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The American University in Cairo

School of Global Affairs and Public Policy

THE DETERMINANTS OF CITIZENS' SATISFACTION IN THE

WATER PUBLIC SERVICE

THE CASE STUDY OF THE GOVERNORATE OF FAYOUM

A Thesis Submitted to the

Department of Public Policy and Administration

in partial fulfillment of the requirements for the degree of
Master of Public Policy

By

Mona Salem El Rassass

Supervised by

Dr. Khaled Zakaria Amin

Public Policy and Administration Associate Professor

May 2013

ABSTRACT

University   : The American University in Cairo

Thesis Title : The Determinants of Citizens' Satisfaction in the Water Public Service: The

                   Case Study of the Governorate of Fayoum

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This empirical study aims at investigating the determinants that influence the level of citizens' satisfaction regarding the water public service. It provides the policy makers and the management of the water companies, with scientific evidence on the factors that control the citizens' satisfaction, and the potential areas of water service improvement. The study used a primary data from a survey of 3000 respondents, collected by the Social Contract Center in December 2011 in the governorate of Fayoum.

The investigated variables of this study have been classified into two main groups; the first group is the **service-related variables**, which included variables related to the water quality, and service quality. The second group is the **non service-related variables**, which included the socioeconomic, and the demographic variables.

For the service-related variables, the study has found that the variables of water quality (i.e. water taste, color, and smell) were all significant in influencing the level of citizens' satisfaction, where the satisfaction varied according to the incidents of facing problems in the water quality. For the variables investigated under the service quality, the study has found that only water pressure, continuity of water flow during the day, and the water company's response to the service urgent needs were significant in influencing the citizens' satisfaction level, while the other variables of having a functioning water meter, facing problems in water bills, and accessibility to the water service information were not influential in affecting the citizens' level of satisfaction regarding the water public service.

For the non service-related variables, the study has found that regarding the socioeconomic characteristics of the citizens, the education level of respondents was significant in affecting their level of satisfaction; while on the contrary, the monthly spending average of the household has not show any significance. The demographic characteristics of the citizens have been investigated, and showed that, the gender, and rural-urban distribution of the citizens were significant in affecting the level of satisfaction regarding the water service, yet, the citizens' age failed to show a significant influence.

The findings of the study highlight the importance of improving the service-related factors, in order for the water companies to increase the level of citizens' satisfaction with the service.

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS

CAPMAS	Central Agency for Public Mobilization And Statistics
CAPW	Construction Authority for Potable Water and Waste Water
HCWW	Holding Company for Water and Waste Water
EU	European Union
EWRA	Egyptian Water Regulatory Agency
FADWASC	Fayoum Drinking Water and Sanitation Company
IDSC	Information and Decision Support Centre
MDGs	Millennium Development Goals
NOPWASD	National Organization for Potable Water And Sanitary Drainage
SCC	Social Contract Centre
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WHO	World health Organization

I. INTRODUCTION

Citizen satisfaction represents a major indicator in assessing the quality of public service delivery. Many governments view the citizen satisfaction to be an ultimate outcome of their policies and plans. Therefore, they usually seek to identify what are the factors that mostly drive citizen satisfaction. Improving those factors is important for the process of delivering a better water service.

Exploring the views of citizens regarding the public services has not been only limited to assessing the final product, yet it had been used to reflect other important aspects. Communities used citizen satisfaction surveys for different reasons; such as assessing the community needs, guiding short and long term planning, assessing the communication with citizens, and evaluating the provided services. The surveys' results can be reported to the public, the staff, or they could be incorporated into the performance measurement, (Gattis, 2010: page2). Therefore, these results can play an important role in modifying services and altering policies.

Providing the public services in a good quality, and a low cost, does not necessarily means that the citizens will be satisfied with the service. Although, improving the service quality, can definitely affect the level of citizen satisfaction with the public services, yet there is no guarantee that it can automatically lead to a higher level of citizen satisfaction (Swindell & Kelly, 2000, P.32). Similarly, a higher level of citizens' satisfaction doesn't necessarily reflect the quality of service performance (Stipak, 1979, P.51). Therefore, it is necessary to figure out what factors affect this relationship between the service performance and citizens' satisfaction, as some other variables seem to be middling the relation.

This study aims at examining the factors that influence the citizen satisfaction regarding the water public service. These factors could directly be linked to the service itself, such as the water quality in terms of taste, smell, color, and pressure, and controlling for the demographic and socioeconomic characteristics of citizens such as age, gender, education, and expenditure.

The study depends on a primary source of data collected by the Social Contract Center (SCC), in December 2011, from the governorate of Fayoum in Egypt, to assess a set of governance principles from the perspective of citizens. A household questionnaire was designed to get the citizens' evaluation of 6 main public services: water and sanitation, health, education, roads paving, street lighting, and waste management. The questionnaire was designed to get the views of citizens regarding governance components, mainly service efficiency, effectiveness, responsiveness, transparency, participation, accountability, equity, and fighting against corruption.

A. Research Problem

The right to clean water is a fundamental right in the Egyptian constitution. Article 68 in the new constitution of 2012, guarantees the citizens' right in a proper housing, healthy food, and clean water. Defining what 'a proper service' means is directly related to the perception of the citizens towards the provided services, as they are the direct beneficiaries of the service.

For the water authorities, citizen satisfaction is important to identify what are the appropriate interventions to respond to the citizens' needs, and demands. For example, a water

company will not be able to judge what will better satisfy the citizens' needs unless they have provide them the opportunity to express those needs at the first place.

Many countries have recently followed annual benchmarking tools to assess all the service related aspects such as water quality, service quality, sector transparency, and responsiveness. Some of them have also included a citizen profile, to be able to conduct additional analysis of the beneficiaries.

Additionally, the huge investment in the infrastructure of the water sector; either for constructing new plants, networks, or maintaining the existed system, is a very important reason behind the need to study the citizens' satisfaction. It becomes necessary to the water sector authorities, to make sure that all these investments at the latest are effective, and of a good quality to the common citizen.

According to the Ministry of Economic Development's report on Investment in Egypt in the period between 1982 and 2007, Egypt has invested more than 94 billion on public utilities during this 25 years period ("Ministry of Economic Development", 2008). Despite this tremendous expenditure, and despite the fact that the water service coverage has significantly increased during this period, the evidence on how the citizens evaluate and perceive the service quality is very scarce.

Generally, there is a significant shortage in the assessments of citizen satisfaction with the water service in Egypt. According to The Water and Sanitation Governance Index, issued by the Social Contract Centre[1] (SCC) in 2013, less than 1% of the citizens in the Governorate

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[1] The Social Contract Center is a joint project between the Egyptian Cabinet of Ministers' Think Tank (The Information and Decision Support Center) and the United Nations Development Program.

of Fayoum have been previously surveyed by the water authority to explore their views on the water service during the year of 2011 (El Rassass, 2013). This reflects the very low interest of the water authorities to recognize the citizens' opinions, and to take them into consideration in the sector's future plans.

Complaints, on the other side are perceived to be an important tool in figuring out the citizens' problems. In Egypt, and mostly after the 25th January revolution, citizens do complain more about the public services. The complaints have taken a frequent form of road blocking, and protesting. In the governorate of Fayoum, more than 20 incidents of road blockings, have taken place since the revolution, to denounce the deteriorating water service in the different districts of the governorate (Masress, 2013). Most of the demonstrations were due to the interruption or the weakness in the water flow in the villages far from the main water plants.

These demonstrations bring out only the urgent and severe problems of the citizens to the surface, yet they don't reflect on the other problems of the service daily usage in particular. Therefore, the citizens' satisfaction surveys are important in obtaining the full picture of these common and daily problems.

In the SCC study on the governorate of Fayoum, citizens – unexpectedly – revealed a very low tendency towards reporting their encountered problems to the water authority. 93% of the citizens, who had already faced problems in the water service, didn't complain about them. The reason for not complaining could be attributed to many reasons such as, lack of trust in the water authority, lack of knowledge with the complaints' mechanisms, or because of the citizens' culture itself.

As concluded from the aforementioned aspects, measuring the level of citizens' satisfaction, and studying the variances in this satisfaction demand better understanding for what are the satisfaction determinants, how they are interlinked together, and which variables have the most influence over the others. It also helps in providing more understanding of the water service realties in Egypt, and facilitating more effective citizen oriented-planning of the service in the near future. Additionally, investigating the determinants of satisfaction can help in drawing a map for the most dissatisfied regions, and predict the reasons of dissatisfaction.

B. Research Objectives

The study aims at:

- Identifying the effect of the service related factors on the citizens' level of satisfaction.

- Identifying the effect of the demographic factors on the citizens' level of satisfaction.

- Identifying the effect of the socioeconomic factors on the citizens' level of satisfaction.

- Providing a scientific evidence for policy makers, and the water authorities' management for potential improvements of the service.

- Bridging a gap in the literature regarding the nature of citizens' satisfaction with the water public service in Egypt.

C. Research Questions

The study aims at investigating the following questions:

1. What are the determinants that influence the level of citizens' satisfaction regarding the water service?

2. Which group of variables does mostly affect the level of citizens' satisfaction; service, demographic, or socioeconomic factors?

3. What are the potential policy implications to improve the water public service, based on the study findings?

D. The Water Profile in Egypt

The surface water is the main source of drinking water in Egypt representing 82% of the total amount of water produced, followed by the ground water representing 17%, and the desalinated water with less than 1 % of the water production (Moawad, 2012).

The total amount of water produced is 24 million cubic meters per day ("EWRA," 2013), with more than 2600 water treatment plants ranging between filtration, compact, well plants and desalination plants, and 146.000 kilometers of water distribution networks (Moawad, 2012).

The official percent of the water coverage in Egypt exceeds 98% ("EWRA," 2013), which puts it among the countries with the highest water coverage rate in the Middle East and Africa, as well as it fulfills the Seventh Millennium Development Goal with regard to halving the proportion of people without sustainable access to safe drinking water and basic sanitation.

Although the announced percent is high, it doesn't mean that 98% of the population is covered by the water service. This is attributed to the fact, that some households in the poorer villages cannot afford extending the water connection from the main pipelines near to their houses. According to the "1000 Poorest Villages Baseline Survey", conducted in 2010 in the

governorates of Suhag, Asyut, El Sharqiya, Qena, El Behira, and El Minya, only 84% of population, were covered by the water service.

The water and sanitation sector in Egypt is fully managed by the public sector. Before the 25th January revolution, the Ministry of Housing and Urban Communities used to run the sector, along with its housing, and community development projects. Afterwards, the sector has been moved to the newly established Ministry for Water and Sanitation Utilities. The following figure illustrates briefly the government bodies that manage the water and wastewater sector in Egypt.

Figure 1: Water and Wastewater Sector in Egypt

Source: HCWW Presentation on "Achieving the MDGs for Water and Sanitation Sector in Egypt (Moawad, 2012).

According to this structure, four different entities are responsible for the sector management:

1.   The National Organization for Potable Water and Sanitary Drainage (NOPWASD)

NOPWASD is the responsible authority for the construction of the new projects in all the governorates of the republic except for Greater Cairo and Alexandria governorates. It has been established by the presidential decree No.197 for the year 1981("National authority", 2013).

The main duties of the authority are:

- Drawing the policies and future plans of the sector on the national level.
- Supervising the construction of the main national projects in the governorates.
- Providing the technical consultancy with respect to the sector productivity and efficiency.
- Establishing training centers to improve the technical capacities of the employees.

The NOPWASD is the responsible authority for receiving the sector's investment allocations from the Ministry of Planning, and redirecting them to the projects of the sector. The total proposed investments in the annual plan for the year 2013/14, reached 8.9 billion, distributed between the water sector projects (4,3 billion), and the sanitation sector projects (4.7 billion).

The distribution of these allocations shows that the first priority was given to completing the unfinished projects by the value of 7.8 billion, followed by 600 million

allocated to the planned new projects, and 550 million for the operations of infrastructure replacement and maintenance activities ("Proposed plan of," 2013).

This plan reflects an unbalanced distribution between the funds directed towards the water sector, and the sanitation sector, where they received nearly the same amounts of investment, regardless the fact that the coverage rate of the sewage networks (50% coverage rate classified as 90% urban, and 12% rural), is significantly low, when compared to the coverage rate of water networks (98%), and consequently requires more allocations for investment.

Additionally, the plan's allocations for the operations of infrastructure replacement and maintenance activities, is significantly low, when compared to the investment in the new infrastructure, where it counts for less than 5% of the funds. According to the World Health Organization (WHO), the operational and maintenance for the low technology options costs between 5% and 10% of capital cost per year, and the percent even increase another 5% to 10% for the protection of the water source (Hutton & Bartram , 2013).

2. **The Construction Authority for Potable Water and Waste Water (CAPW)**

CAPW is the other entity that is responsible for the sector's constructions. It has been established in the year of 1981, for the construction of the water and sanitation projects within the Greater Cairo territories, and Alexandria Governorate. The name of the authority has been changed from the "Cairo and Alexandria Construction Authority for Potable Water and Waste Water" to the new name CAPW, after the ministerial decree No.296 for the year 2007 which included the governorates of Giza and Qalyoubiya to the authority's scope of work.

The responsibilities and duties of the CAPW are very similar to the ones of the NOPWASD ("National authority", 2013), which raises the question of the redundancy in the sector authorities, and whether there is a real need for having two bodies with the same duties, or they could be merged in one body with different branches in the governorates.

3. The Holding Company for Water and Waste Water (HCWW)

The HCWW has been established by the presidential decree No.203 for the year 2004. Upon its establishment, the Public sector's economic authorities that were operating the water and sanitation services in the governorates have been moved below the HCWW ("Holding Company," 2013).

The number of the affiliated companies is currently 23 companies. They serve almost all the republic's governorates except for the Suez Canal governorates, which are managed by the Suez Canal Authority. The company serves more than 11 million households comprising more than 83 million (Moawad, 2012).

The main duties of the HCWW are:

- Managing the technical aspects of the sector such as applying the procedures of purification, desalination, transmission and distribution of the water service, and the treatment, and safe disposal of the waste water.
- Setting the internal rules and regulations for the affiliated companies.
- Evaluating the performance of the affiliated companies, and identifying the possible gaps.

- Preparing a sectoral database to identify the needs and requirements of the affiliated companies to enable a better sectoral planning.
- Setting and modifying the water tariffs.

The HCWW is currently facing severe problems regarding the cost recovery of the water production, and management, compared to the low tariffs, and the government restrictions imposed on raising them. This problem is reflected on the ability of the company to maintain and operate the sector in an efficient and effective way, and lead to the excessive water loss. Water loss is estimated between 30% and 40% of the total amount of water produced according to the EWRA's executive manager statement in 2008 (El Salakawy, 2008). This percent exceeds the international common leakage average of 15%.

4. The Egyptian Water Regulatory Agency (EWRA)

The EWRA has been established by the presidential decree No.136 for the year 2004, in order to ensure the provision of an adequate water and sanitation service to the citizens in the most effective, and efficient way, and with adequate pricing ("Egyptian water regulatory," 2013).

The main duties of the EWRA are:

- Setting the regulations that should be followed by all sector's authorities.
- Conducting the monitoring and evaluation activities for the sector performance.
- Providing the technical guides for the required criteria for a better service.
- Following up with the customer service units in the affiliated water and sanitation companies.

- Studying the tariffs' increase requests, and ensuring the fiscal balance in the sector's budget.

- Publishing the sector-related reports and information to help the customers to know their rights and duties in a transparent framework.

According to the previous mandates, the EWRA should frequently compile the sector's key performance indicators, and the citizen satisfaction surveys. Obviously, this role is not fully fulfilled, due to the significant shortage in publishing or discussing any sectoral reports or indicators widely.

The unclear formulation of the duties among the EWRA and the HCWW, regarding responding to the citizens' complaints has also lead to confusion among the citizens about which body is mandated, and authorized to respond to their complaints. The limited financial and human resources of the agency, additional to the lack of representation in the governorates, have lead to the inability of the agency to achieve its mandates effectively.

As a general remark, the overall organizational chart of the water sector raises concern about the subordination of all water authorities under the Ministry of Water and Sanitation Utilities. This means that the contracting, implementation, oversight, and operating processes, are all under the supervision of the ministry. This can definitely lead to a situation of inconsistency and impartiality, and hinder the effectiveness of the monitoring role.

Additionally, the concentration of the sector's power in the hands of a single, centralized authority represented in the ministry, has prevented the governorates' districts, and local units from managing, and supervising their projects by themselves, which was

guaranteed to them before in the Law No. 43 of 1979, and reaffirmed in the presidential decree No. 197 for the year 1981.

Because of the divergent nature of the water and sanitation sector, and in order to coordinate the sectors' policies with the external ministries, and governmental bodies, a new ministerial "Infrastructure Committee" has been created from the representatives of relevant ministries such as: Irrigation, Health, Agriculture, Planning, Environment, and Housing ministries, (Allen, Dávila & Hofmann).

E. The Water Profile for the Governorate of Fayoum

Source: Governorate of Fayoum, http://www.fayoum.gov.eg/Tou/Map/default.aspx
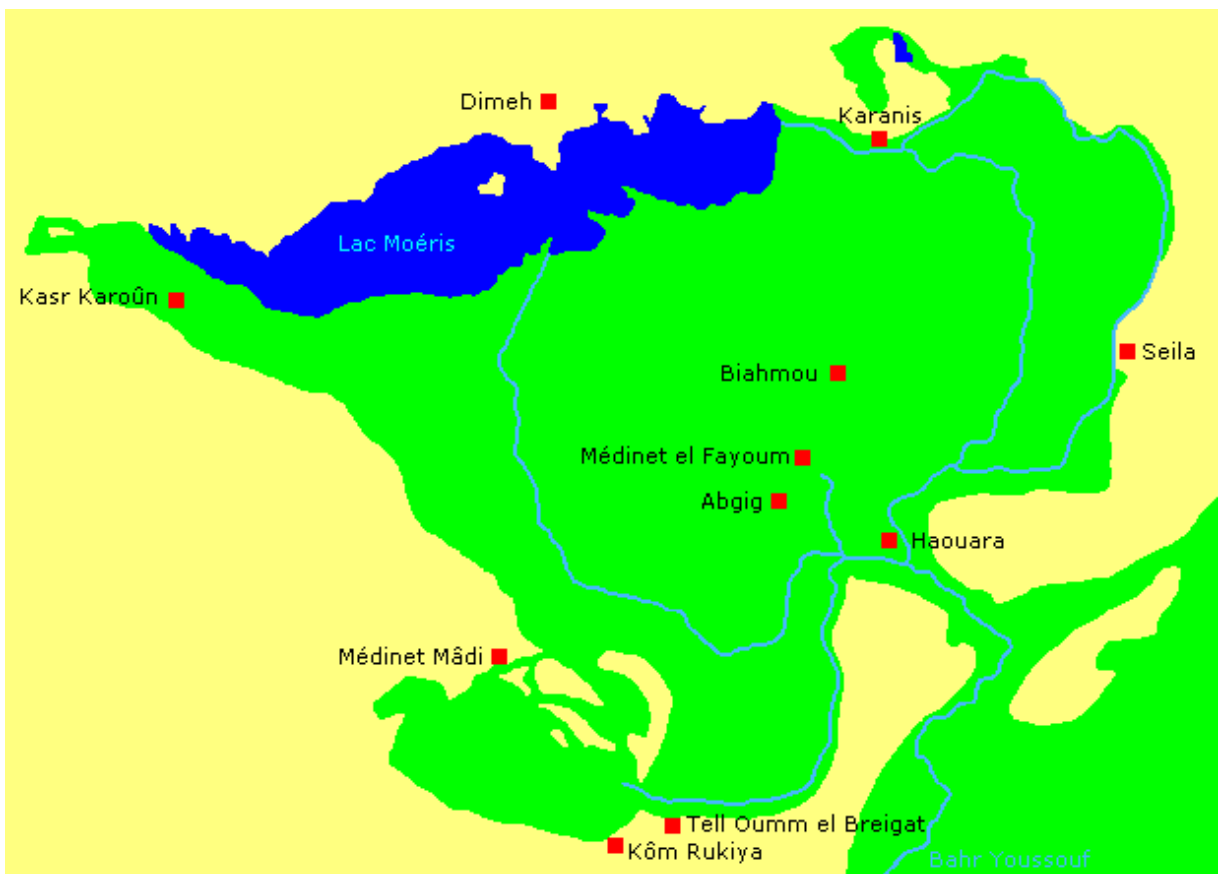
The Fayoum Drinking Water and Sanitation Company (FADWASC), is authorized by the HCWW to operate and maintain the water and sanitation services in Fayoum. It covered 1827 km2, which represents almost 96% of the whole populated area of the governorate. It provides the water service to almost 2.7 million, with an average of 167 liter per capita per day ("Holding Company," 2013).

The company provides the water service to its 6 local districts of Fayoum, Tamyia, Ebshway, Etsa, Sennores, and Yousof Al Seddiq, and handles the citizens' complaints and problems, through its office of customer service in each district.

The governorate of Fayoum receives the Nile flood water through the Hawara gap to the Fayoum depression. The canal of Bahr Youssef which is the main drinking water source of the governorate passes through this gap ("Drinking water supply," 2010). The sufficiency of the water in the canal is the most important issue to the company, and the citizens alike. This is due to the scarcity of the water resources in the governorate's Saharan climate, and the low annual average of rainfall.

In the period between 1990 and 2009, almost 75% of the citizens in Fayoum became connected to the water piped service, yet the problem of the low water pressure has represented a common problem to the citizens during this period, and up to date ("Drinking water supply," 2010).

In the study conducted by the SCC in 2011 on Fayoum, the percentage of citizens connected to the water network through a house connection were 92% of the citizens, while the rest of them were getting their needs of water by other means such as: buying from private tanks or using external shared connections (El Rassass, 2013).

II.   LITERATURE REVIEW

The literature review will be classified into 3 main sections. The first section will introduce the citizen satisfaction as a key metric in assessing the sector performance. It will also show the development of considering the citizen satisfaction in improving the level of governance in countries, and as an incentive for the employees' performance.

Because the citizen satisfaction is usually influenced by some variables that are either service or nonservice variables (Van Ryzin & Immerwahr, 2004, P.169), the second and third sections will be allocated for showing the results of studies that have examined each set of the two groups. These sections should give an expectation to what this study might find out in terms of the significance of the selected variables.

1. Citizen Satisfaction: A Key Metric of Performance

The need for adopting a new approach of public sector administration, which is more concerned with the citizens and the quality of service delivery, has emerged in the nineties of the last century (Lan & Rosenbloom, 1992). Many scholars have advocated for this shift, yet in different amount and scope of change (Ingraham & Romzek, 1994). In their book of "Reinventing Government", Osborne and Gaebler (1992) have called for the adoption of the private sector tools in the public sector. One important demand was to shift the way the public sector deals with the common citizens to more of the private sector approach in serving customers. The issue of achieving efficient citizen-oriented performance, with the lowest costs has represented a main objective of the new shift (Levin & Sanger, 1994).

Consequently, it demanded a similar shift from the customer satisfaction to the citizen satisfaction (Shah Abdullah & Kalianan, 2008). This shift has introduced the citizen

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satisfaction as a key metric of performance, and in some cases, a prerequisite for running for elections.

Later on, some national and local governments have adopted the performance measurements, yet the inclusion of the citizens' views in such measurements stayed limited (Ho & Coates, 2004, P.29). The focus was more on assessing the inputs feeding the governance process, how the process itself goes, and what outputs have been achieved.

Very limited attention has been given to the outcomes and the impact of the services on communities, although this is the main concern of the citizens (Fountain, 1991), and accordingly, the citizens and stakeholders will not likely support the performance measurements, if they were not included or considered from the start (De Lancer Julnes, 2001).

Performance measurements need to include citizens and other stakeholders in the assessment process, in order to be able to achieve a higher level of trust and reliability among government and citizens. Studies have found that the more performance measurements fail to respond to the citizens' needs and concerns, and neglect their evaluation to the services provided, the less attention citizens will give to it and consequently public officials will be less encouraged to use them. Therefore, the measurement will be less effective and less relevant in the governmental decision making process (Ho, 2003).

With the beginning of the 21st century, and the introduction of the good governance concept, many assessments have considered citizen satisfaction as one important criterion for measurement. Usually, it comes under the principle of *Effectiveness* ("Government Effectiveness," 2013).

Effectiveness is essentially concerned with measuring the outputs of the policy formulation and implementation. It focuses on outcomes rather than what is being done in the process itself (USAID, 2000), (EU, 2001). Therefore, this outcome, cannot be recognized unless, the quality of the final product or services is assessed from the perspective of recipients, and their level of satisfaction.

Currently, some countries use the citizen satisfaction in their performance indicators, such as in Malaysia and Japan (Maher, 2011), while some other countries have taken a further step by linking any additional payments over the basic salary to the performance and citizen satisfaction. For example, in the United Kingdom, starting 2004, patients' satisfaction has been approved as one of the key criteria that affect 25% of physicians' salaries (Maher, 2011).

In the context of supporting the administrative reform in Egypt, some initiatives have been announced to improve the governance level. Among them is the European Union joint program for "Political Reform and Good Governance" in Egypt (2007 – 2013), which has been extended after the 25th January revolution to accommodate the emergent requirements of reform ("Action fiche for Egypt," 2010).

One component of this program is to measure and improve the performance of the administration with regard to delivering the public service to citizens. This component is expected to produce a national guideline for measuring and improving the public services. It is also expected to improve the quality of the services according to the citizens' needs.

Another initiative of assessing the governance level in Egypt is the one introduced by the SCC to evaluate the performance of the health, education, water and sanitation sectors in

the year 2012. The assessment has been conducted as a pilot phase in the governorate of Fayoum, via surveying 3000 households (El Rassass, 2013).

In this assessment, citizens were asked to report their satisfaction on the water quality and the service quality. Citizens obtained a strong level of satisfaction regarding the water quality, but a poor level of satisfaction regarding the service quality.

2. Service and Institutional Factors and Citizen Satisfaction

The first perception that automatically comes to the mind is that the service related factors such as service quality, are directly related to the citizens' level of satisfaction, some studies have found otherwise. According to the research of Stipak (1977, 1979), and Parks (1984), evaluations of services were not interlinked with the actual services or its quality, as most of the respondents did not have accurate information about the services, so their perception did not reflect the actual status of service quality.

Some studies has found a bigger influence for the institutional performance factors – the so called service factors in this study – on the citizens' level of satisfaction, than the influence of the socioeconomic and demographic factors for the same group of citizens (Adhikari, 2011, P.52).

In a study on "The impact of service quality of public sports facilities on citizens' satisfaction, image, and word-of-mouth intention" in South Korea, the researchers found that the citizen's level of satisfaction was significantly influenced by the service related factors such as operating, events, and program services. They also found that this perception of service quality had varied significantly among participants of the study, depending on their

demographic characteristics such as: gender, marital status, education, job, and income (Hee-Kwan & Jong-Ho).

A recent study was conducted in Nepal 2011, to assess the citizen satisfaction with the public services delivered in Bharaptur Municipality. It tested two main sets of factors against their effect on the satisfaction level (Adhikari, 2011, P.3). The first group is the socio-demographic factors including among other factors gender, age, education, employment status, and level of income, while the second group is the institutional performance which includes time and cost of service, access to information complaint redress, and officials' attitudes towards clients. As concluded by the study, information dissemination, grievance handling and the service time and cost were the most significant factors to influence the citizens' satisfaction, while age and income were the most significant factors among the socio-demographic factors to influence the citizens' satisfaction. Overall, the institutional performance factors had the biggest influence over citizens.

3. **Socioeconomic and Demographic Factors and Citizen Satisfaction**

Although, many studies and reports have focused on the magnitude of the citizen satisfaction, and its variations among regions and services, very few studies have investigated the multidimensionality of the communities, and its effect on the satisfaction level (LaPlant & McDonald, 2004).

In Brown & Coulter study in 1983, citizens' race and income were found to influence the citizens' evaluation for the service quality and quantity. Some ethnic groups may perceive the same service provided, lower than other groups. Characteristics of neighborhood can also affect the citizens' evaluation for the services according to (Lineberry ,1977).

In the study of Christensen, and Lægreid on the importance of citizen satisfaction, and demography on the trust in government, trust was highest among the citizens' with a higher education level and a job in the public sector. It also increased among women, and higher ages, although those later variables were of a weaker correlation (Christensen & Lægreid, 2002).

Although some studies have found significant variations in satisfaction among cities based on the nonwhite population and income level, these variations could not be precisely attributed to either the demographic characteristics of citizens or to the nature of the residence area; rural or urban (DeHoog, Lowery & Lyons, 1990, P. 810). In DeHoog and Lowery study, the survey data was collected from 5 basic types of socioeconomic communities in two different metropolitan areas in Kentucky, USA. The study found that white and lower income citizens tend to hold a higher level of satisfaction with regard to the local government services, while the factors of gender, owning the home, and age have failed to generate significant coefficients. The study has also found that the level of satisfaction varies by city and neighborhood.

A study on "Determinants of citizen satisfaction with the police service" in USA (Kusow, Wilson & Martin, 1997, P. 660), has examined the influence of individuals' race, age, gender, prior victimization and residential location on the level of perceived satisfaction with police service. Residential location was found to be the main predictor of satisfaction, followed by race, and prior victimization. Education and age factors also recorded a significant impact, while gender unexpectedly recorded no effect holding the other variables controlled.

These results were similar to another study conducted by Reisig and Parks on data collected from Indianapolis and St. Petersburg in 1999. The study has found that the perceived neighborhood quality of life was the most important determinant of overall citizen satisfaction with the police service (Reisig, 2000). In a consequent study, Reisig focused on the encounter-level of satisfaction, which includes the police service related variables such as the call for service or traffic stop. For him these variables were much easier to improve, and more effective in increasing the encounter-level of satisfaction than the neighborhood variables (Reisig, 2000).

The literature review shows the different approaches that have been adopted to measure the performance of a given sector. The traditional approach has only evaluated the inputs of the system, the processes of operating these inputs, and the final outputs. This approach was found insufficient in drawing on the real outcomes and impact of the programs, and services, so it gradually lead to a more comprehensive governance approach, that seeks to put in place measures to evaluate every step of the programs implemented.

The citizens' surveys has taken a new participatory pattern, after the change from the simple citizens' evaluation after receiving the service, to the citizens' evaluation prior to the service delivery. This includes the participation of the citizens in identifying the needs of the sector, the possible implementation mechanisms, and the monitoring and evaluation activities.

Regarding the determinants of citizens' satisfaction, the literature was beneficial in pointing out different kinds of variables that should be included in the analysis either form the service or non-service related variables. On another side, it opened the floor for this study to examine new service-related variables that have not been part of the scrutinized studies, such

as the accessibility of the sector information, and the response to the urgent needs in the service.

As summarized in the previous studies, the service related variables were mostly significant in shaping the satisfaction level of the citizens. On the socioeconomic and demographic side, education, income, and the characteristics of the neighborhood area, were the most significant variables in influencing the citizen satisfaction. For some other variables such as gender and age, the influence was either limited or didn't exist.

Because of the differences among these findings, and due to the variations among the significance of the service and nonservice variables on the citizens' level of satisfaction in each study, it becomes more important to carefully analyze the effects of these variables in the Egyptian context, and figure out what is the nature of the relationship between each single factor and satisfaction. The huge data collected will definitely allow for more accurate and comprehensive analysis to the factors, as it will be further discussed in the next chapter.

III. METHODOLOGY

Description of Data

This study uses a survey-based data set collected by the SCC in December 2011, in the governorate of Fayoum. The household survey aimed at assessing the level of governance in the water service, in terms of water accessibility, affordability, quality, and coverage. The full version of the water households' questionnaire is included in Appendix 1.

Worth mentioning, that the researcher has done the earlier processes of designing, developing and testing the questionnaire as part of her work in the SCC, as well as training the surveyors before the phase of data collection in Fayoum. Additionally, the researcher has obtained an official permission from the SCC to use the collected data to produce the required analysis.

Population Framework

The governorate of Fayoum has been selected to the pilot governance assessment due to some characteristics such as:

- The urban and rural representation in the governorate will allow for studying the variations among citizens regarding the service provision.
- The number of districts in Fayoum is very adequate to the process of sampling and generalization.
- The governorate of Fayoum includes different kinds of economic activities such as agriculture, industry, poultry, and tourism.
- Higher poverty ratio, when compared to the governorates in Lower Egypt.

The questionnaire covered 3000 households, representing the whole governorate with an urban rural and local districts distribution. The sample has included the city of Fayoum, and the 6 districts of El Fayoum, Tamyia, Ebshway, Etsa, Sennores, and Yousof Al Seddiq.

Sample Type

The sample type is a stratified cluster probability sample from the 6 cities of districts capitals, and 42 villages. The sample has been selected by the Central Agency for Public Mobilization and Statistics (CAPMAS) from the 2006 National Census, and has been updated by the CAPMAS upon the request of the SCC before the phase of data collection.

Operationalization of the Variables in the Study

In this study the level of citizen satisfaction will act as the dependent variable, while the service-related variables, along with the socioeconomic and demographic variables will act as the independent variables, which potentially will have an influence over the satisfaction level.

The Independent Variables

Fourteen independent variables were selected from the survey to be included in the analysis, and are operationalized in the following table.

Table 1: Operationalization of the Independent Variables

Group	Sub-group	Independent Variable	Definition
1. Service-related Variables	1.1 Water Quality	1. Water Taste	Households facing problems in water taste.
		2. Water color	Households facing problems in water color.
		3. Water smell	Households facing problems in water smell.
	1.2 Service Quality	4. Functioning water meter	Households who have a functioning water meter.
		5. Water pressure	Households facing problems in water pressure.
		6. Continuity of water during the day	Average of total hours of water discontinuity per day.
		7. Water bills	Households facing problems in water bills.
		8. Response to the	Households who

		urgent needs	perceive the water authority as promptly responding to the urgent needs of the neighborhoods.
		9. Access to the water service information	Households who perceive the water sector's information as easily accessible when requested.
2. Socioeconomic and Demographic Variables	2.1 Socioeconomic Variables	10. Education Level	
		11. Average of Monthly Spending	
	2.2 Demographic Variables	12. Age	
		13. Gender	
		14. Rural & Urban Distribution	

The Dependent Variable

The dependent variable of this study is the citizen satisfaction regarding the water service. Originally, the citizens' satisfaction in the questionnaire has been evaluated through 4 questions:

1. Are you satisfied with the quality of water you drink?

2. Are you satisfied with the quality of water service in general?

3. Are you satisfied with the time spent to get the connection?

4. Are you satisfied with the way your complain was handled?

All questions have used a 3 points scale of responses; satisfied, satisfied to a certain extent, or not satisfied. Because the third and fourth questions have a specific nature to the households who recently applied for the water service, or reported complaints, the numbers of missing values in the sample were above 90%. Therefore, the citizen satisfaction in this study has discarded the responses in the third and forth questions, and considered only the responses of the first and second questions, due to their generic nature and high response rate.

The primary analysis of the first two questions has showed a very strong correlation between the households' satisfaction with water quality, and the satisfaction with the water service in general. Table 2 shows a significant strong correlation of .85 using the Pearson correlation measure.

Table 2: Correlation between Water Quality and Service Quality Satisfaction

		Satisfaction with water service quality	Satisfaction with water quality
Satisfaction with water service quality in general	Pearson Correlation	1	.852[**]
	Sig. (2-tailed)		.000
	N	2426	2426
Satisfaction with drinking water quality	Pearson Correlation	.852[**]	1
	Sig. (2-tailed)	.000	
	N	2426	2426

**. Correlation is significant at the 0.01 level (2-tailed).

Due to this strong correlation, the researcher has decided to combine together the responses of the households regarding the satisfaction with the Water Quality, and the Service Quality in a new variable. This new variable recorded the citizens who responded by "satisfied" or "satisfied to a certain extent" in both questions, by giving them the code 1, and the citizens who responded by "not satisfied" in both questions, by giving them the code 0.

This means that the citizens, who reported satisfaction on one question, but the opposite to the other, have been omitted from the whole sample. Therefore, the number of respondents has decreased from 3000 households to 2426 households only.

The following figure summarizes the operationalaization of the dependent and independent variables of the study.

Figure 2: Operationalization of the study variables

Citizen Satisfaction with the Water Public Service

Service-related Variables

Non Service-related Variables

Water Quality

- Water Taste
- Water Color
- Water Smell

Service Quality

- Water Meter
- Water Pressure
- Continuity of water per day
- Water Bills
- Response to the Urgent Needs
- Access to the Water Service Information

Socioeconomic Variables

- Education Level
- Average of Monthly Spending

Demographic Variables

- Age
- Gender
- Rural & Urban Distribution

The Model of Data Analysis

Because of the binary nature of the dependent variable, the most suitable statistical model to use will be the *logistic regression model*. This model is usually used to describe and test the relationship between a categorical or dichotomous explained variable – citizen satisfaction in this case – and one or more categorical or continuous explanatory variables (Joanne Peng & Lee, 2002).

The logistic regression model will be used to predict the possibility of occurrence of the event. It will also be used to predict the association between each of the explanatory variables separately on the explained variable, holding other variables constant (Logistic Regression, 2012).

The odds ratio represents the central concept behind the logistic regression model. It provides the odds that an explained – or an outcome – variable will occur given the existence of the explanatory variable (Joanne Peng & Lee, 2002). For example, if the probability of an event occurring is 0.8, then the probability of the event not occurring is 0.2, and accordingly the odds ratio of the event is 4:1. This means that, the bigger the odds are, the higher the probability of an event to occur, and vice versa.

The Equation of Logistic Regression

The logistic formula is stated in terms of the probability that Y = 1, which is referred to as ˆp . The probability that Y is 0 is 1 - ˆp (Logistic Regression, 2012).

$$\ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = B_0 + B_1 X$$

Where β0 is the "intercept" and β1 is the "regression coefficient" of x1.

In the application on the level of citizen satisfaction as the predicted variable on one side, and the service, socioeconomic, and demographic predictable variables on the other side, the model in general will be:

Logit(p) = log(p/(1-p))= β0 + β1X1+ β2X2+ β3X3+ β4X4 + β5X5 + β6X6 + β7X7 + β8X8 + β9X9 + β10X10 + β11X11 + β12X12 + β13X13 + β14X14.

Where, X1 is the water taste, X2: is the water color, X3: is the water smell, X4: is the water meter, X5: is water pressure, X6: is the continuity of water per day, X7: is the water bills, X8: is the response to the urgent needs, X9: is the access to the water service information, X10: is the Age, X9: is the education level, X11: is the average of monthly spending, X12: is the age, X13: is the gender, X14: is the rural & urban distribution.

IV. ANALYSIS OF DATA

The data is analyzed on three stages. The **first stage** is the univariate analysis, which includes a preliminary descriptive analysis for the dependent variable, and each variable of the independent variables.

The **second stage** includes the bivariate analysis for identifying the empirical relationship between each independent variable, and the dependent variable. This step is important for identifying the correlation among variables. The test of Gamma has been used with the ordinal variables, such as water color, taste, and education. Its value ranges between -1 and 1, where values close to an absolute value of 1 reflect a strong relationship among the two measured variables, and values close to 0 reflects a weak or no relationship at all. The study also uses the test of Lambda, with the nominal variables, such as gender, and rural urban distribution of the respondents.

The **final stage** of analysis includes building a logistic regression model to identify the significance of each independent variable, quantify the magnitude of effect, and explore the potential causal relationships among the satisfaction, and the other tested variables.

Before proceeding with the frequencies of each variable, the following table will briefly provide the description of the continuous variables included in the study in terms of number of observations (N), minimum value of response, maximum value of response, the average of responses (mean), and the standard deviation.

Table 3: Descriptive Statistics of the Study Continuous Variables

Variable	N	Min.	Max.	Mean	Std. Dev.
1. Continuity of water during the day	1925	0 Hours	24 Hours	1.2	2.24
2. Age	2419	14 Years	90 Years	39.7	14.98
3. Average of Monthly Spending	2419	80 L.E	6500 L.E	1110	673.77

Frequency of Citizen Satisfaction

Citizen satisfaction is the dependent variable of this study. As early explained, the new variable of citizen satisfaction has been calculated from the households response in two questions measuring the satisfaction of the water quality, and the service quality. This technique has reduced the number of households included in this study from 3000 households to 2426 households.

Table (4) shows that almost 82% of respondents were satisfied with the water service, which reflects a very high level of satisfaction with the service among the households, while only 18% of respondents were not satisfied with the service.

Although, the low percent of dissatisfaction usually hinder the study of the variations in any sample, yet the number of unsatisfied respondents in this sample (440 respondents) is statistically enough to draw representative and accurate findings.

Table 4: Satisfaction among respondents

	Frequency	Valid Percent	Cumulative Percent
Not Satisfied	440	18.1	18.1
Satisfied	1986	81.9	100.0
Total	2426	100.0	

1. **Service-related Variables**

The service related variables are classified into two main groups. The water quality variables include the water taste, water color, and water smell. The service quality variables include the water meter, water pressure, continuity of water per day, water bills, response to the urgent needs, and access to the water service information.

1.1 Water Taste

Almost one third of the sample (around 760 respondents) did face problems in the taste of water in the governorate of Fayoum, compared to two thirds who didn't face taste problems. Figure 3 illustrates this finding.

Figure 3: Facing problems in water taste
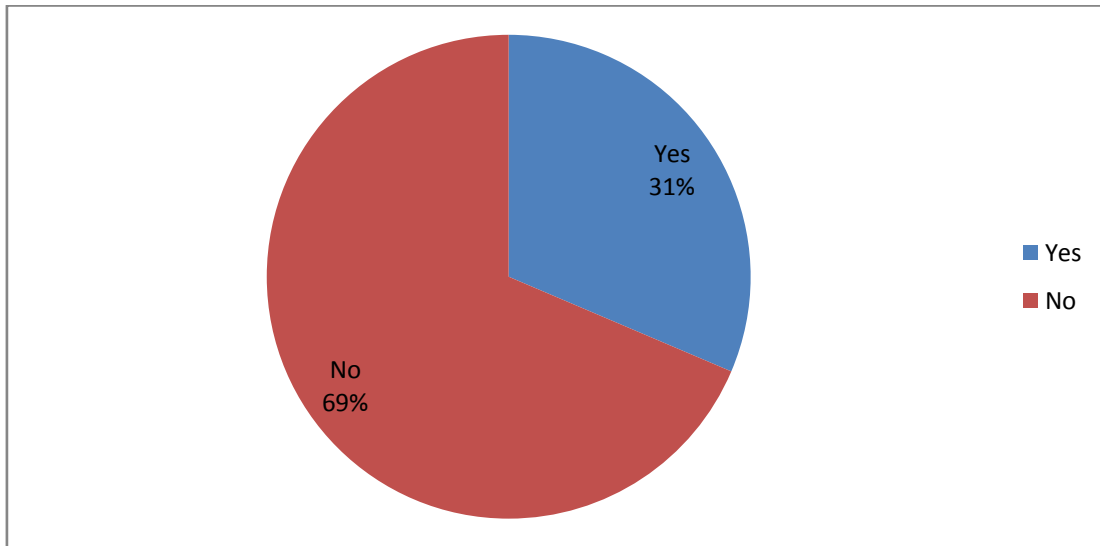
When analyzing the responses on the water taste problems, in relation to the satisfaction level, the study found that 95.4 % of the respondents, who reported no problems in the water taste, were satisfied with the water service. On the other hand, 47.8 % of respondents who reported problems in water taste were not satisfied with the water service. Figure 4 shows the results of the cross tabulation analysis.

Figure 4: Satisfaction according to problems in water taste
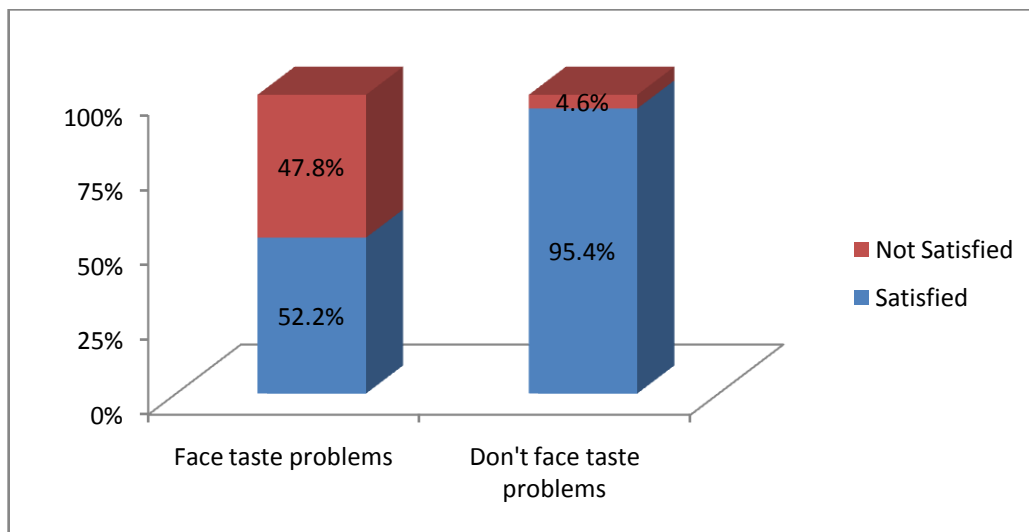
To measure the strength of association between the water taste and the satisfaction level, the study used the Gamma test. The Gamma test is appropriate in this case because of the ordinal nature of the responses, where responding by No indicates a better response than Yes, as it means that no problems have been encountered in the water taste.

Table 5 shows that, the relationship between facing problems in water taste, and the water service satisfaction is significant, and very strong, where the value of Gamma is equal to -0.899. The direction of the relationship is negative, where the more the citizens face water taste problems, the less satisfied they tend to be.

Table 5: Association between problems in water taste and satisfaction

Symmetric Measures						
		Value	**Asymp. Std. Error(a)**	**Approx. T(b)**	**Approx. Sig.**
Ordinal by Ordinal	**Gamma**	-.899	.013	21.450	.000
N of Valid Cases		2424			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.2 Water Color

The data shows that 675 respondents, representing 27.8% of the sample, have experienced problems in the color of water in the governorate of Fayoum, compared to 1750 respondents, representing 72.2% of the sample, have not experienced problems in the color of water. Figure 5 illustrates this finding.

Figure 5: Facing problems in water color
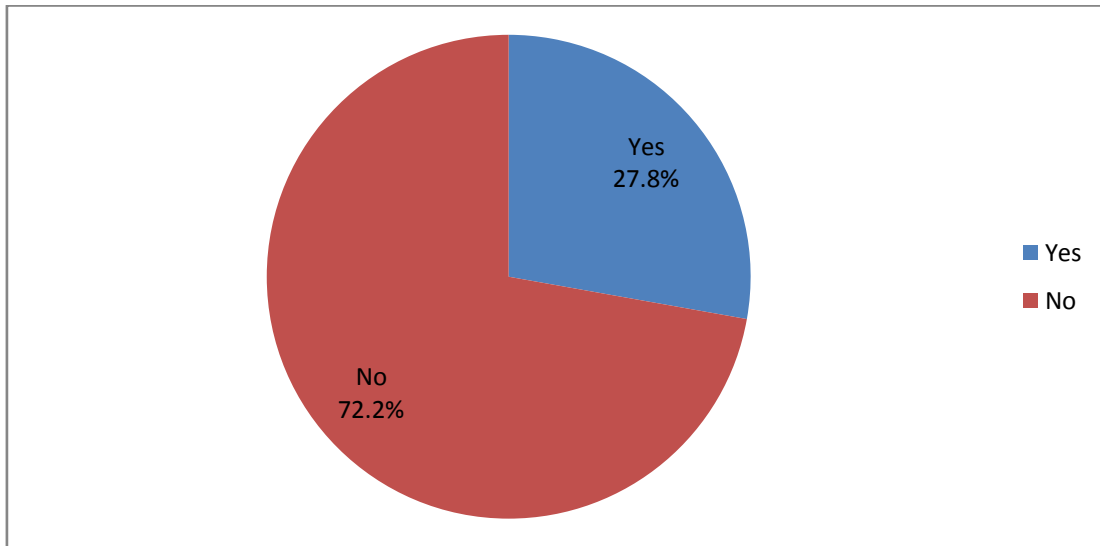
By analyzing the responses of the water color problems, in relation to the satisfaction level, the study found that 93.7 % of the respondents, who reported no problems in the water color, were satisfied with the water service. On the other hand, half of the respondents (48.7 %) who reported problems in water color were not satisfied with the water service. Figure 6 shows the results of the cross tabulation analysis.

Figure 6: Satisfaction according to problems in water color
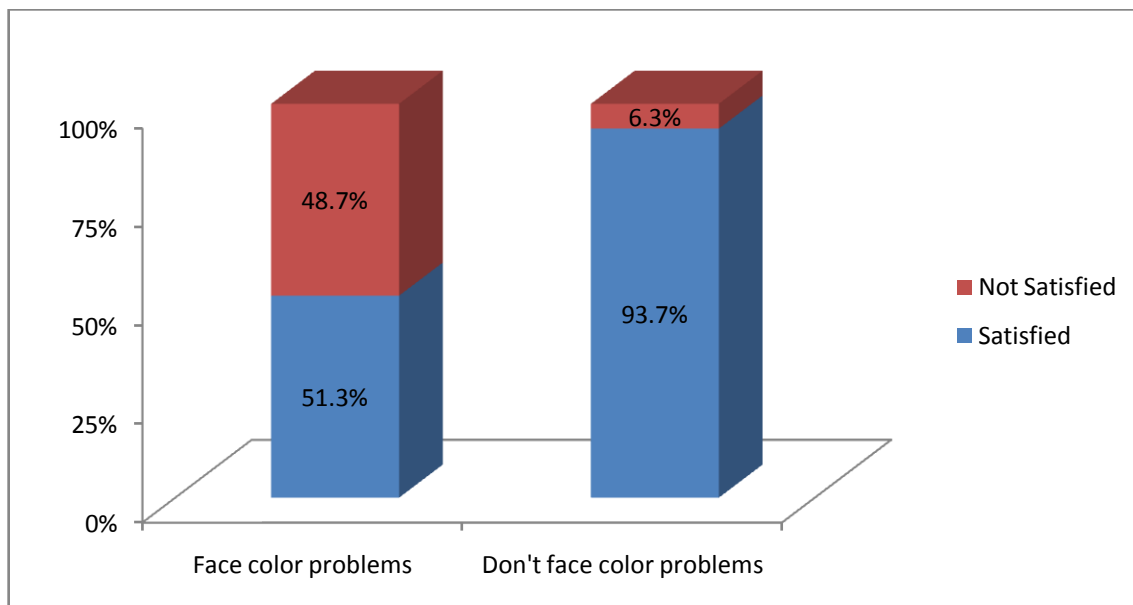
To measure the strength of association between the water color and the satisfaction level, the study used the Gamma test. Table 6 shows that, the relationship between facing problems in water color, and the water service satisfaction is significant, and very strong, where the value of Gamma is equal to -0.867. The direction of the relationship is negative, where the more the citizens face water color problems, the less satisfied they tend to be.

Table 6: Association between problems in water color and satisfaction

Symmetric Measures		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	**Gamma**	-.867	.015	19.421	.000
N of Valid Cases		2425			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.3 Water Smell

Compared to the problems faced in the water taste and water color, a fewer number of respondents have reported problems in the water smell. The data shows that 400 respondents, representing 16.5% of the sample, have experienced problems in the water smell in the governorate of Fayoum, compared to 2022 respondents, representing 83.5% of the sample, have not experienced problems in the water smell. Figure 7 illustrates this finding.

Figure 7: Facing problems in water smell
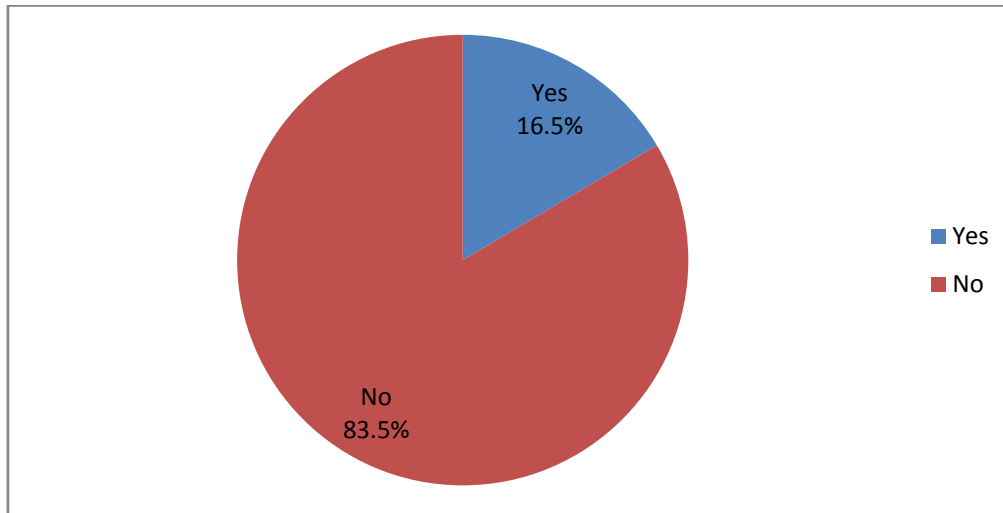
In the bivariate analysis, the responses on the water smell variable, has been analyzed in relation to the satisfaction level. The study found that 90.5 % of the respondents, who reported no problems in the water smell, were satisfied with the water service. On the other hand, 61.5 % of respondents who reported problems in water color were not satisfied with the water service.

Worth noting, that the percent of respondents who are facing problems in the water smell is relatively higher than in the water taste and water color, and similarly, the percent of those who reported dissatisfaction was much higher in the water smell than in the taste and color variables . Figure 8 shows the results of the cross tabulation analysis.

Figure 8: Satisfaction according to problems in water smell
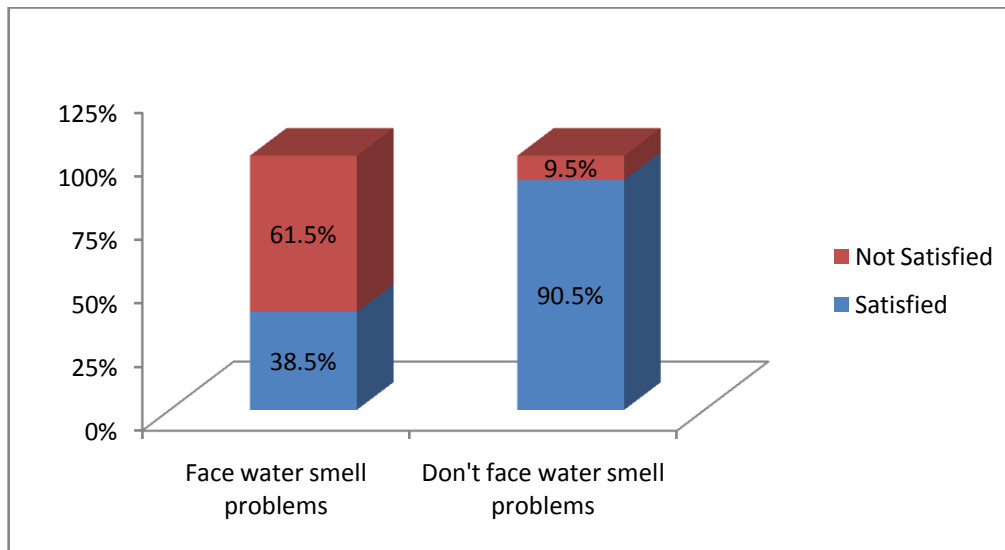
The study used the Gamma test to measure the strength of association between the water smell and the satisfaction level. Table 7 shows that, the relationship between facing problems in water smell, and the water service satisfaction is significant, and very strong, where the value of Gamma is equal to -0.877. The direction of the relationship is negative, where the more the citizens face water smell problems, the less satisfied they tend to be.

Table 7: Association between problems in water smell and satisfaction

| Symmetric Measures					
		Value	**Asymp. Std. Error(a)**	**Approx. T(b)**	**Approx. Sig.**
Ordinal by Ordinal	**Gamma**	-.877	.015	16.465	.000
N of Valid Cases		2422			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.4 Water Meter

Citizens were asked to report whether they have a water meter in their houses, and if these meters are functioning well.

Most of respondents reported having a functioning water meter, with the percent of 93.1%, while only 3.5% have reported having a non functioning water meter, and 3.4% reported not having a water meter. This result reflects one good aspect of efficiency at the side of the Fayoum Water and Sanitation Company, towards insuring more accuracy in calculating the water bills, and decreasing the non-revenue water that is possibly lost because of the inaccurate measurement techniques. The following table shows the frequencies of each category, with its valid percent.

Table 8: Having a Water Meter

	Frequency	Valid Percent	Cumulative Percent
No water meter	81	3.4	3.4
Having a non functioning water meter	85	3.5	6.9
Having a functioning water meter	2241	93.1	100.0
Total	2407	100.0	

By analyzing the responses of having a water meter, in relation to the satisfaction level, the study found that almost all the three categories have scored similar results of satisfaction and dissatisfaction among the respondents. The satisfaction among the respondents who have a functioning water meter scored 82.5%, which is slightly higher than the other two categories (75.3%, 74.1%), while those who had non-functioning water meters were slightly unsatisfied compared to the other dissatisfied respondents, with a

percent of 25.9% compared to 17.5% for those who had functioning ones. Figure 9 shows the results of the cross tabulation analysis.

Figure 9: Satisfaction according to having a water meter
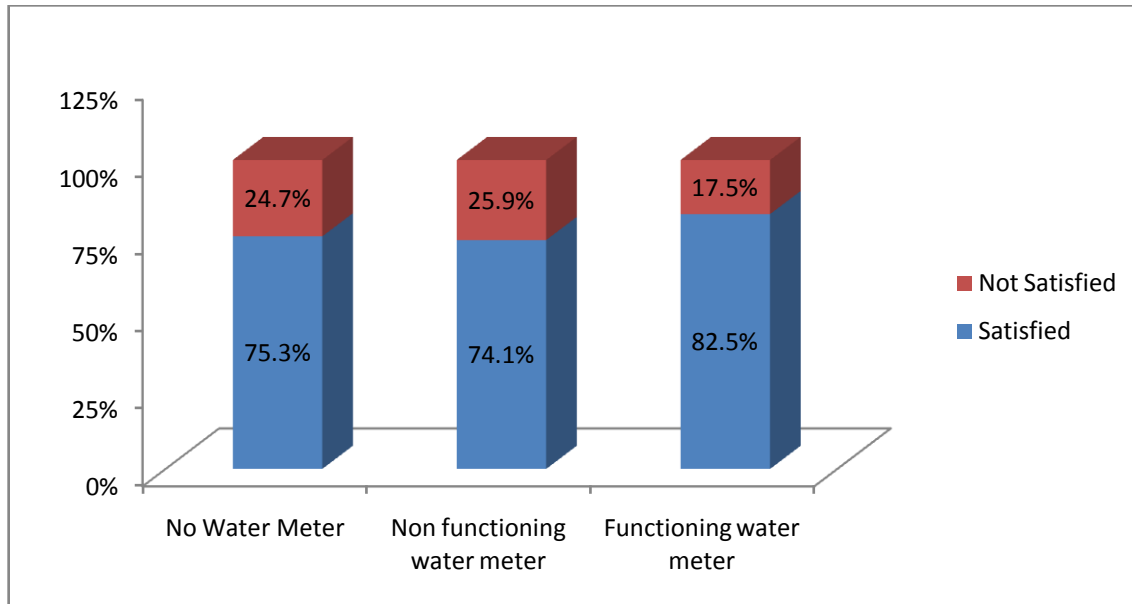
The study used the Gamma test to measure the strength of association between having a water meter and the satisfaction level. Table 9 shows that, the correlation between having a water meter, and the water service satisfaction is positive, and weak, because the value of Gamma is equal to 0.223, yet this correlation is significant because the approximate significant value scored 0.027, which is lower than the significance level 0.05.

Table 9: Association between having a water meter and satisfaction

| Symmetric Measures			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	**Gamma**		.223	.087	2.206	.027
N of Valid Cases			2407			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.5 Water Pressure

The data shows that almost half the numbers of respondents did face problems in the water pressure in the governorate of Fayoum. The water pressure problem has been considered one of the major problems in the water service inside the governorate, as houses located at the end of the water networks, usually don't get adequate amounts of water for their basic needs (El Rassass, 2012). Figure 10 illustrates the descriptive analysis of the water pressure problems.

Figure 10: Facing problems in water pressure
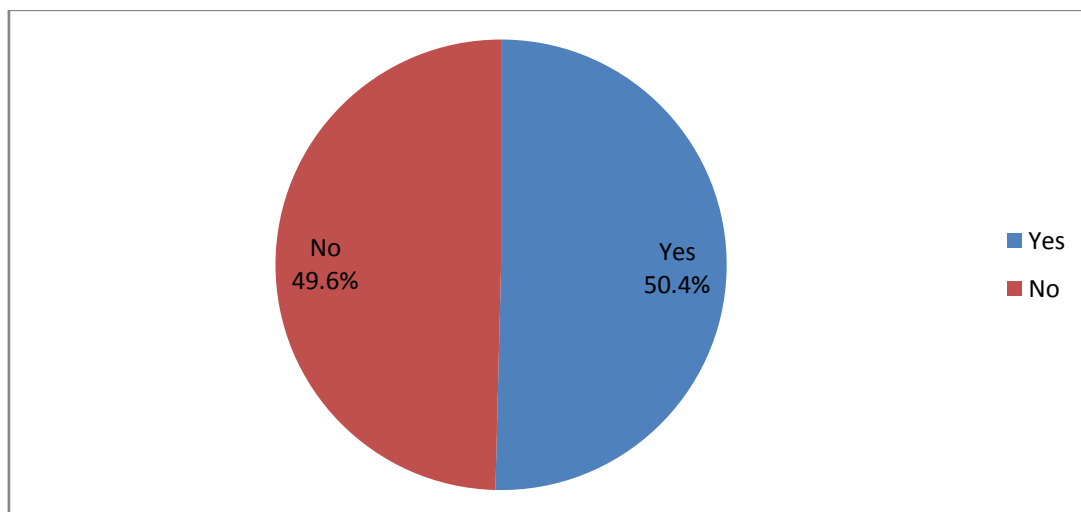
In analyzing the responses of the water pressure problems, in relation to the satisfaction level, the study found that 88.8 % of the respondents, who reported no problems in the water pressure, were satisfied with the water service. On the other hand, 25 % of respondents who reported problems in water pressure were not satisfied with the water service. Figure 11 shows the results of the cross tabulation analysis.

Figure 11: Satisfaction according to problems in water pressure
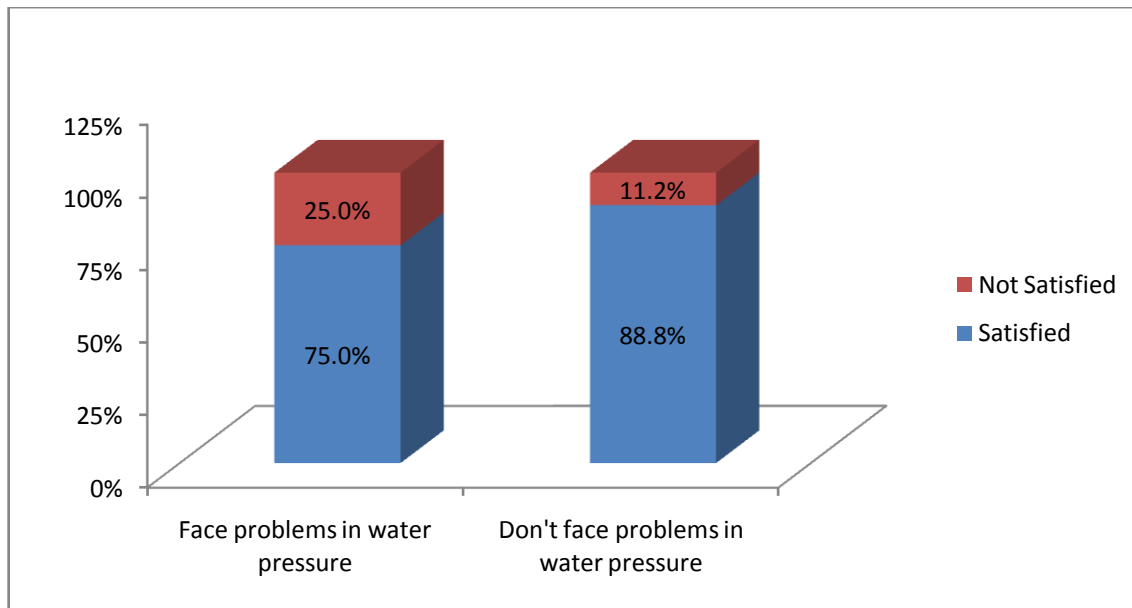
To measure the strength of association between the water pressure and the satisfaction level, the study used the Gamma test. Table 10 shows that, the relationship between facing problems in water pressure, and the water service satisfaction is significant, and moderate, where the value of Gamma is equal to -0.450. The direction of the relationship is negative, where the more the citizens face water pressure problems, the less satisfied they tend to be.

Table 10: Association between problems in water pressure and satisfaction

Symmetric Measures		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	**Gamma**	-.450	.045	8.950	.000
N of Valid Cases		2424			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.6 Continuity of water per day

Respondents were asked to report on whether they experience any interruption in the water service either daily, weekly, monthly, or it is never interrupted. Then for those who reported interruption, they were asked to state how many hours in average per each interruption. A new variable has accordingly been created to record the number of hours of interruption per day from 0 hours to 24 hours. The average of this new variable has scored 1.18 hours of discontinuity per day.

To measure the strength of association between the total hours of water discontinuity per day, and the respondents' satisfaction level, the study has used the Gamma test. Table 11 shows that, the relationship between both variables are negative, because the more total hours of discontinuity increases, the fewer respondents are satisfied with the service, and vice versa. The association is weak, as the gamma value is equal to -0.245. , yet it is significant as it scored below the significance level of 0.05

Table 11: Association between total hours of water discontinuity per day and satisfaction

Symmetric Measures		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	**Gamma**	-.245	.042	-5.452	.000
N of Valid Cases		1925			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.7 Water Bills

The data shows that almost one third (36.9%) of the sample did face problems in water bills in the governorate of Fayoum. These problems ranged between the high value of the bills, delay delivery of bills, or not matching the water meter readings. Figure 12 illustrates the descriptive analysis of the water pressure problems.

Figure 12: Facing problems in water bills
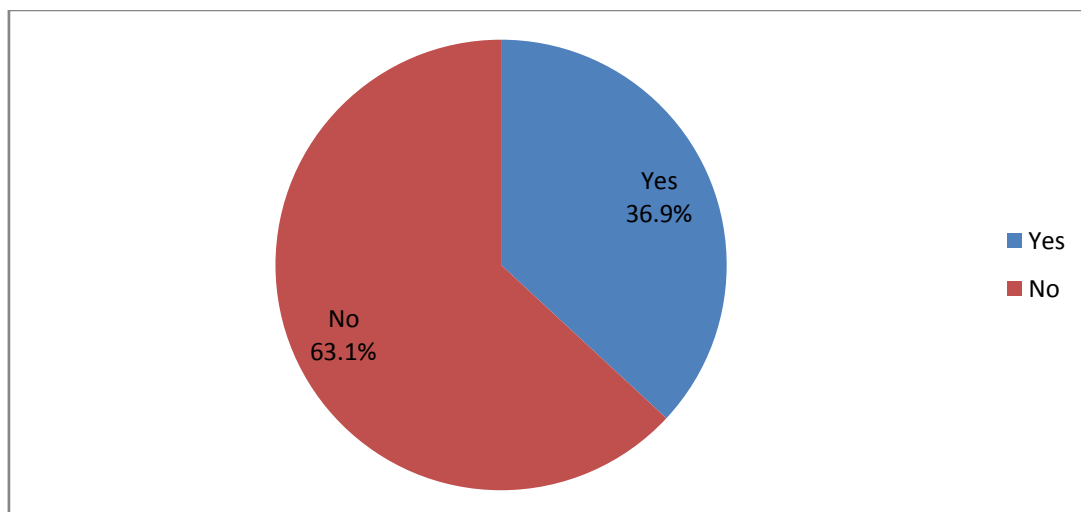
In analyzing the responses of the water bills problems, in relation to the satisfaction level, the study found that no big differences in satisfaction were found among those who

faced water bills problems (75.3%), and those who didn't face them (85.9%). On the other hand, 24.7 % of respondents who faced problems in water bills were not satisfied with the water service, compared to 14.1% of respondents who didn't face problems in water bills, and were unsatisfied. Figure 13 shows the results of the cross tabulation analysis.

Figure 13: Satisfaction according to problems in water bills
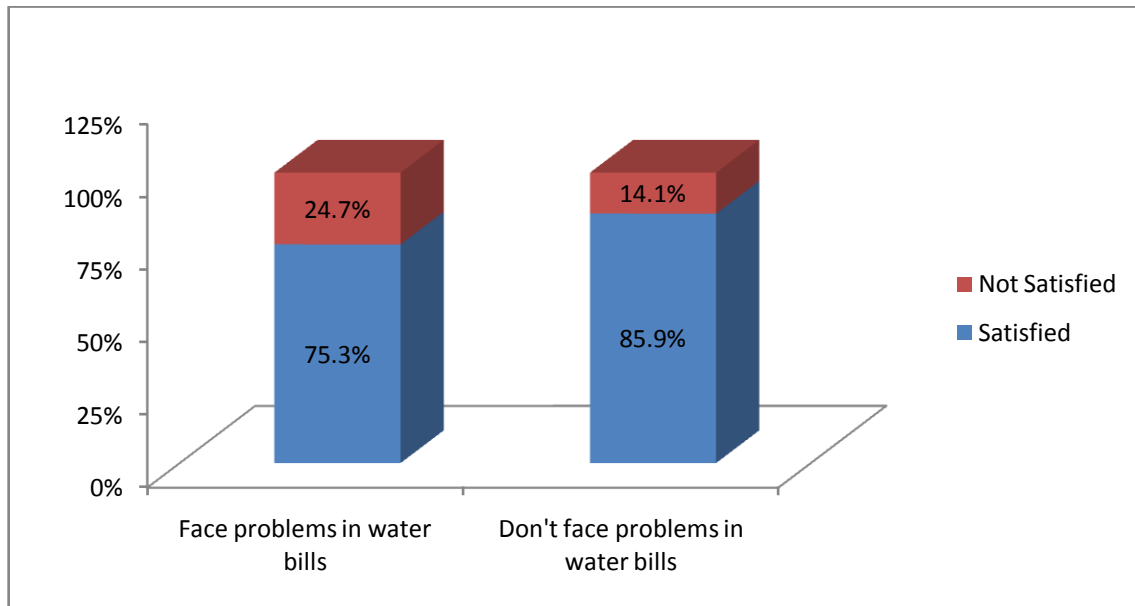
To measure the strength of association between facing problems in water bills and the satisfaction level, the study used the Gamma test. Table 12 shows that, the relationship between facing problems in water bills, and the water service satisfaction is significant, and moderate, where the value of Gamma is equal to -0.336. The direction of the relationship is negative, where the more the citizens face water bills problems, the less satisfied they tend to be.

Table 12: Association between problems in water bills and satisfaction

| Symmetric Measures					
		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	**Gamma**	-.336	.048	6.265	.000
N of Valid Cases		2401			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.8 Response to the Urgent Needs

To figure out the degree of The Fayoum Water Company's immediate response to the urgent needs of the governorate, the respondents were asked to evaluate whether the company quickly respond to the urgent needs of their neighborhoods or not. The question used an ordinal scale of yes, yes to certain extent, or no.

The data shows that 42.6% of the sample perceived the water company as not quick in responding to the urgent needs, while 26% saw that it responded quickly to the citizen needs, and 31.6% saw it responded to certain extent. Figure 14 illustrates the descriptive analysis of the water company's response to the urgent needs.

Figure 14: Water Company's response to the urgent needs
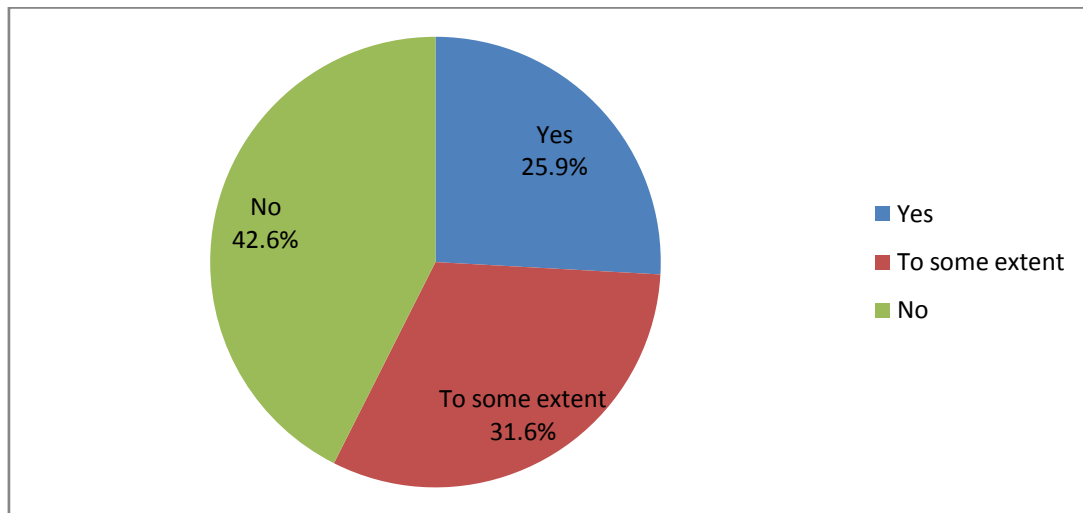
In analyzing the water company's response to the urgent needs, in relation to the satisfaction level, the study found that 32.6% of respondents who perceive the water company as not responding, are unsatisfied with the water service, while respondents who replied with responded, or responded to certain extent almost scored the same scores (93.2%, 90.2%). Figure 15 shows the results of the cross tabulation analysis.

Figure 15: Satisfaction according to the Water Company's response to the urgent needs
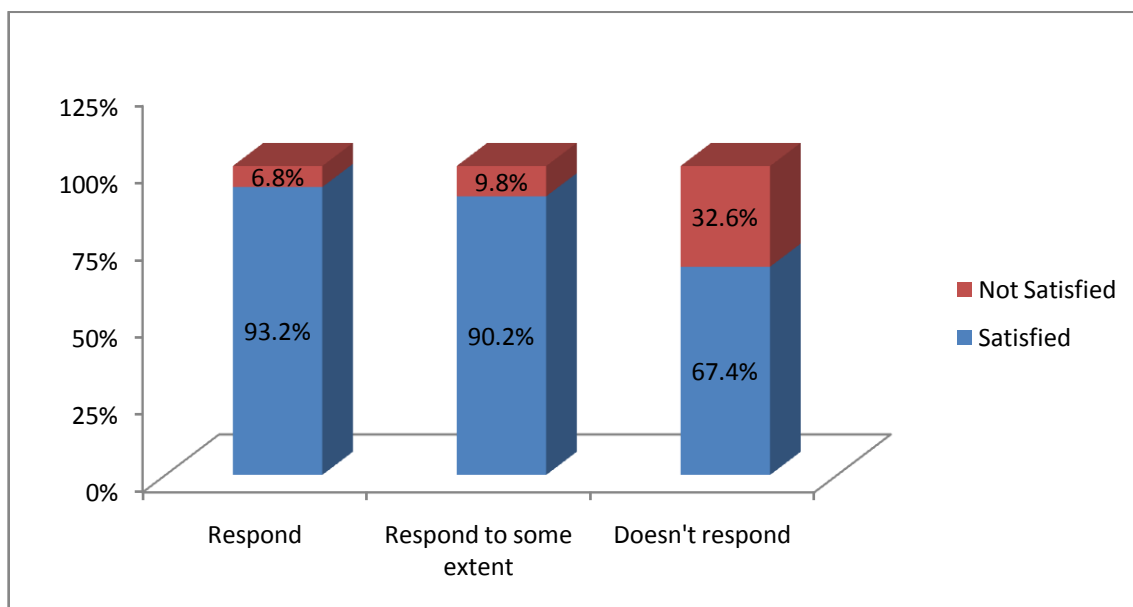
To measure the strength of association between the water company's response to the urgent needs and the satisfaction level, the study used the Gamma test. Table 13 shows that, the relationship between the water company's response to the urgent needs, and the water service satisfaction is significant, and above moderate, where the value of Gamma is equal to 0.619. The direction of the relationship is positive, where the more the water company responds to the urgent needs of the citizens regarding the service, the more satisfied they tend to be.

Table 13: Association between the Water Company's response to the urgent needs and satisfaction

Symmetric Measures					
		Value	**Asymp. Std. Error(a)**	**Approx. T(b)**	**Approx. Sig.**
Ordinal by Ordinal	**Gamma**	.619	.037	-13.956	.000
N of Valid Cases		2108			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

1.9 Access to the Water Service Information

In order to measure the availability of information when requested by the citizens, the survey has included a question on how far the households can easily get any information related to the water service when requested, such as the information related to the timings of urgent water cuts, the maintenance periods, the modification in water tariff, and the procedures of extending a water connection. The question used an ordinal scale of yes, yes to certain extent, or no.

The data shows that more than half the respondents (56%) in the sample, couldn't get an access to the requested sector information, while 21.6% reported that they can get the information they request, and 22.5% can get it only to certain extent. Unlike the other questions, this question has witnessed a lower reply level, where only 1556 respondents have replied. Figure 16 illustrates the descriptive analysis of the water company's response to the urgent needs.

Figure 16: Respondents' access to the water service information
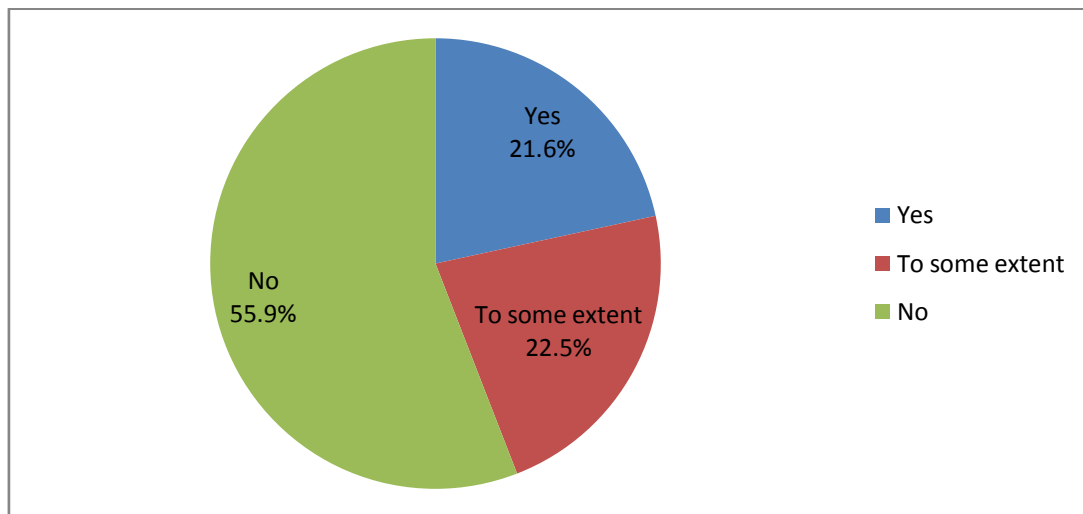
In analyzing the access to the water service information, in relation to the satisfaction level, the study found that 90.5% of respondents who could get an access to the water service information are satisfied with the water service, compared to a lower percent of respondents (73.7%) who reported that they can't access the information of the service, yet they are still satisfied. Figure 17 shows the results of the cross tabulation analysis.

Figure 17: Satisfaction according to the respondents' access to the water service information
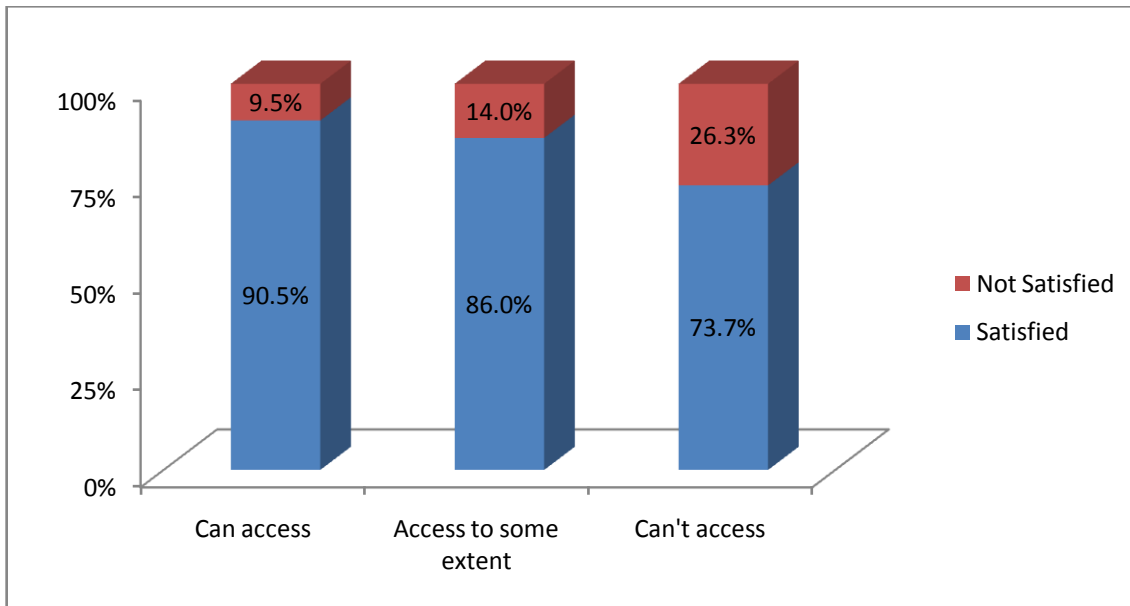
To measure the strength of association between the access to the water service information and the satisfaction level, the study used the Gamma test. Table 14 shows that, the relationship between both variables is significant, and moderate, where the value of Gamma is equal to 0.427. The direction of association between the two variables is positive, where the more the citizens can access the water service information, the more satisfied they tend to be.

Table 14: Association between the respondents' access to the water service information and satisfaction

Symmetric Measures					
		Value	**Asymp. Std. Error(a)**	**Approx. T(b)**	**Approx. Sig.**
Ordinal by Ordinal	**Gamma**	.427	.053	-7.895	.000
N of Valid Cases		1556			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

2. Socioeconomic Variables

This group of variables will tackle the socio economic aspects of the respondents' profile, through studying the education and expenditure characteristics.

2.1 Education Level

The respondents' level of education has been classified to 6 main levels, starting from the category of "never enrolled in the school", which counts for more than half of the sample, representing 55% of the respondents, then "primary" education which counts for 5.4%, followed by the "preparatory" level scoring 1.3%, and the "secondary" level, which recorded the second higher percent of respondents after the never enrolled category with a 27%. The last two levels are the "above average" education with the percent of 2.7%, and the category of "university or higher", representing 8.7% of the sample. Figure 18 illustrates the descriptive analysis of the education level of respondents.

Figure 18: Education Level of Respondents
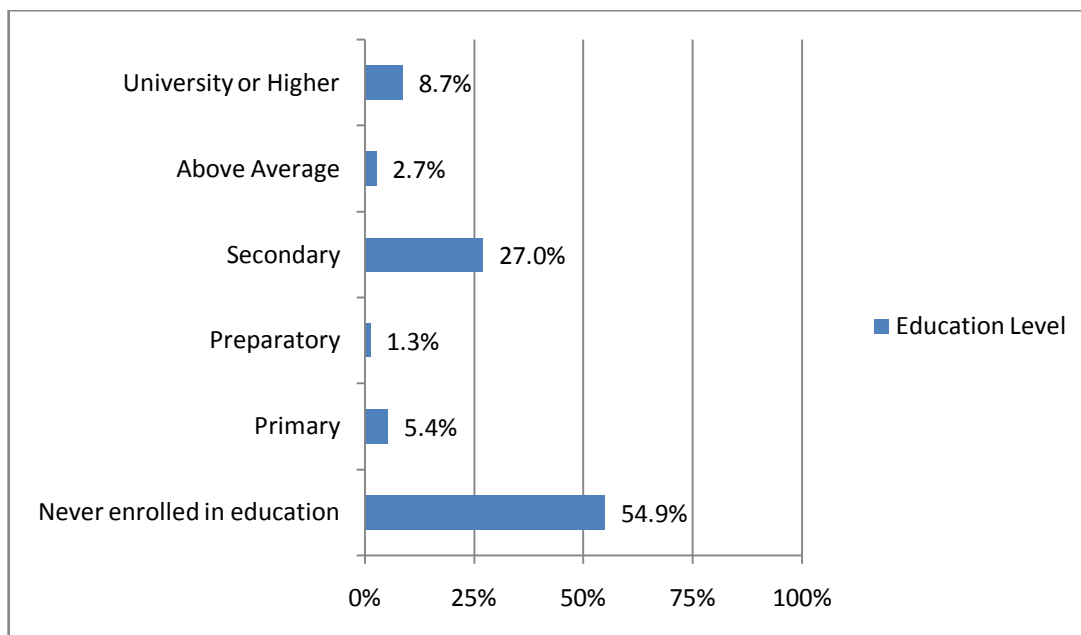
In analyzing the education level of respondents, in relation to the satisfaction level, the study found that the most satisfied respondents were those who have never enrolled in education with a 85.7 %, while this percent has decreased among those who acquired a university degree or higher, with a percent of 64.5%. Respondents above average almost recorded the same percent of satisfaction and dissatisfaction as the respondents with a university degree or higher. Figure 19 shows the results of the cross tabulation analysis.

Figure 19: Satisfaction according to the respondents' level of education
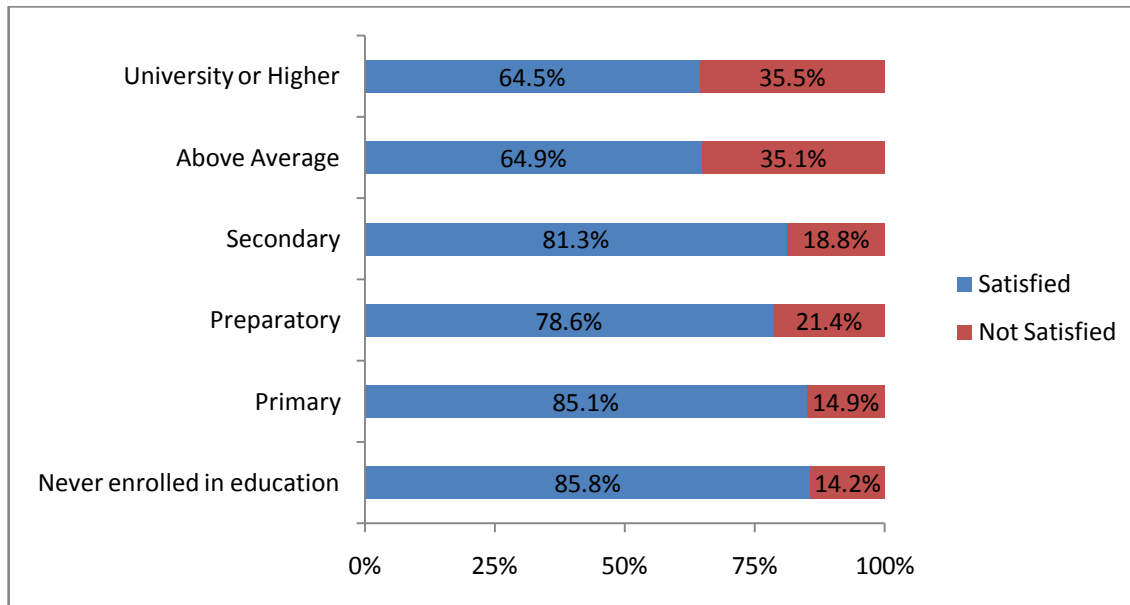
To measure the strength of association between the respondents' level of education and the satisfaction level, the study used the Gamma test. Table 15 shows that, the relationship between both variables is significant, but weak, where the value of Gamma is equal to -0.286. The direction of association is negative, since the more education the respondent gets, the less likely he or she will be satisfied with the service, and vice versa.

Table 15: Association between the respondents' level of education and satisfaction

Symmetric Measures					
		Value	**Asymp. Std. Error(a)**	**Approx. T(b)**	**Approx. Sig.**
Ordinal by Ordinal	**Gamma**	-.286	.043	-5.957	.000
N of Valid Cases		2130			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

2.2 Average of Monthly Spending

The survey didn't include an explicit question on the income of respondents. Rather, it included a question on the average of monthly spending for the whole household, as estimated by the respondent. Then the responses have been classified into quintiles, to sort the respondents in five 20 percent sections[2]. These five categories are: Poorest (1 L.E - 600 L.E), Poorer (Above 600 L.E - 900 L.E), Average (Above 900 L.E - 1000 L.E), Rich (Above 1000 L.E - 1500 L.E), and Richest (Above 1500 L.E).

The results shows that the higher percent of respondents fall under the poorest category (23.6%), followed by poorer (21.6%). The richest category scored the lower percent of respondents representing only 15.4%. Figure 20 illustrates the descriptive analysis of the categories of respondents according to the average of monthly spending.

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[2] This method is commonly used in the poverty and wealth studies, such as the Demographic and Health Survey Wealth Index, http://www.childinfo.org/files/DHS_Wealth_Index_(DHS_Comparative_Reports).pdf

Figure 20: Categories of respondents according to the average of monthly spending
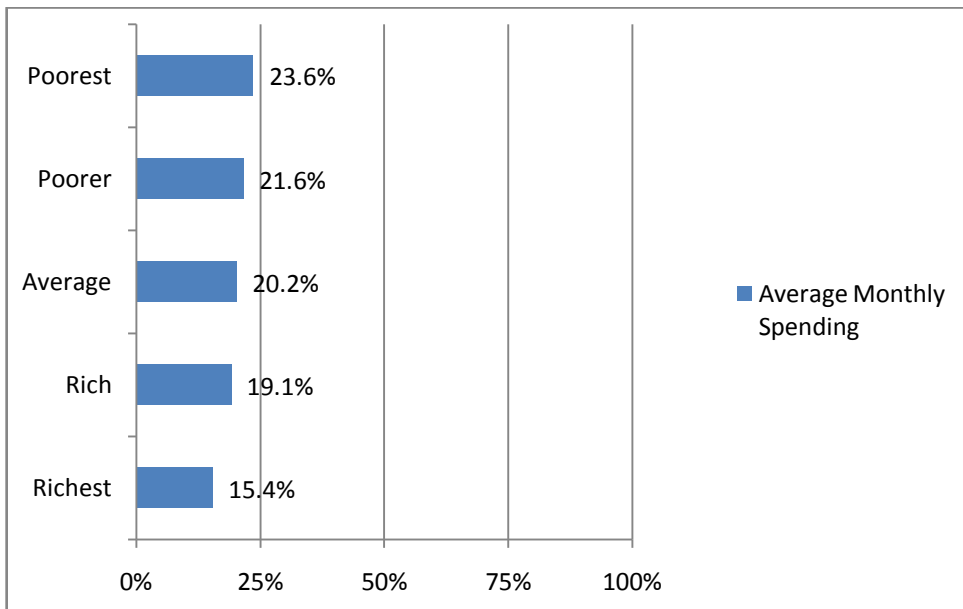
In analyzing the categories of the average of monthly spending, in relation to the satisfaction level, the study found that the most satisfied respondents were those who were the poorest among the sample with a 87.6 %, and the following category of the poorer (86.6%), while this percent has decreased among those who were the richest among the sample, with a percent of 74.5%. Figure 21 shows the results of the cross tabulation analysis.

Figure 21: Satisfaction according to the categories of average monthly spending
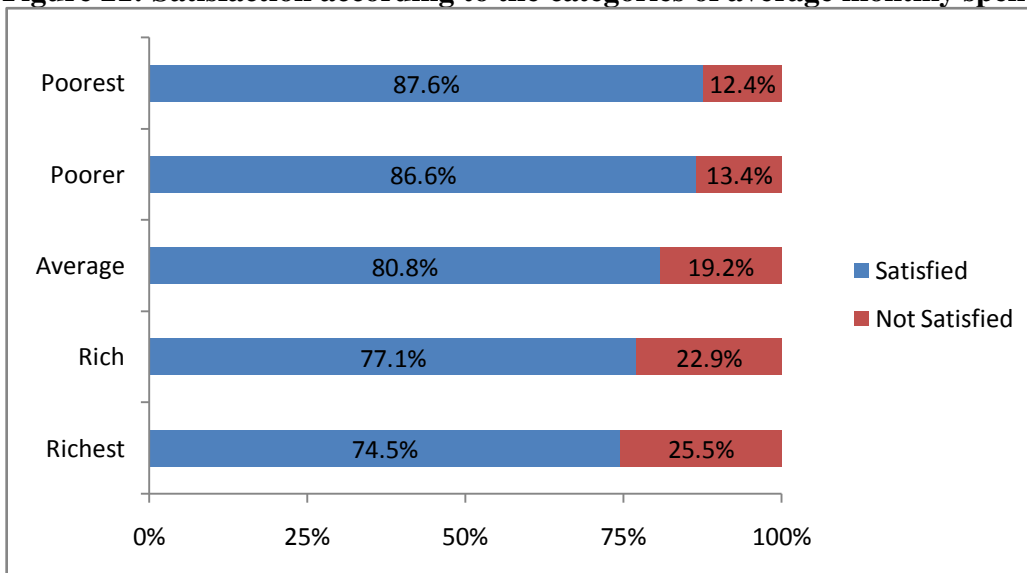
To measure the strength of association between the categories of the average of monthly spending and the satisfaction level, the study used the Gamma test. Table 16 shows that, the relationship between both variables is significant, but weak, where the value of Gamma is equal to -0.234. The direction of association is negative, since the more rich the respondent gets, the less likely he or she will be satisfied with the water service, and vice versa.

Table 16: Association between the categories of average monthly spending and satisfaction

Symmetric Measures					
		Value	**Asymp. Std. Error(a)**	**Approx. T(b)**	**Approx. Sig.**
Ordinal by Ordinal	**Gamma**	-.234	.036	-6.304	.000
N of Valid Cases		2419			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

3. Demographic Variables

This group of variables will tackle the demographic aspects of the respondents' profile, through studying the age, gender, and the rural urban distribution characteristics.

3.1 Age

The respondents' age has been classified to 6 main levels. The categories are as follows:

- Respondents aged between 14 and 19 years, represented 3.4% of the sample.

- Respondents aged between 20 and 25 years, represented 16% of the sample.

- Respondents aged between 26 and 35 years, represented 28.6% of the sample.

- Respondents aged between 36 and 40 years, represented 11.4% of the sample.

- Respondents aged between 41 and 50 years, represented 17.7% of the sample.

- Respondents aged above 50 years, represented 22.9% of the sample.

Figure 22 illustrates the descriptive analysis of the age of respondents.

Figure 22: Age of Respondents
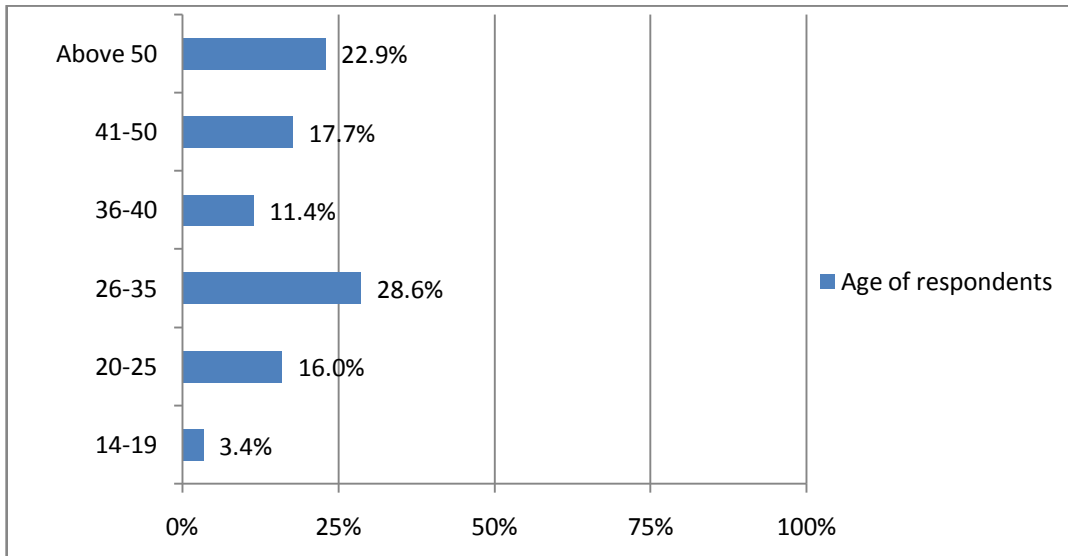
In analyzing the age of respondents, in relation to the satisfaction level, the study found that there was no big difference among the categories of age, where the highest percent of satisfaction with the water service was among the respondents aged above 50, with a percent of 85.4%, while 74.9% of the respondents aged between 36 and 40, were dissatisfied with the water service. Figure 23 shows the results of the cross tabulation analysis.

Figure 23: Satisfaction according to the age of respondents
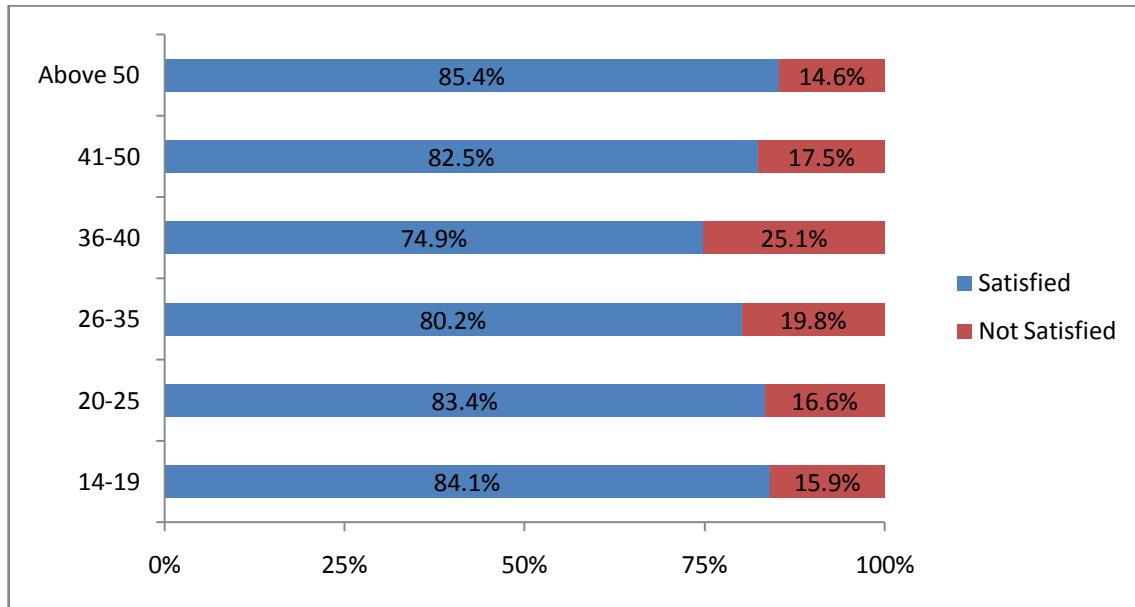
To measure the strength of association between the age of respondents and the satisfaction level, the study used the Gamma test. The results shows that no association exists between both variables, where the value of Gamma is equals to 0.041, and the significance value is 0.245, which is greater than the used significance level of 0.05. Table 17 illustrates this result.

Table 17: Association between the age of respondents and satisfaction

Symmetric Measures		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	**Gamma**	.041	.036	1.163	.245
N of Valid Cases		2419			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Since this is the first variable among the whole tested variables, either service or non service related variables, to fail to show a kind of ordinal association with the satisfaction using the Gamma test, another test has therefore been used to describe if there is any relationship in general among the two variables, regardless the direction and the amount of correlation. The used test is Lambda, and it showed significance, based on the chi-square approximation as illustrated in Table 18 below.

Table 18: Association between the age of respondents and satisfaction

			Value	Asymp. Std. Error(a)	Approx. T	Approx. Sig.
Nominal by Nominal	Lambda	Symmetric	.000	.000	.(b)	.(b)
		Age Dependent	.000	.000	.(b)	.(b)
		Satisfaction Dependent	.000	.000	.(b)	.(b)
	Goodman and Kruskal tau	Age Dependent	.001	.001		.007(c)
		Satisfaction Dependent	.007	.003		.007(c)

a Not assuming the null hypothesis.
b Cannot be computed because the asymptotic standard error equals zero.
c Based on chi-square approximation

3.2 Gender

The data shows that 880 respondents, representing almost one third of the sample (36.3%) were males, compared to 1546 female respondents representing 63.7% of the sample. Figure 24 illustrates these percents.

Figure 24: Gender of Respondents
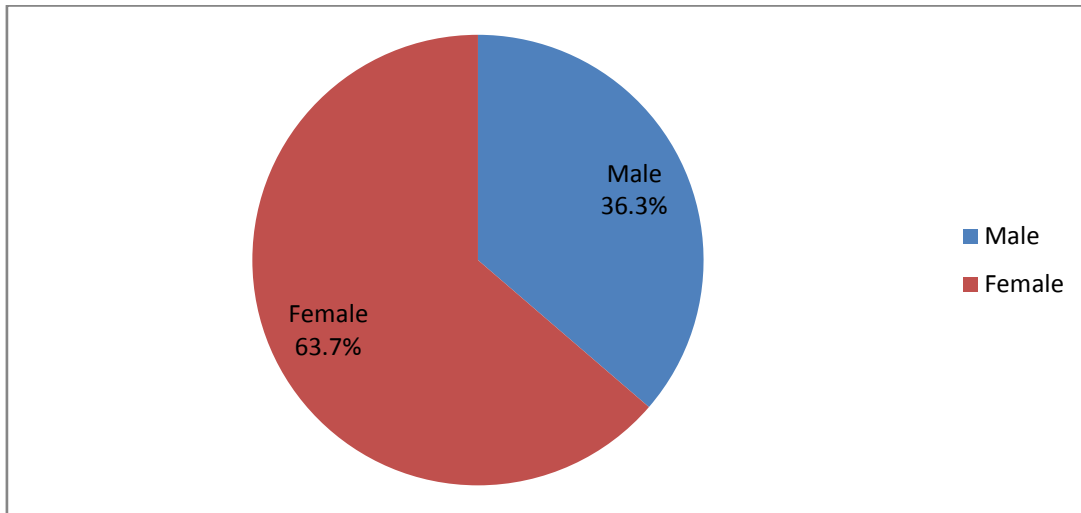
In analyzing the gender of respondents, in relation to the satisfaction level, the study found that among the female respondents 84.2% were satisfied in general with the water service, while a less percent of satisfaction has appeared among the male respondents with 77.8%. Figure 25 shows the results of the cross tabulation analysis.

Figure 25: Satisfaction according to respondents' gender
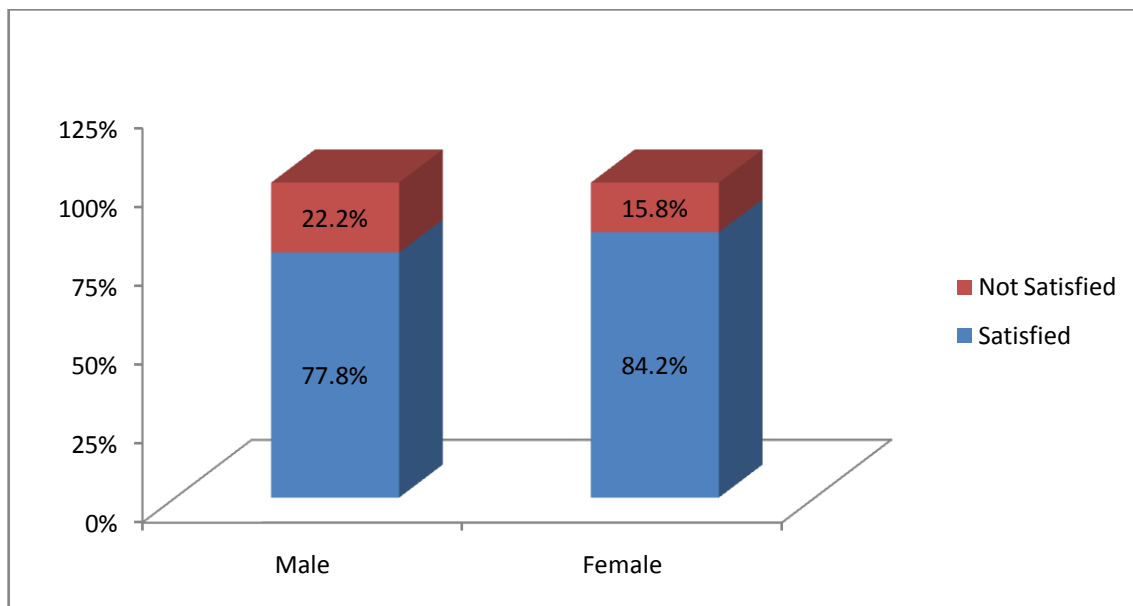
To measure the strength of association between the gender of respondents and the satisfaction level, the study used the Lambda test. Since the gender variable is nominal, the Lambda test is the most suitable test to use. Table 19 shows that, the Lambda value cannot be computed because the asymptotic standard error equals zero, but based on the chi-square approximation, the relationship between the gender of respondents, and the water service satisfaction is significant in general.

Table 19: Association between the gender of respondents and satisfaction

			Value	Asymp. Std. Error(a)	Approx. T	Approx. Sig.
Nominal by Nominal	Lambda	Symmetric	.000	.000	.(b)	.(b)
		Gender Dependent	.000	.000	.(b)	.(b)
		Satisfaction Dependent	.000	.000	.(b)	.(b)
	Goodman and Kruskal tau	Gender Dependent	.006	.003		.000(c)
		Satisfaction Dependent	.006	.003		.000(c)

a Not assuming the null hypothesis.
b Cannot be computed because the asymptotic standard error equals zero.
c Based on chi-square approximation

3.3 Rural & Urban Distribution

The data shows that almost three quarters of the sample live in rural areas, counting for 72.7% of the sample (1764 respondents), while 662 respondents, representing 27.3% of the sample, live in urban area. Figure 26 illustrates these percents.

Figure 26: Rural & Urban Distribution of Respondents
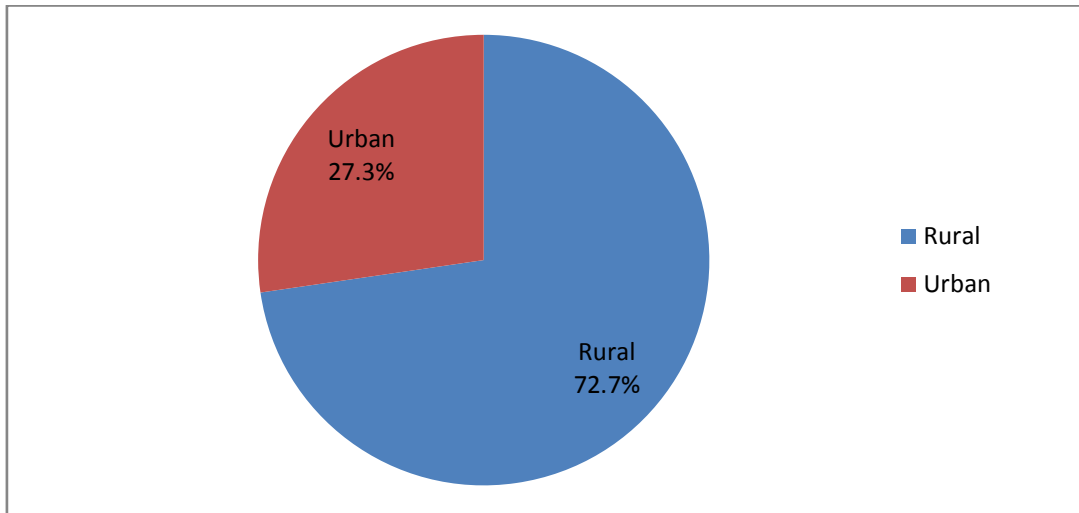
In analyzing the spatial distribution of the respondents, in relation to the satisfaction level, the study found that among the rural residents 85.8% were satisfied in general with the water service, while a less percent of satisfaction has appeared among the urban residents with 71.3%. Figure 27 shows the results of the cross tabulation analysis.

Figure 27: Satisfaction according to the rural & urban distribution of respondents
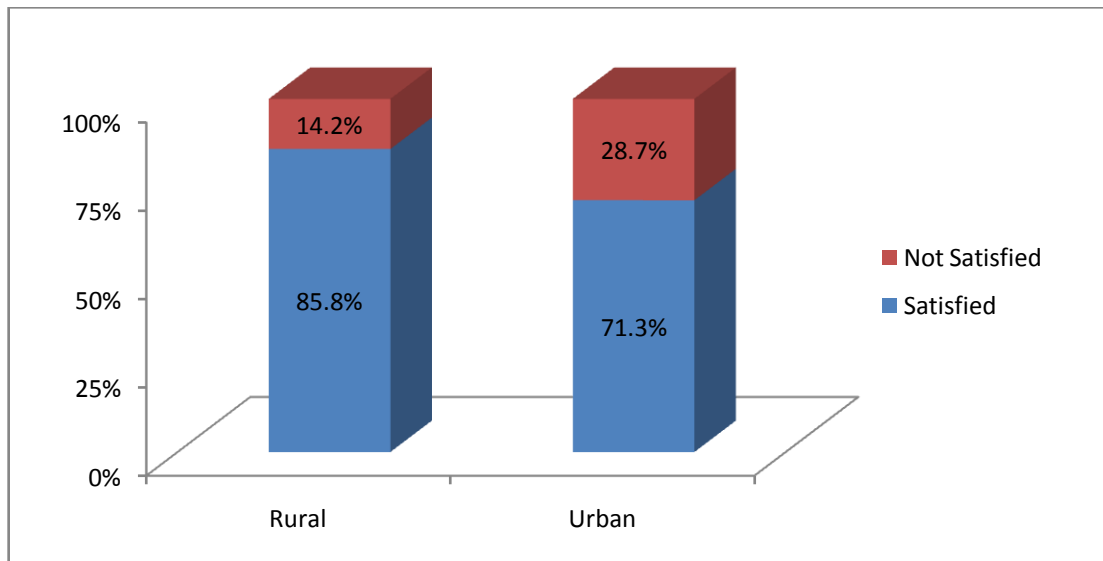
To measure the strength of association between the rural and urban distribution of respondents and the satisfaction level, the study used the Lambda test. Since the

independent variable is nominal, the Lambda test is the most suitable test to use. Table 20 shows that, the Lambda value cannot be computed because the asymptotic standard error equals zero, but based on the chi-square approximation, the relationship between the rural and urban distribution of respondents, and the water service satisfaction is significant in general.

Table 20: Association between the rural & urban distribution of respondents and satisfaction

			Value	Asymp. Std. Error(a)	Approx. T	Approx. Sig.
Nominal by Nominal	Lambda	Symmetric	.000	.000	.(b)	.(b)
		Urban / Rural Dependent	.000	.000	.(b)	.(b)
		Satisfaction Dependent	.000	.000	.(b)	.(b)
	Goodman and Kruskal tau	Urban / Rural Dependent	.028	.007		.000(c)
		Satisfaction Dependent	.028	.007		.000(c)

a Not assuming the null hypothesis.
b Cannot be computed because the asymptotic standard error equals zero.
c Based on chi-square approximation

The previous analysis shows that all the independent variables have a significant correlation with the dependent variable of citizen satisfaction, except for the 'age' which did not prove a significant correlation using the Gamma test, but showed some correlation using the Lambda test.

The strength of the correlation varied between strong correlations such as the water taste, smell, and color, and weak correlations such as having a water meter, and continuity of water during the day. To sum up the results of the bivariate analysis, the following

table illustrates the main characteristics of the correlation between each independent variable and the citizens' satisfaction.

Table 21: Main characteristics of the correlation between the dependent and independent variables

Variable	Used Test	Correlation Significant	Correlation Strength	Correlation Direction
4. Water Taste	Gamma	Yes	Very Strong	Negative
5. Water color	Gamma	Yes	Very Strong	Negative
6. Water smell	Gamma	Yes	Very Strong	Negative
7. Functioning water meter	Gamma	Yes	Weak	Positive
8. Water pressure	Gamma	Yes	Moderate	Negative
9. Continuity of water during the day	Gamma	Yes	Weak	Negative
10. Water bills	Gamma	Yes	Moderate	Negative
11. Response to the urgent needs	Gamma	Yes	Moderate	Positive
12. Access to the water service information	Gamma	Yes	Moderate	Positive
13. Education Level	Gamma	Yes	Weak	Negative

14. Average of Monthly Spending	Gamma	Yes	Weak	Negative
15. Age	Gamma	No		
	Lambda	Yes		
16. Gender	Lambda	Yes		
17. Rural & Urban Distribution	Lambda	Yes		

The analysis of the Logistic Regression Model

After completing the univariate and bivariate levels of analysis, the last phase will focus on building the logistic regression model. It aims at identifying the significance of each independent variable on the dependent variable, quantify the magnitude of this effect, and explore the potential causal relationships among the satisfaction, and the other tested variables.

The multicollinearity problem usually happens when some of the independent variables are correlated in the regression analysis, in a way that might produce redundant information about the dependent variable, and makes it difficult to identify the exact influence of each independent variable on predicting the occurrence of the dependent variable ("Multicollinearity," 2004).

Therefore, the study used a statistical test known as the Variance Inflation Factor (VIF) test, in order to quantify how much the variance in the dependent variable is inflated by the correlation among independent variables.

Variance Inflation Factor (VIF)

The value of the VIF determines whether the inflation exists or not. The normal VIF threshold is 3, so if the value is above 3, then probably a multicollinearity issue will appear, and if it is above 5, this means that the model very likely has a multicollinearity issue. VIF value above 10 means that there is a serious multicollinearity problem that needs correction ("Detecting multicollinearity using," 2004). The value of "Tolerance" less than 0.20 or 0.10 indicates a multicollinearity problem.

Table 22 shows the values of VIF for each of the independent variables in the study.

Table 22: Values of the Variance Inflation Factor Test

	Multicollinearity Statistics	
	Tolerance	**VIF**
Face problems in water taste	.455	2.199
Face problems in water color	.468	2.136
Face problems in water smell	.549	1.822
Face problems in water pressure	.897	1.115
Face problems in water bills	.896	1.116
Water Meter	.966	1.036
Total hours of water discontinuity per day	.884	1.131
Water Company make a quick response for the urgent needs	.673	1.486

Access to information concerning water service	.669	1.495
Age	.832	1.202
Gender	.901	1.110
Average Monthly Spending	.825	1.212
Education level	.719	1.391
Urban / Rural	.794	1.260

a Dependent Variable: Water Service Satisfaction

Although the multicollinearity problem is more likely to appear in the models with a big number of independent variables – which is exactly the case of this study – yet fortunately enough, the multicollinearity problem did not represent an issue for this study, were no variable has reached the threshold limit. According to the table above, the highest values recorded among the variables were the water taste (2.2) and water color (2.1).

This means that the logistic regression will be done using all the 14 variables, without the need to correct the model.

Description of the Model

The model has included 2367 respondents out of the total number of respondents which counts for 2426. It represents 97.6% of the whole sample. For the purpose of comparing the different categories in each variable, a reference category has been chosen for each independent variable.

The model initially ran 4 iterations in block 0, and it was able to predict the relation among the dependent and independent variables correctly by 82%. Then the model ran additional 6 iterations in block 1, which increased the percent of model prediction to be 87.8%

(table 23). This improvement reflects the good ability of the model to correctly predict the observations studied by the model.

Table 23: Classification Table

	Observed		Predicted		
			Satisfaction		Percentage Correct
			Not Satisfied	Satisfied	Not Satisfied
Step 1	Satisfaction	Not Satisfied	241	182	57.0
		Satisfied	106	1838	94.5
	Overall Percentage				87.8

a. The cut value is .500
Cells on the diagonal are correct predictions.
Cells off the diagonal are incorrect predictions.

The Nagelkerke R Square for the model is 0.526, which means that the model is able to explain 52.6 % of the observations included in the analysis. In other words, this finding means that the independent variables included in the study are able to explain more than half of the observations of the citizens' satisfaction about the water service.

Table 24: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1308.104(a)	.320	.526

a Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Then the final step is generating the parameters estimates' table, which summarizes the effect of each independent variable on the dependent variable (the satisfaction level). Among the most important columns to look at in the parameter estimates' table is the significance of the Wald statistic, since it determines whether the variable is useful for the model or not, and it should be below 0.05.

The second important column is the Exp(B), which in the case of logistic regression is much easier to understand and comment on than the B. the B value is usually used in the linear regression models. The Exp(B) indicates the ratio change in the odds of an event for a one unit change in the independent variable.

Table 25 below shows the cell of 'categories' for each independent variable, after lifting up the reference category that was early determined before running the model. The table also includes the significance and the Exp(B) of each category. It also indicates the percentage change in odds for each unit of increase, and the direction of the effect through the last column of Exp(B)-1.

Table 25: The Parameter Estimates and Significance

Variables	Categories	Sig.	Exp(B)	Exp(B) -1
Face problems in water taste	Yes	0.000***	0.202	-80%
Face problems in water color	Yes	0.000***	0.371	-63%
Face problems in water smell	Yes	0.000***	0.343	-66%
Face problems in water pressure	Yes	0.000***	0.472	-53%
Face problems in water bills	Yes	0.511	0.906	-9%
Water Meter	Meter	0.825		
	No water meter	0.540	1.280	28%
	Having a non functioning water meter	0.903	1.043	4%
Total hours of water discontinuity per day	Hours of discontinuity per day	0.028**	0.925	-7%
Water Company makes a quick response to the urgent needs	response	0.000***		
	No	0.000***	0.248	-75%
	To some extent	0.131	0.693	-31%
Access to information concerning water service	Access	0.422		
	No	0.225	0.807	-19%
	To some extent	0.888	0.967	-3%
Age	Age	0.443		

	14-19	0.840	0.920	-8%
	20-25	0.750	0.923	-8%
	26-35	0.258	0.782	-22%
	36-40	0.075*	0.633	-37%
	41-50	0.941	1.018	2%
Gender	Male	0.008***	0.664	-34%
Average Monthly Spending	Expenditure	0.364		
	Poorest	0.867	1.042	4%
	Poorer	0.360	1.251	25%
	Average	0.800	0.943	-6%
	Rich	0.283	0.779	-22%
Education level	Education	0.042**		
	Never enrolled in education	0.001***	2.334	133%
	Primary	0.021**	2.664	166%
	Preparatory	0.447	1.657	66%
	Secondary	0.008***	2.053	105%
	Above Average	0.384	1.495	49%
Urban Rural	Urban	0.000***	0.547	-45%

*   P value is significant at the 0.1 level

**   P value is significant at the 0.05 level.

*** P value is significant at the 0.01 level.

In general, the result of the logistic regression analysis shows that the overall model is **significant**. Nine variables out of 14 have been found significant. Each variable is being explained in details below.

1. Facing problems in water taste: While holding all other factors constant, the probability of satisfaction with the water service is more likely to decrease by 80% for households who are facing problems in water taste, than for those households who are not facing this problem.

2. Facing problems in water color: While holding all other factors constant, the probability of satisfaction with the water service is more likely to decrease by 63% for

households who are facing problems in water color, than for those households who are not facing this problem.

3. <u>Facing problems in water smell:</u> While holding all other factors constant, the probability of satisfaction with the water service is more likely to decrease by 66% for households who are facing problems in water smell, than for those households who are not facing this problem.

4. <u>Facing problems in water pressure:</u> While holding all other factors constant, the probability of satisfaction with the water service is more likely to decrease by 53% for households who are facing problems in water pressure, than for those households who are not facing this problem.

5. <u>Total hours of water discontinuity per day:</u> While holding all other factors constant, the probability of satisfaction with the water service is more likely to decrease by 7% for households who face longer hours of water cut per day, than for those households who face fewer hours of water cut per day.

6. <u>The Water Company responds quickly to the urgent needs:</u> While holding all other factors constant, the probability of satisfaction with the water service is more likely to decrease by 75%, when the water company doesn't make a quick response to the urgent needs of a certain neighborhood, compared to the situation when the company responds quickly.

With regard to the category of "responding to some extent", the model didn't find it significantly different than the category of "responding quickly".

7. Gender: While holding all other factors constant, males are less likely to be satisfied with the water service than females by 34%.

8. Education level: While holding all other factors constant,

- Individuals who are never enrolled in schools are more likely to be satisfied with the water service by 133%, compared to individuals with a university degree or higher.

- The individuals with a primary education are more likely to be satisfied with the water service by 166%, compared to individuals with a university degree or higher.

- The individuals with a secondary education are more likely to be satisfied with the water service by 105%, compared to individuals with a university degree or higher.

- While, the individuals with a "preparatory" or "above average" education, didn't differ in their satisfaction level from those who have a university degree or higher.

9. Urban-Rural Distribution: While holding all other factors constant, individuals living in urban areas are less likely to be satisfied with the water service by 45%, than individuals living in rural areas.

The previous variables have succeeded to show a significant effect in predicting the citizen satisfaction regarding the water service in the governorate of Fayoum. On the other hand, the rest of the variables in the model have failed to show a level of significance in explaining the water service satisfaction. Those variables are either service-related variables such as: *having a functioning water meter, facing problems in water bills, access to the water sector information* (i.e. the timings of urgent water cuts, the maintenance periods, modification in

water tariff, and the procedures of extending a water connection), or demographic and socioeconomic variables such as: *age, and average of monthly spending*.

In order to test the robustness of the model, and ensure the significance of the investigated variables, a second run of the model has been made. This time, the insignificant categorical variables of age, and average of monthly spending, have been incorporated in their continuous form, instead of the first form of categorical classification. The results of the model are illustrated in the following table.

Table 26: The Parameter Estimates and Significance (Second Run)

Variables	Categories	Sig.	Exp(B)	Exp(B) -1
Face problems in water taste	**Yes**	**0.000*****	**0.205**	**-80%**
Face problems in water color	**Yes**	**0.000*****	**0.377**	**-62%**
Face problems in water smell	**Yes**	**0.000*****	**0.334**	**-67%**
Face problems in water pressure	**Yes**	**0.000*****	**0.478**	**-52%**
Face problems in water bills	**Yes**	**0.575**	**0.92**	**-8%**
Water Meter	**Meter**	**0.816**		
	No water meter	**0.534**	**1.28**	**28%**
	Having a non functioning water meter	**0.874**	**1.056**	**6%**
Total hours of water discontinuity per day	**Hours of discontinuity per day**	**0.026****	**0.925**	**-8%**
Water Company makes a quick response to the urgent needs	**response**	**0.000*****		
	No	**0.000*****	**0.249**	**-75%**
	To some extent	**0.128**	**0.692**	**-31%**
Access to information concerning water service	**Access**	**0.408**		
	No	**0.211**	**0.802**	**-20%**
	To some extent	**0.856**	**0.958**	**-4%**
Gender	**Male**	**0.004*****	**0.643**	**-36%**
Education level	**Education**	**0.069***		
	Never enrolled in education	**0.002*****	**2.222**	**122%**
	Primary	**0.030****	**2.492**	**149%**

	Preparatory	0.395	**1.762**	**76%**
	Secondary	0.010***	**1.999**	**100%**
	Above Average	0.348	**1.533**	**53%**
Urban Rural	**Urban**	0.000***	**0.545**	**-46%**
Age	**Age**	0.272	**1.006**	**1%**
Average Monthly Spending	**Expenditure**	0.269	**1.000**	**0%**

*   P value is significant at the 0.1 level
**   P value is significant at the 0.05 level.
*** P value is significant at the 0.01 level.

The results of the model show that nearly all variables have showed the same significant results, with minor fraction differences in P values, and Exp(B). The significance of the overall variable of education level has changed in the second run from **0.042,** where the P value is significant at the 0.05 level, to **0.069**, where the P value is significant at the 0.1. The categories of education have reported the same results of significance in the two models.

Regarding the variables of Age, and Average of monthly spending, the model showed that they were insignificant, even after running the model on the continuous values of the variables instead of the pre-defined categories.

As a general conclusion, the models showed that the variables of the "water quality" (taste, color, and smell) were the most significant group of variables in affecting the citizens' satisfaction regarding the service. The variables of "service quality" have witnessed mixed evidence, where half of the investigated variables under this group, has proved significance, while the other half has not.

On the socioeconomic and demographic side - and consistent with the studies reviewed in the section of literature review - the education level, and the urban-rural distribution, were significant in influencing the citizen satisfaction, while gender and income have both proved a different finding than the literature.

V.CONCLUSIONS, IMPLICATIONS & RECOMMENDATIONS

The study aimed at investigating the determinants of citizens' satisfaction regarding the water public service in the governorate of Fayoum. The findings refer to the significant influence of the water quality variables (i.e. taste, smell, and color) in affecting the satisfaction level. Some of the service quality variables have also showed a significant influence such as; water pressure, continuity of water during the day, and the company's response to the urgent needs. The education levels of respondents, gender, and the residency in urban or rural areas have all affected the respondents' satisfaction level significantly.

The findings of the study imply the following key messages:

- Improving the quality of water, can rapidly increase the satisfaction of citizens. This will require the allocation of more resources by the water companies, to guarantee the purification of the water source. This finding also raises a very important issue relates to the quality of the water network. In many areas in Egypt, and in Fayoum, the water distributed from the water plants does meet the qualifications and the standards of the service, yet the problem starts afterwards because of the deteriorating conditions of some water networks, which affect the quality of the water, by the time it reaches the households.

  - The problem of water pressure in the governorate of Fayoum had always been a concern to the FADWASC, and the citizens. The changing water level in Bahr Youssef Canal, the desert and mountainous nature of the governorate's lands, and the rapidly increased populations, were all reasons for the problem of the unstable water

pressure in the networks[3]. The low water pressure has caused a frequent interruption of the water flow in more than half of the households surveyed, although the average duration of each water cut was around an hour and half.

- The response of FADWASC to the urgent needs of the water service in the governorate was found to have a significant influence on the citizens' satisfaction. This fact is crucial for the improvement of the company's performance, especially after the negative opinions of more than 40% of the households in the company's quick response. To improve their response, the company needs to provide stronger trainings for building the capacity of the technical support teams in handling the emergency cases. The company also needs to provide advanced detecting systems, to quickly identify any drops in the provided service.

- The fewer incidents of reporting complaints to the water company should be carefully studied. This is because the fewer number doesn't always imply a better performance or satisfaction. The study supports this argument by showing that 93% of the citizens, who had already faced problems in the water service, didn't complain about them. This finding reflects the importance of ensuring the efficiency of the complaint mechanism used by the company to respond to the citizens' problems.

- Although, the citizens' access to the water service information was insignificant in predicting the satisfaction regarding the service, yet this finding should not lead to neglecting further research on this factor. On one hand, this is due to the significant and moderate correlation between accessibility and satisfaction, and on the other hand,

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[3] Eng. Farag Ali, FADWASC, Vice Chairman, personal communication, October, 2012)

due to the possibility that citizens are not fully aware that requesting, and receiving the service-related information is an inherent right.

- The study has sought to include the variables related to the magnitude of citizens' participation in the sector's processes of identifying needs, planning the budget or monitoring activities. It also sought to include some variables to measure how far the company was proactive in notifying the citizens about the most pertinent information to the service such as the timings of water cut off, maintenance, modifying the tariffs, and installing the water meter. These efforts have completely failed due to the very limited positive responses on these questions in the survey (almost zero response rate). This fact pulls the attention towards the important role of the civil society organizations, and especially the non-governmental organization in educating the citizens about their rights of getting involved, and actively participating in the sector's plans and activities. They can also advocate for the institutionalization of these concepts in the sector's work cycle.

- The increased satisfaction level among the illiterate citizens or among the citizens with a primary and secondary education – compared to the higher degrees' holders – reflects the low expectations of those people regarding the adequate standards of the water service. This result is also supported by the fact that the citizens living in rural areas were more satisfied with the service by 55%, which obviously reflects the same low expectations about the standards of the good service, among the citizens of rural areas. This finding is supported by the literature, and endorses the mentioned role of the civil society organizations in empowering the citizens to acquire their rights.

The recommendations of this study are classified into the following three parts.

1. **Organizational Recommendation:**

- The role of the EWRA in conducting the performance indicators, and in reviewing the citizens' opinions regarding the water service, should be further endorsed. To achieve this role, the authority should be given more attention in terms of financial resources, and qualified staff.

- The water authorities should be more open to the international standards and measurements. This can be reached through joining any of the international benchmarking sectoral assessments, which provide the guidelines and indicators for evaluating the service in all its processes.

- The HCWW should allocate more funds towards surveying the citizens' opinions regarding the service daily usage. This task should complement the efforts of the EWRA in drawing medium and long term evaluation of the service.

- Coordinating the intersected duties and responsibilities among the sector's different authorities, to guarantee a better and effective implementation of the service.

2. **Operational Recommendation**

- Improving the compliant mechanisms in the water companies is important in improving the quality of service, and encouraging more citizens' accountability.

- Implementing new mechanisms to enhance the transparency, as a tool for achieving better governance inside the sector, and effective communication with the beneficiaries. Publishing the sector's information on the internet and in the offices of customer service will also increase the transparency.

- Adopting emergent, durable, and low cost plans, for increasing the water pressure in the governorate of Fayoum. This entails the work towards decreasing the leakage and water losses in the governorate's network.

3. Recommendations for Future research

- Studying the citizen satisfaction surveys on the national level, will help in drawing more general results, and will lead to more profound evidence-based policies on the national level. This involves encouraging the efforts of incorporating systemic modules on public services in the national surveys.

- Studying the complaints of the citizens in relation to the trust in government, will help revealing the reasons behind the very low level of reporting complaints, despite the frequent problems of the service. This issue might also trigger the studying of other relevant topics such as, democracy, the political regime, and the quality of public service delivery in general.

- Including more variables in studying the determinants of the citizens' satisfaction, such as the citizens' participation in the sector's plans, budget, and monitoring activities, as long as investigating the effect of transparency in the sector, on increasing the levels of citizens' satisfaction.

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Questionnaire

Governance Assessment of the Water Public Services in El Fayoum Governorate

December 2011
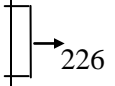
No	Question	Answer		Skip to
201	What is the main source of drinking water in your house?	House connection.......................	01	⌐→
		External connection (at the yard)......	02	205
		Bottled water...................	03	
		Public Tanks............	04	
		Private Tanks.........................	05	
		Public water source (public tap)........	06	
			07	
		Water pumps........................	08	203
		Surface water (canal, lake, stream)	96	
		others		
		_____		
		(specify)		
202	What is the water source for other household purposes	House connection.......................	01	⌐→
		External connection (at the yard)......		205
		Public tanks	02	
		Private tanks	03	
		Public water resource (public tap)........	04	
			05	
		Water pumps........................		

No	Question	Answer		Skip to
		Surface water (canal, lake, stream	06	
		others_____	07	
		(specify)	96	
203	How far is the water source to your home?	Less than 100 meters.......................	1	
		100 to less than 500 meters..............	2	
		500 meters and above......................		
		Don't know.................................	3	
			8	
204	Why your house is not connected to the water network?	Can't afford for the internal connection	A	
			B	
		Can't afford for water bill........	C	
		Building isn't licensed (slum area)	D	
		Neighborhood or part thereof isn't connected to the water network		**219**
		others_____	X	
		(specify)		
		Don't know............................	Z	
205	How long have you been using the water connection? Less than a year write zero zero	month [ ][ ] year [ ][ ] Don't know................................	98	
206	Do you have water meters?	yes.................................	1	
		No..............................	2	209
		Don't know............................	8	
207	Is the meter used for one housing unit or for the whole building?	Housing unit.....................................	1	

No	Question	Answer	Skip to
		Whole building.............................. 2	
		Don't know...................................... 8	
208	Does the water meter work well?	Yes... 1 No... 2 Don't know...................................... 8	
209	Are you satisfied with the quality of water you drink?	Satisfied.. 1 Satisfied to some extent.................... 2 Not satisfied.................................... 3 Don't know...................................... 8	

210	Do you face problems with			211. what is the problem				212. how often; always, sometime or rarely?			
		yes	no	Don't know				always	someti mes	rarely	Don't know
	1. water taste	1	2↓	8↓	▢			1	2	3	8
	2. water color	1	2↓	8↓	▢			1	2	3	8
	3. water smell	1	2↓	8↓	▢			1	2	3	8
	4. water pressure 5. Bills	1	2↓	8↓	High bill A	Late delivery B	Don't match with reading C	Others (specify) X	1	2	3	4	8

213	How often is the water cut off? Daily weekly other never Don't	214. how many times have it cut off during this	215. when cut off, how many hours

No	Question	Answer		Skip to
	monthly know	period?		
	1 2 3 6 7 8 ↓ ↓ ↓ **215** 216 216	☐☐	☐☐	
216	Do you use additional ways to purify water (Filters, boiling) If answer is yes, what is it?	Yes (specify.)...................................... No.. Don't know..	1 2 8	
217	Do you have a motor to lift water?	yes... No.. Don't know..	1 2 8	
218	Are you satisfied with the quality of water service in general?	Satisfied... Satisfied to some extent...................... Not satisfied....................................... Don't know...	1 2 3 8	
219	How much do you pay for all sources of water monthly (for one housing unit)	LE........... ☐☐☐ Don't know................... 998		
220	Have you or any of your family members faced any health problems because of water?	yes... No.. Don't know..	1 2 8	222
221	What are these health problems?	.... ☐☐		

No	Question	Answer		Skip to
222	Have you or any or your family members applied for water connection during the previous 5 years?	yes... No.. Don't know.............................	1 2 8	→226
223	What do you think about the procedures; was it simple, reasonable or complicated?	simple...................................... reasonable............................... complicated............................. don't know..............................	1 2 3 8	
224	Are you satisfied with the time spent to get the connection?	Satisfied................................. Satisfied to some extent.......... Unsatisfied............................. Haven't received this service yet………………. Don't know..............................	1 2 3 4 8	
225	What do you think about the cost of installing the connection to your house?	High.. Fair... low.. Don't know..............................	1 2 3 8	
226	In case of having any problem with water, did your family file complain?	Yes... No... Don't know..............................	1 2 8	→ 235

No	Question	Answer		Skip to
227	How did you file your complain?	Telephone......................................	A	
		Paper complain.............................	B	
		Internet..............................	C	
		Meeting officials	D	
		……………………………..	X	
		others		
		———————————————	Z	
		(specify)		
		Don't know -------------------------------		
228	Was the problem solved?	Yes.....................................	1	
		No...................................	2	
		Don't know..	8	230
229	Was the time spent to solve the problem appropriate?	Yes..	1	233
		To some extent.................................	2	
		No ……..................................	3	
		Don't remember	8	
230	Have you filed any complain to any other entity?	Yes..	1	
		No ……..................................	2	
		Don't know..	8	233
231	Where did you go/ to whom?	Water company....................	A	
		City council..................................	B	
	What else?	Governorate.....................................	C	
		Local popular council member..................	D	

No	Question	Answer		Skip to
		People's assembly member of my constituency	E	
		NGO.................................	F	
		Media	G	
		Natural leader…….	H	
		Other _____ (specify)	X	
232	Was the problem solved immediately?	Yes...	1	
		No...	2	
		Don't know......................................	8	
233	Are you satisfied with the way your complain was handled?	Satisfied...	1	→ 235
		Satisfied to some extent.....................	2	
		Unsatisfied.......................................	3	
		Don't know......................................	8	
234	What are the reasons of dissatisfaction?	Delay in response.............................	A	
		Employee's treatment wasn't good	C	
		Nothing done to solve the problem..	B	
		employee asked for a bribe	D	
		Other (specify) _____	X	
235	In general, do you think that water sector is corrupted (favoritism, bribery,…..)	Yes………	1	
		To some extent …………	2	
		No …………………..	3	
		Don't know ………………	8	

No	Question	Answer					Skip to
							237
236	What is the shape of corruption?	....					⊐→
237	Were you or any of your family member paid tips/ present/ bribes when dealing with the staff working in the water sector in the past 5 years: • Introducing the connection • Solve a problem • Others　(specify)		Yes	No	Didn't deal with the entity	Don't know	
		To introduce connection	1	2	5	8	
		To solve a problem	1	2	5	8	
		Others	1	2			
238	Revise question 237 One answer at least with yes ☐ others ☐ ⟶ 242 ↓						
239	Have you reported the tips/ present/ bribes	Yes.. 1 No.. 2 Don't know....................................... 8					⊐→ **241**
240	What did you do?	....					

☐☐　100

No	Question	Answer		Skip to
		....		
		....		
241	What was the result?	The problem was investigated	1	
		The problem wasn't investigated	2	
		Others (specify)	6	
		Don't know	8	
242	Do you know any NGO in the neighborhood that could be concerned with potable water problems?	Yes...	1	
		No..	2	→ 247
243	Have you or any of your acquaintances gone to any of those NGOs to solve a problem relevant to drinking water?	Yes...	1	
		No..	2	→ **247**
		Don't know	8	
		………………………………….		
244	What was this problem?	--		
		--		

245	Has the NGO played an effective role in solving the problem?	Yes...	1	
		No..	2	→
		Don't know	8	**247**
		………………………………….		
246	What did the NGO do in order to help you? What is the role	File complaints to officials -----------	1	
		File and follow up the complaints-----	2	
		---	6	
		Others ------------		

No	Question	Answer		Skip to
		(Specify)		
247	Has anyone asked about your opinion on the quality of water service in the past 12 months?	Yes...	1	
		No...	2	
		Don't know...................................	8	
248	Who asked about your opinion	The water company…………………………..	A	
		City council	B	
			C	
		The governorate…………………………… ……..	D	
			E	
		Member of the popular local council	F	
		People's assembly member of my constituency	G	
			H	
		NGO	X	
		Media	Z	
		Natural leader……………………………… .		
		Other (Specify)		
		Don't know		
249	Do you feel that the water service in your neighborhood is provided equally for all households?	Yes...	1	→ 251
		No...	2	
		Don't know....................................	8	→ 251
250	On what basis they discriminate?	Mediation/ patronage	A	
		Male/ female	B	
		Religion	C	

No	Question	Answer		Skip to
		Ability to pay bribes	D	
		Geographical location	E	
		Others	X	
		Don't know	Z	
251	Does the water company respond quickly to the urgent needs in the neighborhood?	Yes.. To some extent …………………………….. No.. Don't know......................................	1 2 3 8	
252	Can you access any needed information on the service? For example water cut off, maintenance, modifying the prices, installing water metering…?	Yes.. To some extent …………………………….. No.. Did not ask for any information..............	1 2 3 4	

No	Questions					Response								
252	Are you informed about?					253) How?								
		yes	To some extent	No	Don't know	water bill	T.V/Radio	materials, posters	magazines		telephone, mosque, church, car		Others	
	Timing of water cut off, fixing any problem or maintenance?	1	2	3	8	A	B	C	D	E	F	G	X	Z
	Plans and new projects	1	2	3	8	A	B	C	D	E	F	G	X	Z

No	Questions	Response									
	3.Budget (expenditure/ income) 1 2 3 8	A	B	C	D	E	F	G	X	Z
	Performance indicators (operation and maintenance) 1 2 3 8	A	B	C	D	E	F	G	X	Z
	5.modifying prices 1 2 3 8	A	B	C	D	E	F	G	X	Z
255	Have you or any of your acquaintance asked by officials to participate on the following:	Yes	No	Don't know
	1. Assessing needs/planning for the services of drinking water	 1	2	8
	2. Discussing (request/ suggest) budget allocated for services	 1	2	8
	3. Monitoring the implementation of projects and programs	 1	2	8