as the satisfaction of 35.5% of the households is poor and 50% is average while just 14.5% is good. This result indicates that water networks in Khan Younis city needs maintenance to increase the satisfaction. It is clear that the siege in Gaza strip prevents the municipality to improve and maintain the networks of water. Also, the cost of maintenance equipment is very high.

The results of this study agree with the results of Al-Ghuraiz and Enshasi [8] study showed that the majority of the respondents (97.2%) believed that it is necessary to improve the quality and quantity of water supply service. It was observed that 74.5% was convinced that the improvement process needs extra cost while 14.3% believed the contrary. The results also show that 82.8% of the respondents were willing to pay for improvement services, whereas 17.2% preferred the situation to remain as it is without any improvement because they are not able to pay.

4. Affordability to pay for water services

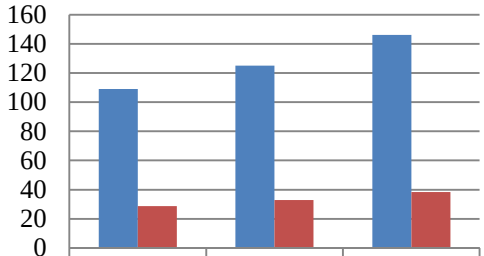
In order to check the respondents' affordability to pay for water services chi-square test, percentages ad frequencies are addressed in this section.

Results of the above table showed that education has affected the respondents' commitment to pay, 69% of the educated respondents are affordable to pay. The findings were similar to those from other studies where the level of education had an influence on the respondents' affordability to pay [9, 10]. This was because, as the respondents were more educated and with better paying jobs and could not afford time to collect water from the sources outside their homesteads. Thus, these respondents were willing to pay for a reliable water services instead of struggling to get water.

TABLE 5
Payment commitment per month

Q_37- Your payment commitment per month		High	Percentage	Average	Percentage	Low	Percentage	Total
Q_2- Gender of the respondent	Male	95	29	113	34	124	37	332
	Female	14	29	12	25	22	46	48
Q_3- Age of the respondent	less than 20	1	25	1	25	2	50	4
	20-30	9	16	24	43	23	41	56
	31-40	47	32	47	32	53	36	147
	Above 40	52	30	53	31	68	39	173
Q_4- Marital status of the respondent	married	102	29	114	33	132	38	348
	single	4	21	6	32	9	47	19
	widower	1	17	2	33	3	50	6
	divorced	2	29	3	43	2	29	7
Q_5- Education of the respondent	elementary	2	18	5	45	4	36	11
	Preparatory	7	33	6	29	8	38	21
	Secondary	17	25	21	31	29	43	67
	Bachlor	58	26	81	36	84	38	223
	Higher Education	25	43	12	21	21	36	58
Q_7- Occupation of the respondent	Employee	49	34	45	31	50	35	144
	Worker	24	25	40	42	32	33	96
	Private work	30	30	30	30	41	41	101
	Unemployed	6	15	10	26	23	59	39
Q_8- Amount of the respondent's income	500-1000 NIS	20	21	35	36	41	43	96
	1000-2500NIS	51	29	61	35	63	36	175
	2500-4000	30	33	22	24	39	43	91
	Above 4000	8	44	7	39	3	17	18

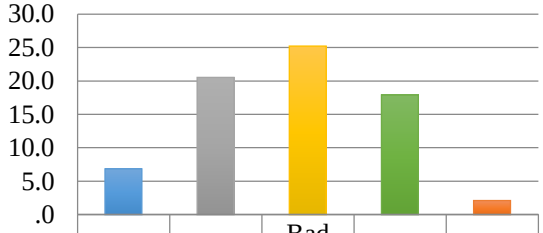
It is clarified from Figure (2) that 28.7% of the respondents have the ability to pay since their commitment is high. While 38.4% have low ability to pay. This reveals that the majority of the respondents are not committed to pay for water services for different reasons.



	high	average	low
	payment commitment		
Frequency	109	125	146
Percent	28.7	32.9	38.4

Figure 2 Payment commitment per month

Findings of Figure (3) demonstrated that 27.4% of the respondents are committed to pay their bills and 72.6% are not committed to pay their water bills for different reasons. The most important reasons are low income with percent 20.5%, the bad quality of water with percent 25.2% and bad municipality services with percent 17.9%. Correspondingly, it can be concluded that high cost low income level bad quantity and quality and bad municipality services (water network maintenance, quick responses to citizens 'complains and regular reader visits) have an impact on the respondents' commitment to pay their water bills every month.



	High cost of bill	Low income level	Bad quality and quantity of water	Bad municipality services.	Others
	reasons of not paying				
Percent	6.8	20.5	25.2	17.9	2.1

Figure 3 The reasons of not paying

It can be seen that the results of the analyses indicated that income, water distribution schedule, water quality, water quantity, municipality services, marital status, water network maintenance, water continuity, techniques in the municipality to deliver citizen's complaint satisfaction, staff response speed about the delivered complaint in the suitable time that have been assumed as the factors for household customer's willingness to pay, all of them are significant. These factors of household's willingness to pay are already expected and are in line with previous studies.

Several studies have asserted the importance of water quality and color [11, 12], and they discussed the fact that water users are willing to pay more for better water quality [9], to reduce water pollution [7] and to be provided with continuous water supply.

The current study revealed that income is a factor for household customer's willingness to pay that agrees with several previous researches [14, 7, 15]. In this study, it is presumed that when household's income is increased, there should be an increase in the household's willingness to pay for water no matter the amount. Moreover, Wahid and Hooi [16] have recommended that willingness to pay is a result of numerous factors or features that are emotionally important to the household customers. Also, the results of this study emphasized by Al-Ghuraiz and Enshasi [8] who concentrate on some essential factors such as water consumption, quality and quantity, socio-economic situation, WTP, ability, and affordability.

IV Conclusions

For socio-economic characteristics of the respondents: the majority of respondents were household heads (84%) aged between 31 and above, and 15% were aged from 20 to 30 years old. 91.6% of the respondents are married and the single respondents are 5%. Respondents' educational level is very high, as almost 60% have their bachelor degree and 15% have got their high education degree. 46% of the respondents have 1001 to 2500 NIS income and 25% have very low income from 500 to 1000 NIS.

For household's access to water and water quality and quantity: the satisfaction of water quality of 45.5% of the households is poor and 45% is average while just 9.5% is good. 48.4% of the households paid 55 NIS, 36.1% paid 25 NIS, 11.3% paid 115 NIS and just 4.2% paid more than 175 NIS so, water bills can be paid since it is not too much. 67.1% of the households have very good water distribution schedule since their schedule of distribution every day and every two days. Only 5.3% of the respondents suffer from water shortage as water comes every week. 82.1% of the households paid 50 NIS for water from other resources per month. It is believed that they buy water not because of water shortage but because the water quality is low. The satisfaction towards water network maintenance of 35.5% of the households is poor and 50 % is average while just 14.5% is good. 43.4% of the households see that municipality service is poor. While 18.9% have good satisfaction. Therefore, the municipality of Khan Younis city has to make improve-

ments to raise its services quality. The satisfaction upon the available techniques in Khan Younis municipality to deliver citizen's complaint is 41% of the households is poor and 44% is average while just 15% is good. 48.4% of the respondents' satisfaction about staff response speed about the delivered complaint in the suitable time is average and 41.6% of the respondents' satisfaction is poor.

For factors affecting willingness to pay for water: It can be seen that the results of the analyses indicated that income, water distribution schedule, water quality, water quantity, municipality services, marital status, water network maintenance, water continuity, techniques in the municipality to deliver citizen's complaint satisfaction, staff response speed about the delivered complaint in the suitable time that have been assumed as the factors for household customer's willingness to pay, all of them are significant.

For affordability to pay for water: 28.7% of the respondents have the ability to pay since their commitment is high. While 38.4% have low ability to pay. Results showed that education has affected the respondents' commitment to pay, 69% of the educated respondents are affordable to pay. There are different reasons for not committing to pay water bills. The most important ones are low income with percent 20.5%, the bad quality of water with percent 25.2% and bad municipality services with percent 17.9%. There is an effect of cost of water consumption paid per month upon households' acceptance to pay more for water improvement and quality. There is an effect of water quality satisfaction upon households' acceptance to pay more for water improvement and quality. There are statistically significant differences at ($\alpha \leq 0.05$) between regular water reader visit and the households' affordability to pay for water improvement and quality.

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