

**Performance Monitoring
of Water Service Providers in Palestine
2011 Report**

Palestinian Water Authority

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ABBREVIATIONS

CMWU	Gaza Coastal Municipal Water Utility
CR	Chlorine Residual
FC	Fecal coliform
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICA	Israeli Civil Administration
IWA	International Water Association
JSC	Joint Service Council
JWU	Jerusalem Water Undertaking
KPIs	Key Performance Indicators
km	kilometers
l/c/d	Liters per capita per day
m ³	Cubic meters
Mg/l	Milligrams per liter
MoLG	Ministry of Local Government
NIS	New Israeli Shekel
NRW	Non-Revenue Water
O&M	Operation and Maintenance
PI	Performance Indicator
PWA	Palestinian Water Authority
TC	Total Coliform
SP	Service Provider
WBWD	West Bank Water Department
U-f-W	Unaccounted-for-Water

FOREWORD

The release of the 2nd issue of the 'Performance Monitoring Report of Water Service Providers in Palestine' comes at a critical time to the Palestinian water sector. The Palestinian Water Authority recently initiated a process of reform of the water sector in Palestine, where the legal and institutional reform processes are to be consolidated under a new water law. When adopted, the new water law will introduce an autonomous water regulator and will focus the functions of PWA to better tackle policy and water sector planning and development.



The guiding vision of the PWA is to manage and develop the water resources of Palestine in an equitable and sustainable manner and to develop water resources through applicable regulations and effective water management. The PWA works to ensure the optimal utilization of the available water resources and to develop the water supply networks so that water of sufficient quantity and suitable quality is supplied to all the Palestinian population at affordable costs. This entails the cooperation of stakeholders at various levels, and requires a great deal of coordination between the different actors of the water sector, including PWA, the bulk water providers and the local service providers. The PWA places high importance on affirming its role as a regulator of the water sector through an autonomous body that works independently to assure its efficient functionality and sufficiency both financially and administratively. This will enable good quality of service provision and consumer satisfaction assuring sustainable service provision for such a vital sector.

Performance monitoring of water service providers is an essential first step to achieving proper regulation of water services, which has a multitude of advantages for PWA, utility managers, and most importantly the end consumers. This report offers insight into the performance of Palestinian service providers and attempts to measure the quality of the services being offered in a sound and transparent manner. Such an assessment is essential for any regulator. It will additionally assist service providers in improving their management, enhancing service provision to the population and will provide a key monitoring tool for safeguarding the interests of the consumers and the sustainability of the sector.

I would like to thank all those involved in preparing this report, mainly the colleagues working at the service providers, whose cooperation and diligence in submitting data was central to this activity, and the project team from PWA and GIZ, including Kamal Issa, Najwan Imseih-Rukab, Marwan Bdair, Abdelnasser Kahla and other supporting staff. A special thanks and appreciation are due to Mr. Abdelkarim Assad for his commitment to this effort and for contributing from his vast knowledge and expertise. Last but not least, special thanks are due for the generous contribution of the Federal Government of Germany and support of the Deutsche Gesellschaft fuer Internationale Zusammenarbeit - GIZ-GmbH in producing this report.

Dr. Shaddad Attali
Head of the Palestinian Water Authority

SUMMARY

In the past two years, the Palestinian Water Authority took steps to reactivate its role as regulator of the water sector and adopted, as a first step, a program for monitoring the performance of a select number of water service providers in Palestine. In 2011, 12 non-bulk water service providers and one bulk water service provider were requested by PWA to submit data to be used in calculating a number of performance monitoring indicators. Of these, Hebron municipality refrained from disclosing its data. These are some of the major service providers in Palestine, serving in total about 1.5 million consumers, or about 40% of the Palestinian population (excluding the municipality of Hebron).

This report presents the findings of the sector performance of these select water service providers in 2011. Key performance indicators were selected to reveal information about the service providers' performance against financial, administrative, and technical measures, including measures of drinking water quality.

Generally, there are vast differences between the water service providers in terms of size and operating conditions. This is apparent from the significant differences in the average daily water consumption per region. Differences in the source and means of extraction of water are directly reflected in the variance of supply prices and operating costs. In the majority of service providers, operating costs are exceeding the operating revenues. They are thus operating under unsustainable conditions with financial deficits being incurred in the operating cycles. High staff productivity indices augment operating costs in some cases. Collection efficiency in some providers is exceptionally good, while in others requires significant improvement. Non-revenue water should be improved in all service providers and water losses within the networks must be reduced. Water quality indicators show that all water service providers in Palestine are delivering water of good quality.

For the first time key performance indicators were used to assess the performance of the West Bank Water Department (WBWD), the sole bulk water provider in the West Bank. The WBWD, however, functions under special circumstances where several technical issues are directly impacted by the political context. The collection efficiency, water losses, and non-revenue water figures reported are not fully reflective of the performance of the WBWD due to the lack of civil and security jurisdiction in Area C where many supply mains and supply points are located. The low collection efficiency, high amount of water losses in supply mains mainly in Area C, the additional charges incurred for the water department of the Israeli Civil Administration, and the direct subsidy in the selling price for water, among other issues, have placed the WBWD in a meager financial state. The key performance indicators were selected as pilot indicators and are expected to be further refined in future assessments.



Chapter One

Sector Performance Overview



INTRODUCTION

The Palestinian Water Authority (PWA) was founded in 1994 as a regulator of the Palestinian water sector. It serves as a policy maker and is responsible for managing the water resources and wastewater in Palestine. Additionally, the PWA, in cooperation and coordination with the relevant parties, is responsible for restructuring and establishing the operational bodies of the water sector, mainly the water utilities, which are responsible for ensuring proper water supply distribution and sanitation services to Palestinian cities and villages. The Palestinian Water law No. 3/2002 grants PWA authority to regulate all ‘matters or activities relating to water and wastewater, in cooperation and coordination with the relevant parties’ (Art.7 (5)). The law further mandates PWA to coordinate and cooperate with the relevant parties to set plans, and programs for regulating the use of water, and preventing wastage, and conserve consumption...’ (Art.7 (8)).

PWA recently initiated a process of reform of the water sector in Palestine with a focus on building enabled functional institutions able to take responsibility and ensure proper and fair services to the Palestinian population via an adequate sector architecture governed by clear laws and regulations under which roles and responsibilities are clearly defined. This ongoing institutional reform process is to be consolidated under a forthcoming new water law, which will introduce an autonomous water regulator and will transform the existing functions of PWA into more ministerial functions to better tackle policy and water sector planning and development. The institutional reform within the water sector is guided by international best practice and established water policy principals, which stipulate that the water sector should be regulated by one responsible body, with the separation of the institutional responsibility of policy functions from regulatory functions from those of service delivery.

PWA is thus promoting the role of the regulator of the water sector and has adopted, as a first step, a program for monitoring the performance of a select number of water service providers in Palestine. This performance monitoring activity requires cooperation and coordination between PWA, as a regulating body, and the local water service providers, in collecting and validating basic data which is then analyzed using a set of performance indicators.

1.1 IMPORTANCE OF PERFORMANCE MONITORING

A nationally accepted sound performance monitoring system used for water and sanitation service providers in Palestine can play a key role in the process of improving the quality of services offered to the Palestinian population and can induce incentives to managers of the service providers in increasing effectiveness and efficiency. The use of performance indicators in assessing the performance of service providers offers a sound and internationally accepted form of measure for the quality of service, efficiency of the provider, and allows transparent, objective comparisons between different providers. This in turn can lead to benchmarking between similar undertakings and can encourage them to provide improved services. The overall aim of performance monitoring is thus to gather data on the water and sanitation provision for the purpose of making appropriate decisions in the sector. A performance monitoring system can be of use to many actors in the water sector and is a necessary first

step for effective regulation.

For the regulator, such a system can define targets for the service providers, assist service providers to improve their management and the services to the population, and monitor compliance of the service providers to implemented standards. Moreover it can enhance cooperation and interface between PWA and the service providers, inform customers about the performance of their service providers and provide key monitoring tools to help safeguard consumer interests.

For the utility management, it provides a measure of performance, helps to understand performance better, helps to develop operational methodologies, allows setting targets for improvement, offers a means for communication with customers, and increases transparency in water and wastewater services. In addition, it allows benchmarking with other institutions in the water industry, provides a basis for comparing the performances between service providers, induces an incentive for improvement of the quality of services offered, introduces best practices between service providers and helps to allocate financial resources efficiently to improve performance, where needed.

For policy makers, a performance monitoring system helps to inform policy makers about the water and wastewater sector, provides a common basis for comparing the performance of service providers and identifying possible corrective measures. It also supports the formulation of policies for the water sector under an integrated management of water resources approach, including resource allocations, investments, and the development of new regulating tools and standards.

For the customer, a transparent performance indicator (PI) system will offer a measure of the quality of service provided by translating complex processes into simplified information, fulfill and protect customers' interests and needs, protect customers from monopoly practices. It will also promote accountability, including keeping the balance between the level of service and its price, and ensuring that customers are getting the service in accordance to set standards and tariff guidelines.

1.2 WATER SECTOR OVERVIEW

The water sector in Palestine is complex in structure, within many actors involved on many different levels. The current institutional arrangement for the water sector is generally made up of four primary levels:

- Policy, Planning, Development and Regulation- undertaken by PWA and other relevant ministries.
- Water Supply- where resources, mainly wells and springs are tapped and utilized by PWA, through the West Bank Water Department, and local water service providers, in addition to quantities of water purchased from 'Mekorot' the Israeli water company.
- Water Distribution- which is carried out by the water service providers.

Currently there exist over 300 water service providers in Palestine, in the form of Undertakings, Utilities, Water Supply and Sewerage Authorities (WSSA), Municipalities, Water departments, Village Councils, Water User Associations, and Joint Service Councils. The West Bank Water Department (WBWD) purchases and distributes bulk water to all the main service providers in the West Bank. The Coastal Municipal Water Utility, in fact, acts as a semi-bulk water and sanitation service provider, where a number of its water connections are bulk connections to sub-providers.

1.3 OPERATION INFORMATION OF WATER SERVICE PROVIDERS

A total of 13 of the largest water service providers were included in 2011, including 11 service providers from the West Bank, 1 service provider from Gaza and 1 bulk water provider for the West Bank, i.e. the West Bank Water Department. These are some of the major service providers in Palestine, serving in total about 1.5 million consumers, or about 40% of the Palestinian population (excluding the municipality of Hebron and the WBWD). Of all the water service providers included in this report, the majority responded and showed commitment, however the municipality of Hebron refrained from submitting its data.

It is important to note that the service providers operate under varied conditions in terms of the economic conditions in the area of operation, available water resources, average total head they are pumping against, infrastructure availability and its state, and level of external support, etc.. These factors may each have an effect on the performance of the service provider and should be taken into consideration when explaining the operating environment of each. An overview of some operating figures of the service providers is presented in the Table 1.

Table 1: Operation Figures of Water Service Providers

Service Provider	Abbreviation	No. of Staff ¹	No. of Active Connections	No. of Persons Served	Water Network Length (km) ²
Jerusalem Water Undertaking	JWU	220	52,781	320,000	1300
Water Supply and Sewerage Authority of Bethlehem, Beit Jala, and Beit Sahour	WSSA	77	11,851	105,000	370
Nablus Municipality Water Supply and Sanitation Department	NWSSD	391	38,101	204,798	428
Tulkarem Municipality Water Supply and Sanitation Department	TWSSD	116	11,688	75,000	350
Qalqilia Municipality Water Supply and Sanitation Department	QWSSD	23	7,696	48,000	140
Salft Municipality Water Supply and Sanitation Department	SWSSD	7	2,268	15,000	54
Jericho Municipality Water Supply and Sanitation Department	JWSSD	31	5,445	31,663	110

Tubas Municipality Water Supply and Sanitation Department	TsWSSD	15	2,700	18,000	47
Jenin Municipality Water Supply and Sanitation Department	JnWSSD	80	7,675	55,000	177
North West Jenin Joint Service council	JnJSC	26	5,200	60,000	500
Hebron Municipality Water and Wastewater Department	HWSSD	*	*	*	*
Gaza Coastal Municipal Water Utility	CMWU	430	48,639	590,000	2,300
West Bank Water Department (Bulk water provider)	WBWD	222	381	N/A	525.3

¹ All full-time and part-time staff working on water and wastewater services.

² Including Mains and including diameters of 1 inch or more.

³ This figure refers to the length of transmission mains.

* No data was submitted by Hebron municipality

The water resources available for each of the service providers differ markedly from one to the other. This leads to direct and profound differences in the costs for abstraction and delivery of water, among other factors, and should thus be taken into account when comparisons between different service providers are made.

Table 2: Available Water Resources per Service Provider

Service Providers	Local Resources (MCM)	Percent %	Purchased Quantities (MCM)	Percent %
WBWD	13.7	21	52.8	79
JWU	2.4	15	13.2	85
NWSSD	8.3	97	0.3	3
TWSSD	6.2	100	0	0
QWSSD	4.0	100	0	0
SWSSD	0.07	12	0.5	88
TsWSSD	0.08	14	0.5	86
JWSSD	2.7	100	0	0
JnWSSD	0.3	14	1.8	86
WSSA	0	0	4.7	100
HWSSD	*	*	*	*
JnJSC	0.4	50	0.4	50
CMWU	30.3	100	0	0

Source: Submitted data

* No data was submitted by Hebron municipality



Chapter Two

Key Performance Indicators



2.0 INTRODUCTION

Creating a consistent and sound set of key performance indicators (KPIs) is a useful tool for regulation. A reliable PI system helps the PWA compare performance of the service delivery institutions, and helps in the decision making process in the utilities and municipal councils. This will allow PWA to better manage the development of the water and wastewater sector and assist the service providers to provide better quality services by perhaps channeling funding to areas of priority, providing capacity building and training to staff of service providers, etc. Reliable performance monitoring reports help customers know the level of service they are receiving and whether the service offered is worth the amount being paid for it.

2.1 KEY PERFORMANCE INDICATORS: DEFINITIONS AND METHODS OF CALCULATION

A set of key performance indicators was used as the basis for the performance monitoring and assessment. The KPIs used were selected by PWA based on the International Water Association PI system, and were adapted for the local situation. The KPIs reflect the broad range of tasks which service providers must perform to provide adequate and efficient services to their customers. To account for differences between the bulk and non-bulk service providers, a customized set of KPIs was used for the West Bank Water Department.

Table 3: Overview of Key Performance Indicators for Non-Bulk Service Providers

KPI	Method of Calculation	Unit
Average daily per capita water consumption	Total billed water sales (m ³) during the assessment period * 1000 / number of days * total number of served population	l/c/d
Average selling price per m ³ of water	Total billed water sales (NIS) / Total domestic, institutional, touristic and industrial water sales (m ³)	NIS
Operating costs per m ³ of water sold	Operation & Maintenance (O&M) and administrative costs (excluding depreciation) / Net water sales (m ³)	NIS
Working ratio (Efficiency Ratio) – for water service	Operation & Maintenance (O&M) and administrative costs (excluding depreciation) / Operating revenues from water	No.
Collection efficiency	Water and wastewater fees collections during the year / total annual water and wastewater billed sales (NIS) × 100%	%
Non-Revenue Water by volume (NRW)	100% - (Total billed quantity (m ³) during the assessment period / (Total supplied water during assessment period ± difference in stored quantities in utility reservoirs) * 100%)	%
Staff productivity index (SPI) per 1000 customers	Total number of working staff / (number of active water subscribers)/1000 customers	No.
Water losses in (m ³) per km in the network per year	Total water losses during the year (m ³) / Network length (km)	m ³
Water samples (taken from network including mains) containing free chlorine residual (RC)	Number of Samples (taken from network) containing free chlorine residual / Total number of tested samples for this purpose *100%	%

Water samples (taken at source) free from total coliform contamination	Number of tested water samples (taken at source) free from total coliform contamination / Total number of tested samples for this purpose × 100%	%
Water samples (taken at source) free from fecal coliform contamination	Number of tested water samples (taken at source) free from fecal coliform contamination / Total number of tested samples for this purpose × 100%	%
Water samples (taken from network including mains) free from total coliform contamination	Number of tested water samples (taken from network including mains) free from total coliform contamination / Total number of tested samples for this purpose × 100%	%
Water samples (taken from network including mains) free from fecal coliform contamination	Number of tested water samples (taken from network including mains) free from fecal coliform contamination / Total number of tested samples for this purpose × 100%	%
Microbiological tests carried out	Number of microbiological tests carried out during the assessment period / number of microbiological tests required by applicable standards or legislation during the assessment period x 100	%

Table 4: Overview of Key Performance Indicators for the Bulk Service Provider

KPI	Method of Calculation	Unit
Working ratio (Efficiency Ratio) - water service	Operation & Maintenance (O&M) and administrative costs (excluding depreciation) / Operating revenues from water	No.
Collection efficiency	Water fees collections during the year / total annual water billed sales (NIS) × 100%	%
Non-Revenue Water by volume	100% - (Total billed quantity (m ³) during the assessment period / (Total supplied water during assessment period ± difference in stored quantities in utility reservoirs) * 100%)	%
Staff productivity index	Total number of working staff / number of bulk connections	No.
Water Losses per km in the supply lines per year	Total water losses during the year (m ³) / supply lines length (km)	m ³
Samples (in the main supply lines) containing free chlorine residual (CR)	Number of Samples (taken from supply lines) containing free chlorine residual / Total number of tested samples for this purpose * 100%	%
Samples (taken at source) free from total coliform contamination	Number of tested water samples (taken at source) free from total coliform contamination / Total number of tested samples for this purpose × 100%	%
Samples (taken at source) free from fecal coliform contamination	Number of tested water samples (taken at source) free from fecal coliform contamination / Total number of tested samples for this purpose × 100%	%
Samples (in the main supply lines) free from total coliform contamination	Number of tested water samples (taken from supply lines) free from total coliform contamination / Total number of tested samples for this purpose × 100%	%
Samples (in the main supply lines) free from fecal coliform contamination	Number of tested water samples (taken from supply lines) free from fecal coliform contamination / Total number of tested samples for this purpose × 100%	%
Microbiological tests carried out	Number of microbiological tests carried out during the assessment period / number of microbiological tests required by applicable standards or legislation during the assessment period x 100	%

In light of the apparent need to improve service delivery and enable service providers to achieve financial sustainability, the selection of KPIs prioritises those that have impact on the

service providers' financial stability, covering costs of production and operation, collection efficiency, etc, and which highlight current administrative practices. The KPIs also include those that measure areas of service performance which impact more directly on consumers, mainly the water quality indicators. A thorough description of each KPI follows.

Average daily per capita water consumption (l/c/day)

Every person should have access to minimum daily water quantities for basic needs. The regulator must set these minimum quantities and should make sure that they are fulfilled in quantity and quality at all times by the service provider. The average daily per capita water consumption includes the domestic, commercial, industrial, touristic, and municipal uses.

Calculation Method: *Total domestic billed water sales (m³) during the assessment period * 1000 / number of days * total number of served population*

Average selling price per m³

Water as an essential good should be supplied to consumers at an affordable price. Service providers should be able to recover the cost of supplying water to consumers to ensure financial viability and sustainability of service providers. At the same time water prices should be monitored and approved by the regulator in order to make sure that consumers are not paying more than the actual cost of water or that they are paying for the inefficiency and poor management of the service providers. The purpose of this indicator is to compare the average water tariff with other suppliers.

Calculation method: *Total billed water sales (NIS) / Total domestic, institutional, touristic and industrial water sales (m³)*

Operating costs per m³

Accurate calculation of operating costs per m³ of water is important for calculating the price per each m³, working ratio, and operating ratio. In the long journey for achieving cost recovery, service providers need first to recover the operating cost. The regulator sets consistent bases for calculating operating cost for all service providers. This means what expenses -during the assessment period- are considered part of the operating costs and what are not, making sure that all operating costs during the assessment period are included in the cost. This will help in making accurate comparison of the efficiency and effectiveness between different service providers. The purpose of this indicator is to compare the level of operating costs between service providers.

Calculation method: *Operation and Maintenance (O&M) and Administrative costs in NIS (excluding depreciation) / Net water sales (m³)*

Working ratio

The regulator as well as the service provider needs to know how well the operating revenues billed cover the operating costs and how much margin is left for the utility to cover its investment and capital costs from its operating revenues. At the same time, the working

ratio is a benchmarking tool used by both the regulator and the operator. It helps a service provider compare self achievements year after year and helps the regulator in comparing one service provider with achievements of other providers in the sector. The purpose of this indicator is to measure the utility's ability to pay its operating costs from annual revenues.

Calculation method: *Operation & Maintenance (O&M) costs and Administrative costs (Excluding depreciation) / Operating revenue*

Collection efficiency (%)

Availability of financial liquidity is important for smooth operation cycle of a service provider. Collecting the due revenues from the consumers on time helps in self financing expenses and costs of the utility, while failing to do so will force the service provider to either take loans with interest thus generating additional costs that will be reflected on the price, or the utility might not be able to fulfill its obligations in providing the level of service requested by the regulator. In addition, the ratio reflects the level of efficiency of the service provider's staff in performing their duties and the level of consumers' willingness to pay. The purpose of this indicator is to measure the utility capability to collect its debts from customers. This indicator measures collection ratio from current year and from previous years' debts.

Calculation method: *Water and wastewater fees collections during the year / total annual water and wastewater billed sales (NIS) × 100%*¹

Non-revenue water by volume (NRW) %

Unaccounted-for-water (UfW) is the difference between water produced and water billed to customers. UfW includes leakages in the network (distribution losses) and illicit connections. Non-revenue water (NRW) is the sum of the UfW and that percentage of water that has in fact been accounted for but was not billed (e.g. that water supplied to mosques and churches, fire trucks, etc). This ratio displays the service provider interest and efforts in maintaining the assets of the utility in general and the network in specific, under good working conditions. The result of this indicator helps the utility plan for investment in rehabilitation or replacement of the network. It also helps the utility to budget the costs and to request a water price increase approval from the regulator. The regulator sets levels of performance for operators to achieve in order to safeguard the interest of customers, reduce operation costs, and preserve precious and limited water resources. The purpose of this indicator is to provide a measure of the network deficiency.

Calculation method: *100% - (Total billed quantity (m³) during the assessment period / (Total supplied water during assessment period ± difference in stored quantities in utility reservoirs) * 100%*

1 In Palestine, some utilities combine fees for water and wastewater services. Since it is difficult to separate these fees, then for the utilities which do combine them the calculation of fees collection efficiency shall include the combined fees collections for water and wastewater. For those utilities which separate these fees, then the calculation of fees collections efficiency shall include the fees collection for water only.

Water losses in (m³) per km in the network per year

This indicator measures the efficiency of the network and main conveyance pipes. The most important feature in this indicator is that it eliminates the effect of the difference in length between networks. Comparing the efficiency per each km of the network gives more accurate, reliable and comparable results. The result of this indicator helps the utility plan for investment in rehabilitation or replacement of the network. It also helps the utility to budget the costs and to request a water price increase approval from the regulator. The use of this indicator by the regulator and by the several service providers gives more accurate and comparable results than results obtained from % of non-revenue water by volume. The purpose of this indicator is to calculate the quantity of water losses (due to both leakage and illicit connections) per km of the network and main pipes.

Calculation method: *Total water losses during the assessment period (m³) / Network length (km)²*

Staff Productivity Index (No.)

The personnel indicators address aspects of efficiency of managing human resources of the service provider. The number of employees required to run a water system depends on the sophistication and on the characteristics of the system, but at the same time it depends on the behavior of the management of the service provider and on the implemented human resources policies and procedures. Generally, the labor cost in a water service provider's system consists over 20% of the total operating costs. It thus has an important effect on the water cost and on the water price. Therefore, it is important for the regulator as well as for the service provider to watch these costs and to compare achievement between different service providers. The comparison of the results of this indicator between utilities that has similar features help identify areas where there is room for improvement. Service providers may use more detailed human resource PIs to compare level of efficiency of managing human resources in different organizational units of the utility. The purpose of this indicator is to calculate the staff productivity in the utility. It displays the number of staff needed per 1000 active subscribers.

Calculation method: *Total number of working staff / (number of active water subscribers) / 1000*

Water samples (taken from network including mains) containing free chlorine residual (CR)

People are entitled to safe water supplies thus water purification is a necessary step that should be taken by service providers. Water supplies reaching the consumer should have a certain minimum level of free chlorine residual. The chlorine residual indicates the service provider's commitment to supply safe water for domestic use. The regulator sets the minimum level of free chlorine residual reaching the consumer's tap. The regulator monitors the quality of water provided to the consumers through the results obtained from this indicator. The operators should have reliable registers that display the date and place of the samples, the result of the testing and the repeated tests carried out for every failing sample. The purpose of this indicator

2 According to PI working team, main pipes are: All pipes that are 1 inch in diameter or more

is to measure percent of samples complying with applicable standards.

Calculation method: *Number of samples containing free chlorine residual / Total number of tested samples for this purpose * 100%*

Water samples (taken at source or from network including mains) free from total coliform (%)

“As operational indicators, total coliforms provide information on the adequacy of drinking water treatment and on the microbial condition of the distribution system. If total coliforms are found in the distribution system, but water tested immediately post-treatment is free of total coliforms, this suggests that re-growth or post-treatment contamination has occurred. Corrective action in such cases is required in order to maintain the usefulness of total coliforms as an indicator of the overall quality of the water. It should be noted that, in the absence of *E. coli*, the presence of total coliforms in the distribution system is of no immediate public health significance. However, their presence should prompt further actions”³. The regulator of the water sector may include in the regulation a value of coliforms in the water leaving the source or in the water treatment plant and a mandatory value for water in the reservoirs and another value for the water reaching the consumers tap. The purpose of this indicator is to measure the percent of samples complying with applicable standards.

Calculation method for water samples taken at source free from total coliform contamination: *Number of tested water samples taken at source free from total coliform contamination/ Total number of tested samples for this purpose * 100%*

Calculation method for water samples taken from network including mains free from total coliform contamination: *Number of tested water samples (taken from network including mains) free from total coliform contamination/total number of tested samples for this purpose * 100%.*

Water samples (taken at source or from network including mains) free from fecal coliform (%)

Service providers should supply people with safe and uncontaminated water. They must test the water through periodical samples taken from the network and from the water sources. The presence of fecal coliform bacteria in the water indicates that the water has been contaminated with fecal material. At the time this occurred, the source of water or the conveyed water in the network may have been contaminated by pathogens or disease producing bacteria or viruses which can also exist in fecal material. The presence of fecal contamination is an indicator that a potential health risk exists for individuals exposed to this water. Fecal coliform bacteria may occur in ambient water as a result of the overflow of domestic sewage or nonpoint sources of human and animal waste. The regulator requires only clean and safe water should be provided to consumers, therefore the fecal coliform tests carried out by service providers are a must. Fecal contamination to the source may cause irreversible damage to the water source that may lead to a permanent ban from the regulator to use the contaminated source. The purpose of this indicator is to measure the

3 Role of total coliforms -Total coliforms – Guidelines for Canadian drinking water quality. <http://www.hc-sc.ca/ewh-semt/pubs/water-eau/coliforms>

percent of samples complying with applicable standards.

Calculation method for water samples taken at source free from fecal coliform contamination: *Number of tested water samples taken from source free from fecal coliform / Total number of tested samples for this purpose* 100%.*

Calculation method for water samples taken from network including mains free from fecal coliform contamination: *Number of tested water samples taken from network including mains free from fecal coliform / Total number of tested samples for this purpose* 100%*

Microbiological tests carried out (%)

Maintenance of the microbiological quality of water is an important means of preventing waterborne disease. The most common microbiological tests done on water are for total and fecal coliforms. The WHO has set a minimum standard for the number of microbiological tests that a water service provider must carry out in order to detect the number and types of microorganisms in waters and assist the service providers in keeping the microbial content of water supplies at a low level. The WHO requires the minimum number of microbial tests per month as the following:

Persons Served	No. of Microbial Tests Required per month
< 5,000	1
5,000-100,000	1 per 5000 persons served
>100,000	1 per 10,000 persons served plus one test per water source per plus 10 additional tests

Calculation method: *Number of microbiological tests carried out during the assessment period / number of microbiological tests required by applicable standards or legislation during the assessment period*100%*

2.2 SOURCES OF DATA

In order to calculate the KPIs, a number of data is collated from several different sources, as outlined in Table 5.

Table 5: Sources of data used to calculate the KPIs

No.	Key Performance Indicator	Registers & Sources of Info.
1.	Average Daily per Capita Water Consumption ¹ (l/c/day)	- Revenues register (m ³) - Palestinian Bureau of Statistics reports - Service provider assessment records
2.	Average Selling Price per m ³	- Revenues register (NIS) - Revenues register (m ³) - Computerized revenues reports
3.	Operating Cost per m ³ of Water	- Purchases and expenses register - Revenues register (m ³) - Credit notes (m ³) records

4.	Working Ratio (Efficiency Ratio)– for water service	<ul style="list-style-type: none"> - Purchases and expenses register - Revenues register (NIS) - Municipal reports for allocated admin. - Costs to the water department
5.	Collection Efficiency (%)	<ul style="list-style-type: none"> - Cash book for water & wastewater - Revenues register (NIS) - Annual financial statements
6.	Non – Revenue Water by Volume (NRW)	<ul style="list-style-type: none"> - Water sources production register - Purchases and expenses register - Water purchased bills (m³) - Revenues register (m³) - Credit notes registers (m³) - Reservoirs (Daily storage records)
7.	Staff Productivity Index (SPI)	<ul style="list-style-type: none"> - Human resources registers/reports - Customer service records/reports
8.	Water Losses in (m ³) per km in the Network per Year	<ul style="list-style-type: none"> - Asset register - Updated network length reports - Water production reports (m³) - Water purchased account/register (m³) - Revenues register (m³)
9.	Water Samples (taken from network including mains) Containing Free Chlorine Residual (CR)	<ul style="list-style-type: none"> - Chlorine residual testing and testing results records - Laboratory reports - Ministry of Health (MoH) Reports
10.	Water samples (taken at source) Free from Total Coliform Contamination	<ul style="list-style-type: none"> - Samples daily register - Daily results records - Laboratory reports (daily, monthly and yearly) - Ministry of Health (MoH) Reports
11.	Water Samples (taken at source) Free from Fecal Coliform Contamination	<ul style="list-style-type: none"> - Samples daily register - Daily results records - Laboratory reports (daily, monthly and yearly) - Ministry of Health (MoH) Reports
12.	Water Samples (taken from network including mains) Free from Total Coliform Contamination	<ul style="list-style-type: none"> - Samples daily register - Daily results records - Laboratory reports (daily, monthly and yearly) - Ministry of Health (MoH) Reports
13.	Water Samples (taken from network including mains) Free from Fecal Coliform Contamination	<ul style="list-style-type: none"> - Samples daily register - Daily results records - Laboratory reports (daily, monthly and yearly) - Ministry of Health (MoH) Reports
14.	Microbiological Tests Carried Out	<ul style="list-style-type: none"> - Samples daily register - Daily results records - Laboratory reports (daily, monthly and yearly) - Ministry of Health (MoH) Reports

2.3 DATA RELIABILITY AND ACCURACY

The quality of input data was assessed in terms of the reliability of the source and of the accuracy of data. Uncertainties in the reliability of the source of data gives account for the reliability of the source. Reliability of the source implies the extent to which the data source yields consistent, stable, and uniform results over repeated observations or measurements under the same conditions each time. The accuracy accounts for measurement errors in the acquisition of input data, i.e. the closeness of observations, computations or estimates to the true value as accepted as being true. Accuracy relates to the exactness of the result, and is distinguished from precision which relates to the exactness of the operation by which the result was obtained. In conformity with the International Water Association (IWA) standards on the quality of data and data sources, broad bands were adopted using categories of data accuracy and reliability.

Data quality sheets were designed for each PI and were filled by the PWA representatives during field visits. Levels of reliability of the data sources and levels of uncertainty of the data were determined as described by the IWA recommended bands.



Chapter Three

Performance Analysis of the Water Service Providers



3.0 OVERVIEW OF SECTOR PERFORMANCE

The performance of 12 water service providers in 14 key performance indicators is summarized in Table 6 below.

Table 6: Levels of Service Provision against Performance Indicators

Indicator name	Unit	JWU	WSSA	Nablus	Tulkarem	Qalqilia	Salfeet	CMWU	Jenin	Jenin JSC	Jericho	Tubas	Hebron
Average daily water consumption	l/c/d	99.8	75.5	79.3	116.7	169.4	68.8	75.6	56.2	30.7	198.6	57.0	–
Average selling price per m ³	NIS	5.52	5.24	6.21	2.79	1.45	4.13	1.98	5.15	4.37	2.02	5.00	–
Operating costs per m ³	NIS	6.93	6.43	5.54	2.88	1.12	5.30	2.53	7.97	6.85	1.37	5.24	–
Working ratio	No.	1.10	1.08	0.85	0.95	0.74	1.03	1.22	1.51	1.16	0.62	1.03	–
Collection efficiency	%	91.7	69.3	67.2	62.2	92.5	90.1	50.7	51.2	115.6	67.5	66.0	–
NRW by volume	%	25.3	38.8	31.4	48.4	26.1	35.4	46.3	45.8	23.6	16.9	24.6	–
Staff productivity index	No.	4.2	6.5	10.3	9.9	3.0	3.1	8.8	10.4	5.0	6.3	5.6	–
Water losses in (m ³) per km network per year	m ³	3033.2	4949.3	6357.0	8558.2	7467.7	3823.8	6107.3	5386.3	416.0	4230.1	3211.1	–
Water samples (networks) containing free RC	%	99.3	94.7	99.5	95.5	100.0	100.0	100.0	52.6	100.0	99.9	99.2	–
Water samples (source) free from TC	%	95.1	100.0	82.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	97.9	–
Water samples (source) free from FC	%	99.0	100.0	82.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	–
Water samples (networks) free from TC	%	100.0	100.0	96.3	99.0	100.0	93.8	100.0	100.0	81.8	100.0	98.4	–
Water samples (networks) free from FC	%	100.0	100.0	96.3	100.0	100.0	98.6	100.0	100.0	81.8	100.0	100.0	–
Microbiological tests	%	124.2	85.9	140.9	110.7	161.2	213.9	100.0	245.1	87.8	794.1	540.5	–

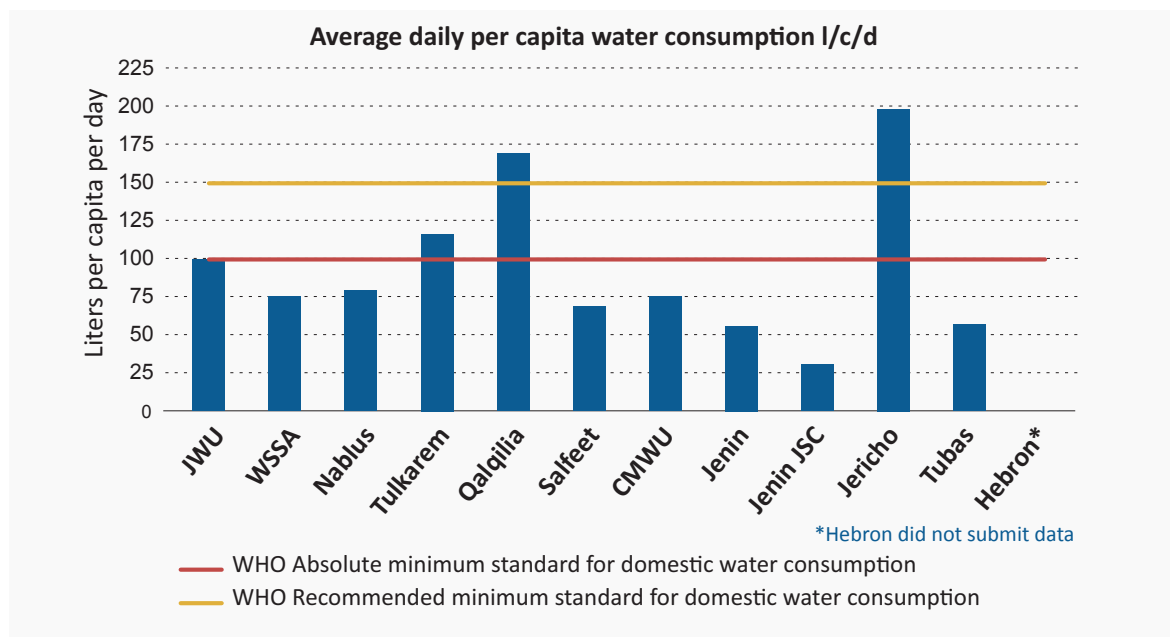
Source: Submitted Data

3.1 PERFORMANCE ANALYSIS

Average daily per capita water consumption (litres/capita/day)

The average daily per capita water consumption varies widely among the different service providers. The values of the average daily per capita water consumption include the domestic, commercial, industrial, touristic, and municipal uses. Jericho, Qalqilia and Tulkarem municipalities have the highest average daily per capita consumption at about 200 l/c/d, 170 l/c/d and 117 l/c/d, respectively. This is mainly due to the abundance of water produced from numerous productive springs and wells in those areas, provided at lower costs in comparison to other municipalities. Many homes in these humid governorates have large garden areas planted with fruit trees, thus they consume much higher quantities. The WHO estimates that the absolute minimum water requirement for direct human consumption and for maintaining human hygiene is 100 l/c/d. The service providers of Bethlehem, Nablus, Salfeet, CMWU, Jenin, Jenin JSC, and Tubas show severely low daily water consumption levels, falling far below the WHO absolute minimum standard. This can be attributed to the restrictions imposed on local water resources and limited water supplies.

Figure 1: Average Daily per Capita Water Consumption

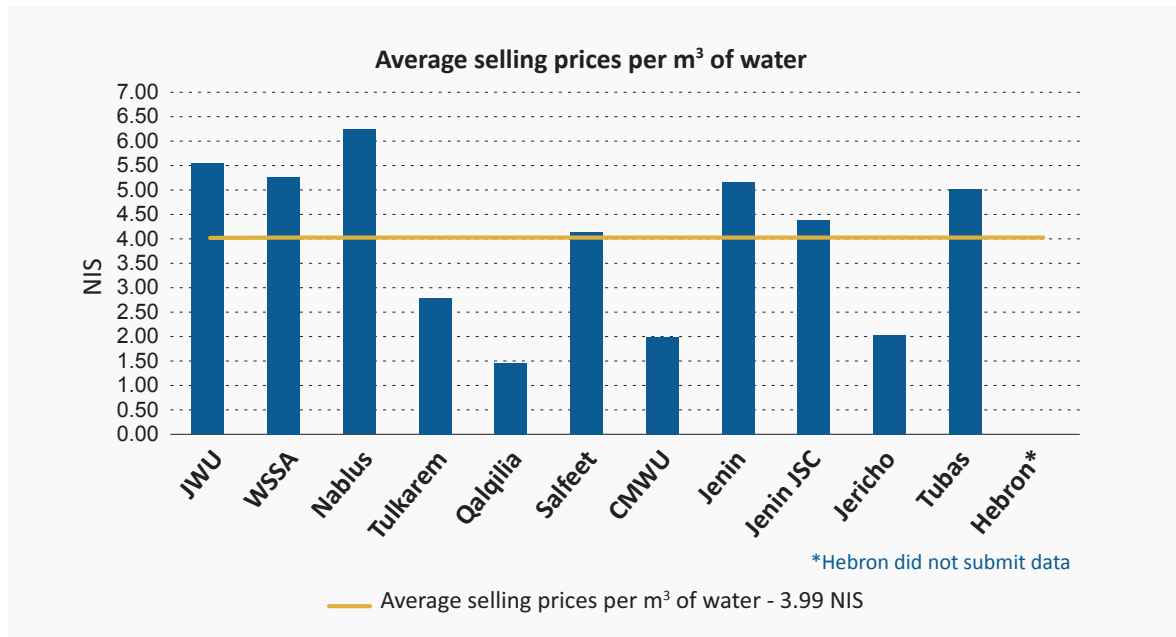


Average selling price per m³

The average selling price of water is significantly different from one water provider to the other, ranging from 1.45 NIS/m³ in Qalqilia to 6.2 NIS/m³ in Nablus. The average selling price of the water providers is 3.99 NIS/m³. The majority of the quantity of water distributed by JWU, Salfeet, Tubas, Jenin, WSSA, and half of that in Jenin JSC is purchased through the WBWD from the Israeli company Mekorot. The WBWD sells bulk water to the service providers at a uniform price of about 2.6 NIS/m³ (as of Dec. 2012). Each water provider however applies different tariffs and most of these tariffs are not set according to the PWA

Tariff Regulation. JWU and WSSA however did formally submit and process updated water tariffs based on the PWA Tariff Regulation, both of which were approved. The low selling price of water at some providers can be related to the lower operating costs, where it was noted that the providers with higher operating costs have imposed higher tariffs on the water provided. It has also been noted that some providers which do not cover their operating costs and are thus generating financial deficits have increased the selling price of water in efforts to reduce their deficits.

Figure 2: Average Selling Prices per m³ of Water

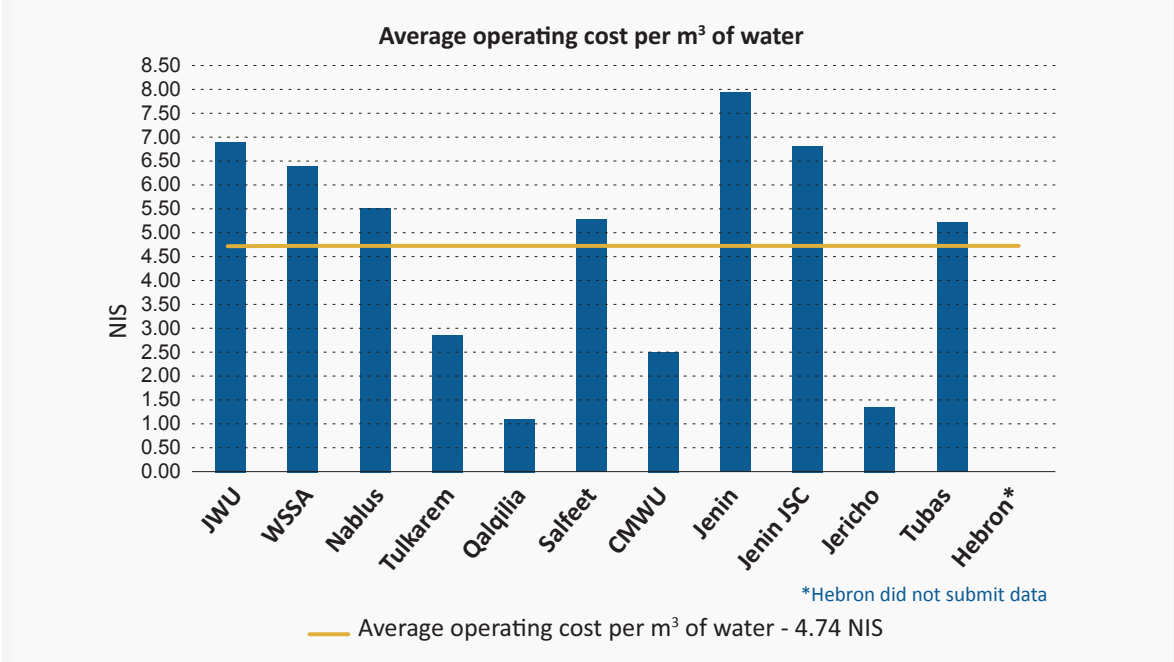


Operating costs of water sold per m³

Many factors influence the variance in operating costs of the water sold among water service providers, namely the origin of different water sources. Water abstraction from wells, where depths vary between 50m to 800m, significantly increases energy consumption and thus increases the resulting cost of water. Water supply originating from local springs usually results in lower extraction costs. Jericho municipality, for example, supplies water solely from the local spring of Ein Al Sultan at a relatively low cost. Non-revenue water (NRW) also affects the cost of water, where high NRW results in higher cost of sold water. The average operating cost of the service providers is around 4.74 NIS.

Operating costs in Jenin, Jenin JSC, JWU, and WSSA are highest and this is mainly attributed to the fact that the majority of supplied water is either purchased or abstracted from deep wells and pumped to the demand areas. The operational costs in Qalqiliya, Jericho, CMWU and Tulkarem are lowest. These same municipalities are fully reliant on supply water extracted from local sources of relatively shallow wells and springs, resulting in lower extraction and pumping costs.

Figure 3: Operating Costs per m³ of Water

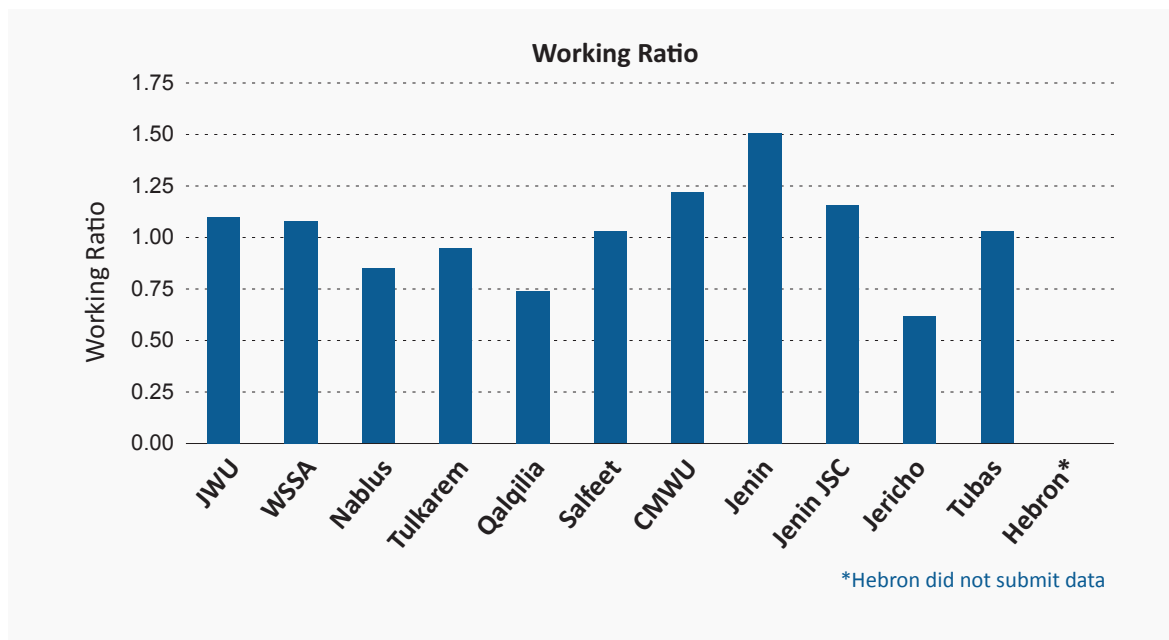


Working ratio

The working ratio is the quotient of the sum of operation and maintenance (O&M) costs and administrative costs (excluding depreciation) divided by the total operating revenues billed. If the working ratio is greater than 1, then the sum of the operating and administrative costs is higher than the operating revenues billed, meaning there are financial deficits incurred in the operations cycle. If the ratio is less than 1, then the operating revenues billed are higher than the operating and administrative cost, which means that the service provider is generating surplus in the operation cycle that may cover part or all of the capital costs. If billing is reliable, then the working ratio gives an indication as to whether the tariff level is enough to cover O&M costs.

Most service providers have shown working ratios greater than 1, meaning that the operating revenues billed are not covering the operating costs. This implies that financial losses are being incurred in the water operations cycle. Jenin showed the highest working ratio at 1.5. This is mostly a result of the high operational costs and high amount of NRW. Four service providers attained working ratios less than 1, thus generating a reasonable surplus while covering their operating and administrative costs. Qalqilia and Jericho have the lowest working ratios, at 0.7 and 0.6 respectively while having the lowest selling price of water and lowest operating costs.

Figure 4: Working Ratio

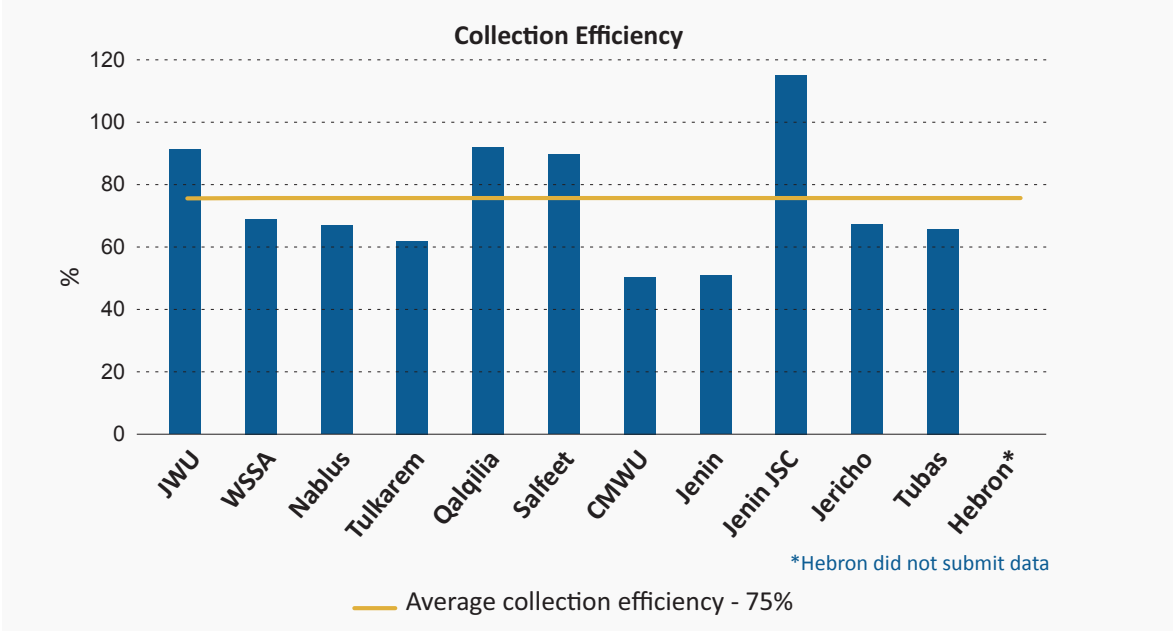


Collection Efficiency (%)

The collection efficiency is a ratio measuring the collection from billing in the current year and from outstanding balances. The ideal collection ratio should be 100% where all billing in the current year is fully collected when the outstanding balance for the previous years is zero.

The best collection efficiency was found in Jenin JSC, achieving 115.56%. Jenin JSC is the only service provider which has fully employed prepaid water meters, thus achieving full current year bill collection in addition to collecting part of the old and outstanding debts. Qalqilia, JWU and Salfeet all achieved greater than 90% collection efficiency, while the other providers achieved less than 70%. In the past 2 years, Salfeet linked the electricity bill with the water bill, where when the electricity bill is paid a portion of the water bill is also settled. The lowest collection efficiency was found in CMWU Gaza and Jenin at around 50%. Efforts must be exerted to raise the percentage of collection in all service providers.

Figure 5: Collection Efficiency

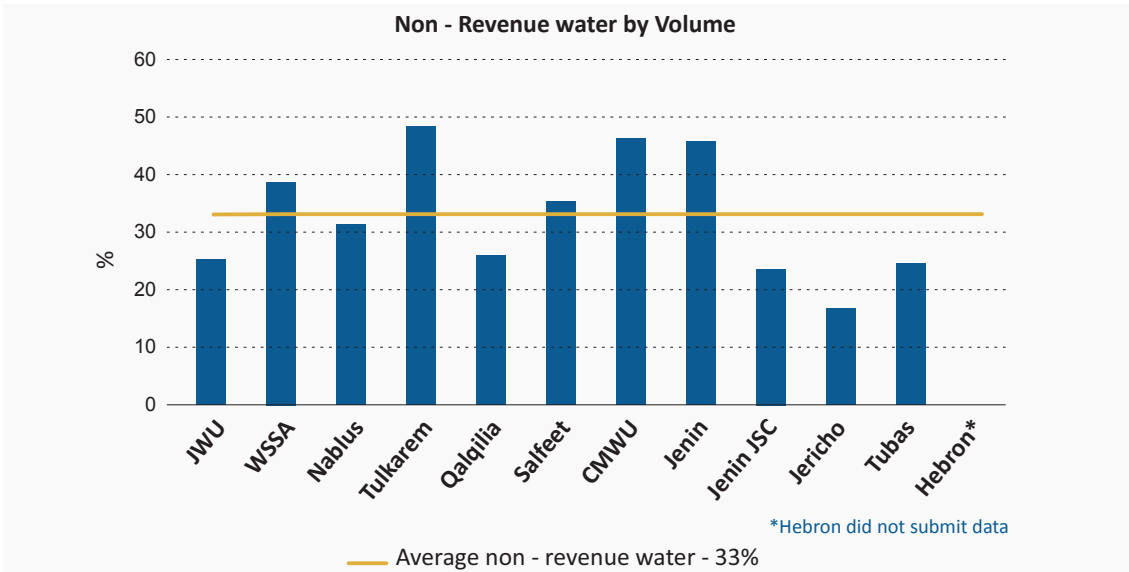


Non-Revenue Water by volume %

Non-Revenue Water (NRW) is the ratio of the total difference between water produced and water billed to customers, including leakages in the network and illicit connections, and that percentage of water that has in fact been accounted for but was not billed. Usually, high NRW increases the operation costs and in many cases results in higher tariffs for the customers.

The high NRW ratios in Tulkarm, CMWU, and Jenin are due to many reasons such as the inaccuracy of the water meters used, the lack of meters at some connections, frequent estimation of meter readings, quantities of credit notes are not recorded, lack of periodic and preventative maintenance for network and meters and the considerable effect of illegal connections. The lowest NRW ratios were found in Jericho, Jenin JSC, Tubas, JWU and Qalqilia.

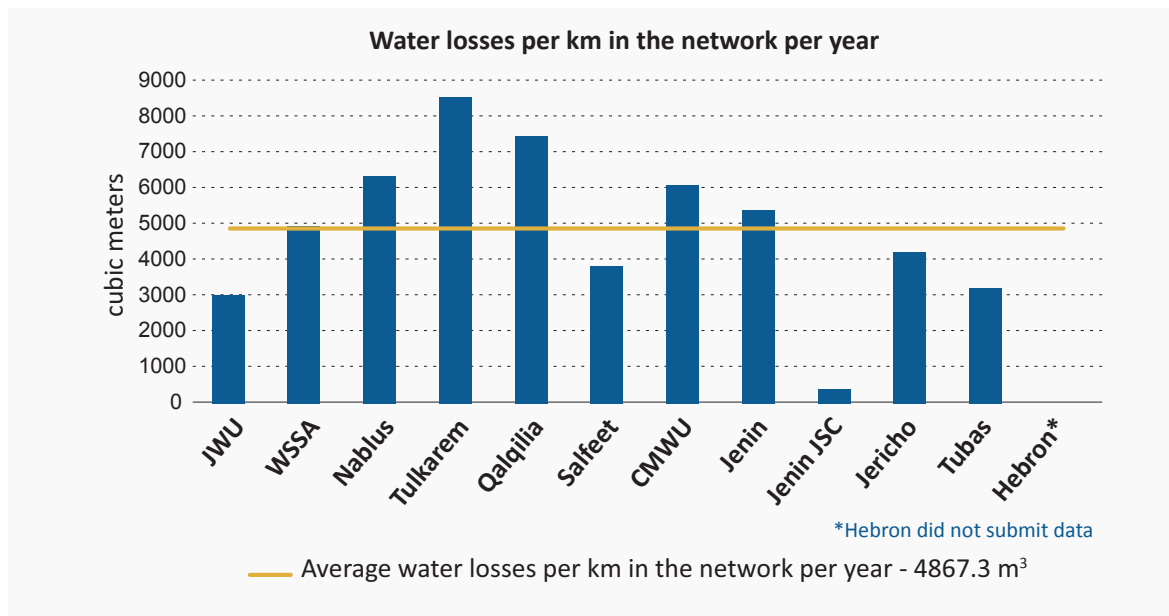
Figure 6: Non-Revenue Water by Volume



Water losses in (m³) per km in the network per year

The measure of water losses per kilometer of network provides an indication of the efficiency of the network and main conveyance pipes while eliminating the effect of the difference in length between networks. The highest water losses per km of network were found in Tulkarm, Qalqilia, and Nablus. In Tulkarm, the water losses are highest. In Qalqilia, the water losses are also high and this can be partially attributed to a group of factors where there is a high supply per capita, limited length of the network, and high population density. In Jenin JSC the ratio was significantly lowest at 416m³/km/year, followed by JWU and Tubas as 3033.2 and 3211.1 m³/km/year respectively. The water supply in Jenin JSC is relatively low and the NRW is low, which means that a small quantity of water lost is divided over a wide network. Low water losses per km in the network are also generally assumed to be a result of better management of the distribution network and metering system.

Figure 7: Water Losses per Kilometer in the Network per Year

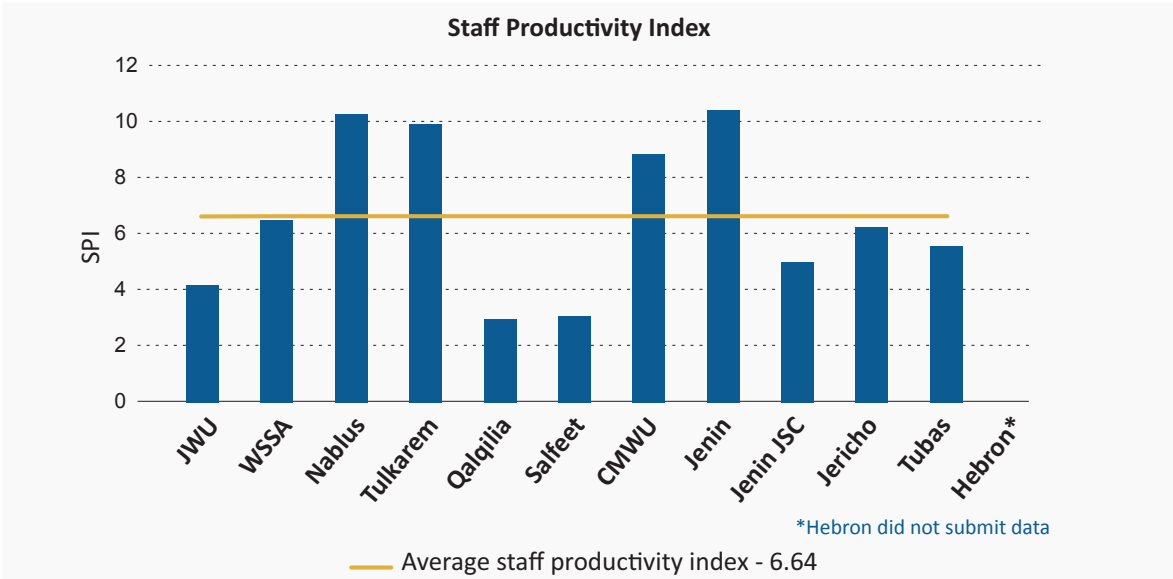


Staff Productivity Index (No.)

Generally, staff costs account for about one fifth of the total operating costs for a water service provider. The staff productivity index thus has some effect on the cost and selling price of water and provides an indicator of comparison between similar service providers and identifies areas of improvement in the operation cycle.

The average number of employees per 1000 customers was found to be about 6.64. In Jenin, Nablus, and Tulkarem the ratio is highest compared to other providers, at around 10. This signifies that they have a high number of employees and workers in the water sector, noting however that some of their staff is employed for water and wastewater services. This indicator is lowest in Qalqilia and Salfit at around 3 and JWU at around 4.

Figure 8: Staff Productivity Index

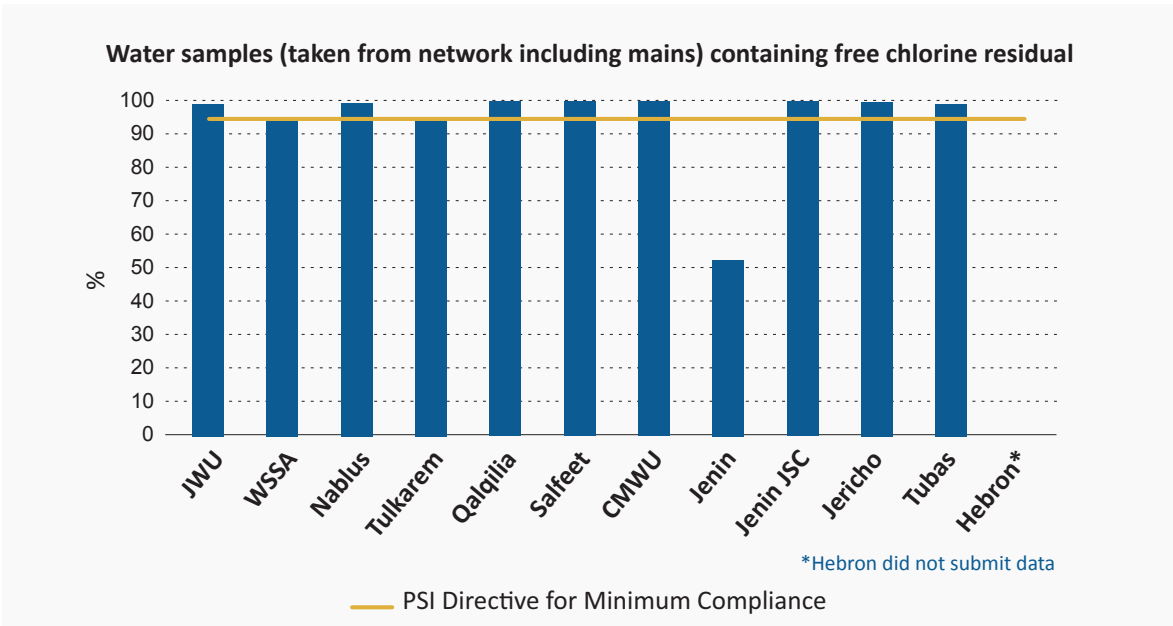


Water samples (taken from network including mains) containing free chlorine residual

Water supplied to consumers should have a certain minimum level of free chlorine residual in order to ensure safe water for domestic use. Palestinian directives issued by the Palestinian Standards Institute limits free chlorine residual concentrations between 0.2-0.8 mg/l, measured at the consumer’s connection. However, for a large volume of samples, the directive requires at least 95% of tests passing for free chlorine residual in water samples.

All of the water service providers achieved passing tests for over 95% of water samples containing free chlorine residual, in compliance with the Palestinian standards. In Jenin however, only 52.6% of the water samples contained free chlorine residual. This however is partially a result of inaccurate data used to calculate this indicator.

Figure 9: Water Samples Containing Free Chlorine Residual

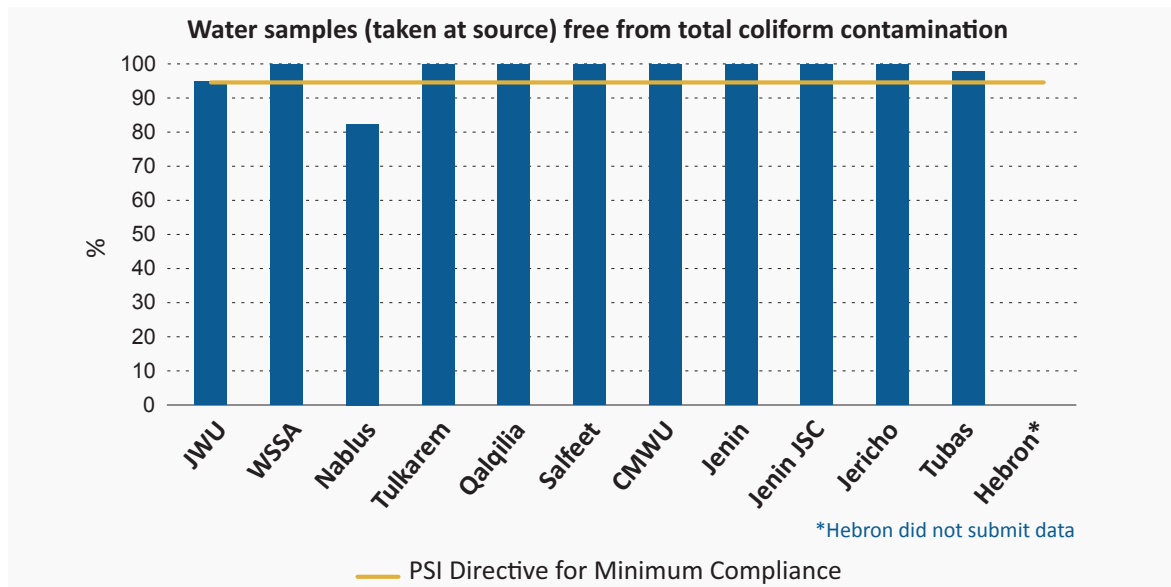


Water samples (taken at source) free from total coliform (%)

Palestinian directives for total coliform bacteria require less than 3 per 100ml. However, for a large volume of samples, if 95% of tests are passing then the samples are considered compliant. These tests are generally performed on water samples taken at the source and/or from the outflow of water purification facilities. It is important to note that although water tested at the sources will not necessarily comply to drinking water standards, the sources must be regularly monitored and maintained to prevent and to mitigate contamination.

All samples taken by service providers at their sources were found to be of good quality in terms of total coliforms. In Nablus however it was found that only 83% of the water samples are free from total coliform contamination. This is mainly due to the contamination of shallow source springs.

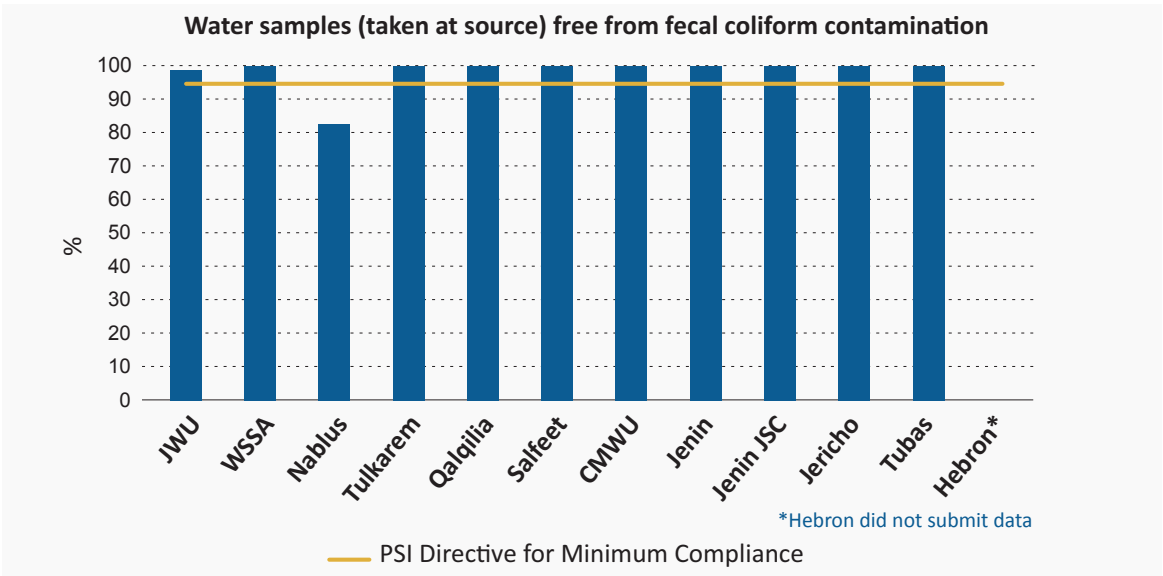
Figure 10: Water Samples (taken at the sources) Free from Total Coliform Contamination



Water samples (taken at source) free from fecal coliform (%)

Samples taken by most service providers at their sources were found to be of good quality in terms of fecal coliforms. In Nablus however only 83% of the water samples are free from fecal coliform contamination. This failure is mainly due to the contamination of shallow source springs.

Figure 11: Water Samples (taken at the sources) Free from Fecal Coliform Contamination

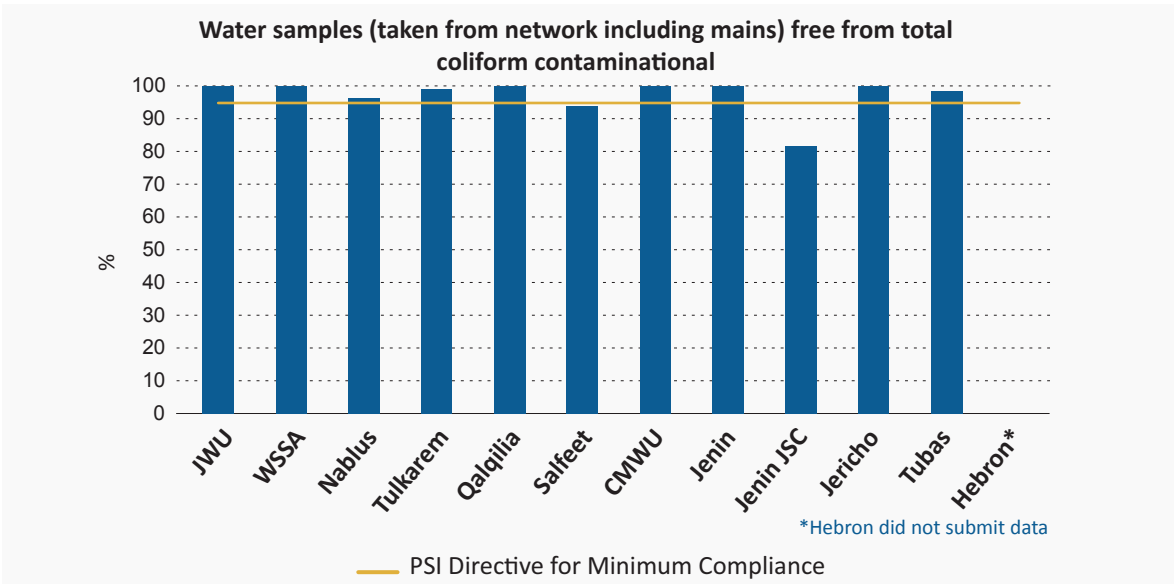


Water samples (from network including mains) free from total coliform (%)

Palestinian directives for total coliform bacteria require less than 3 per 100ml. However, for a large volume of samples, if 95% of tests are passing then the samples are considered compliant. These tests are generally performed on water samples taken from connection points throughout the network.

In Jenin JSC, it was found that only 82% of the water samples are free from total coliform contamination and this is not compliant with Palestinian standards. This contamination reported by Jenin is of high concern to PWA and efforts will be taken to assist in mitigation. All other samples of the water service providers were compliant with the Palestinian standards with greater than 95% of samples passing free of total coliform contamination.

Figure 12: Water Samples (taken from the network) Free from Total Coliform Contamination

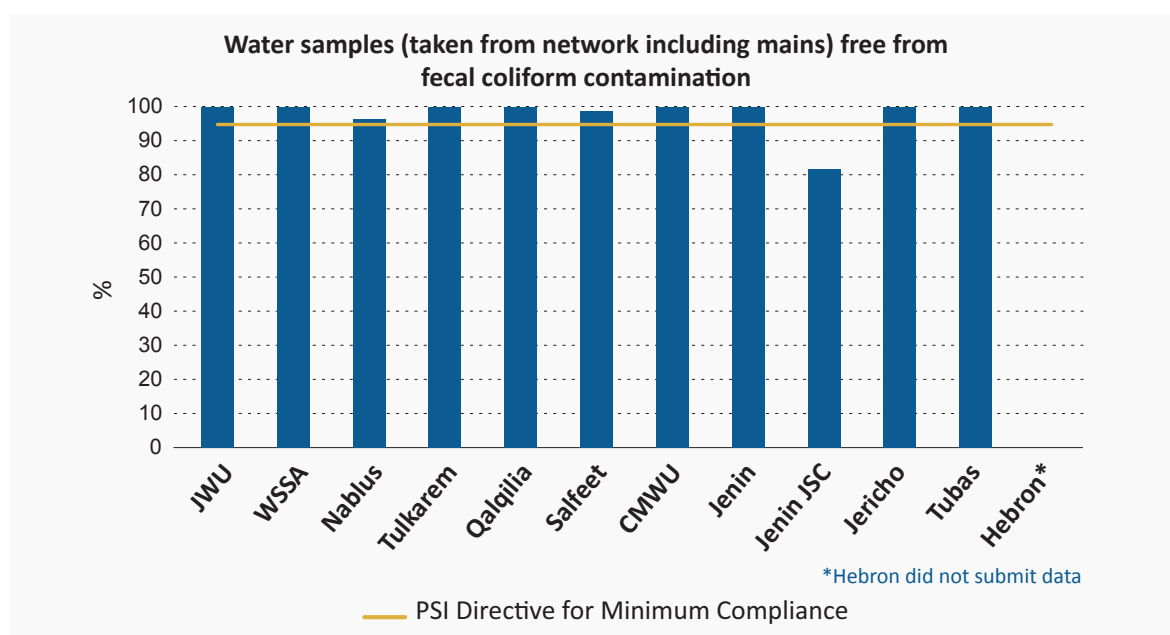


Water samples (from network including mains) free from fecal coliform (%)

Palestinian directives for fecal coliform bacteria require 0 per 100ml, however for a large volume of samples, if 95% of tests pass, then the samples are regarded as compliant. The tests are generally performed on water samples taken at connection points throughout the network.

In Jenin JSC, only 82% of the water samples are free from fecal coliform contamination and this is not compliant with Palestinian standards. This contamination reported by Jenin is of high concern to PWA and efforts will be taken to assist in mitigation. All others service providers were compliant with Palestinian standards for percentage of samples free from fecal coliform contamination.

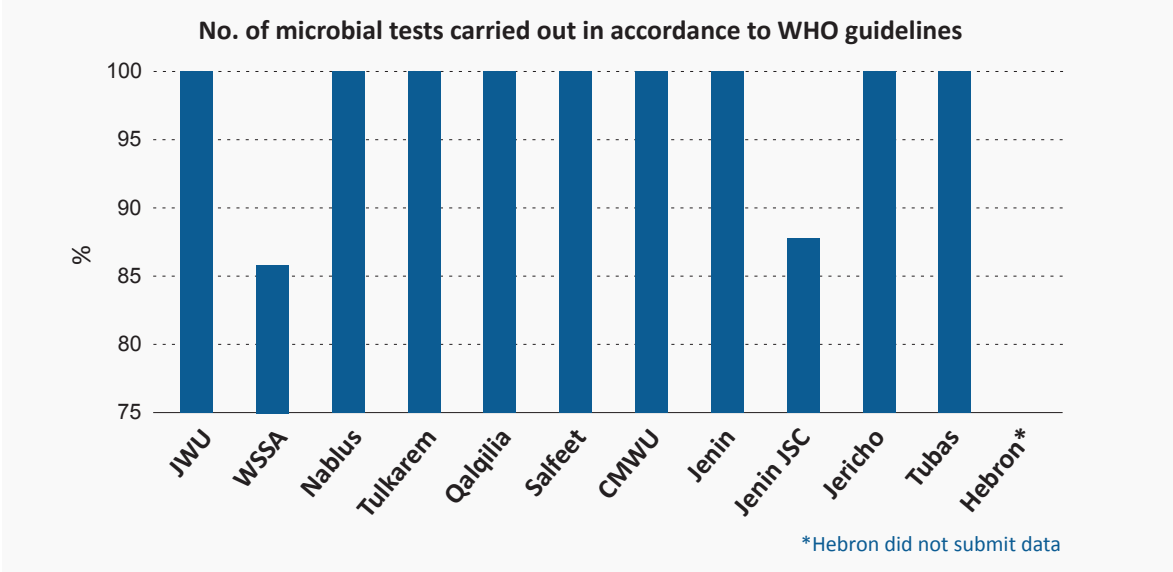
Figure 13: Water Samples (taken from the network) Free from Fecal Coliform Contamination



Microbiological tests carried out (%)

All of the service providers performed more than 100% of the required minimum number of tests as per WHO guidelines, except for WSSA and Jenin. There is a need for WSSA and Jenin to perform more tests, in accordance to the WHO guidelines, especially considering the alarming water quality information reported by Jenin.

Figure 14: Number of Microbial Tests



3.2 PERFORMANCE ANALYSIS OF THE BULK WATER SERVICE PROVIDER

The West Bank Water Department (WBWD) is the sole bulk-water provider in the West Bank. It relies on 2 main water sources: purchased water from Israel, and extracted water from the 17 wells owned and operated by the WBWD. About 80% of the total amount of water currently being supplied and distributed by the WBWD to service providers is purchased from Israeli sources.

The performance of the WBWD in 12 key performance indicators is summarized in Table 7 below. These key performance indicators were selected as pilot indicators and are expected to be further developed and refined in future assessments to offer a more comprehensive analysis of the performance of the WBWD.

The WBWD reports that the weighted average for the unit cost of water produced and purchased by WBWD about 3.0 NIS/m³ and the unified bulk supply price is 2.6 NIS/m³. This difference between the above unit cost of the water supplied and the selling price is directly subsidized by the government.

Table 7: Levels of Service Provision against Performance Indicators for the WBWD

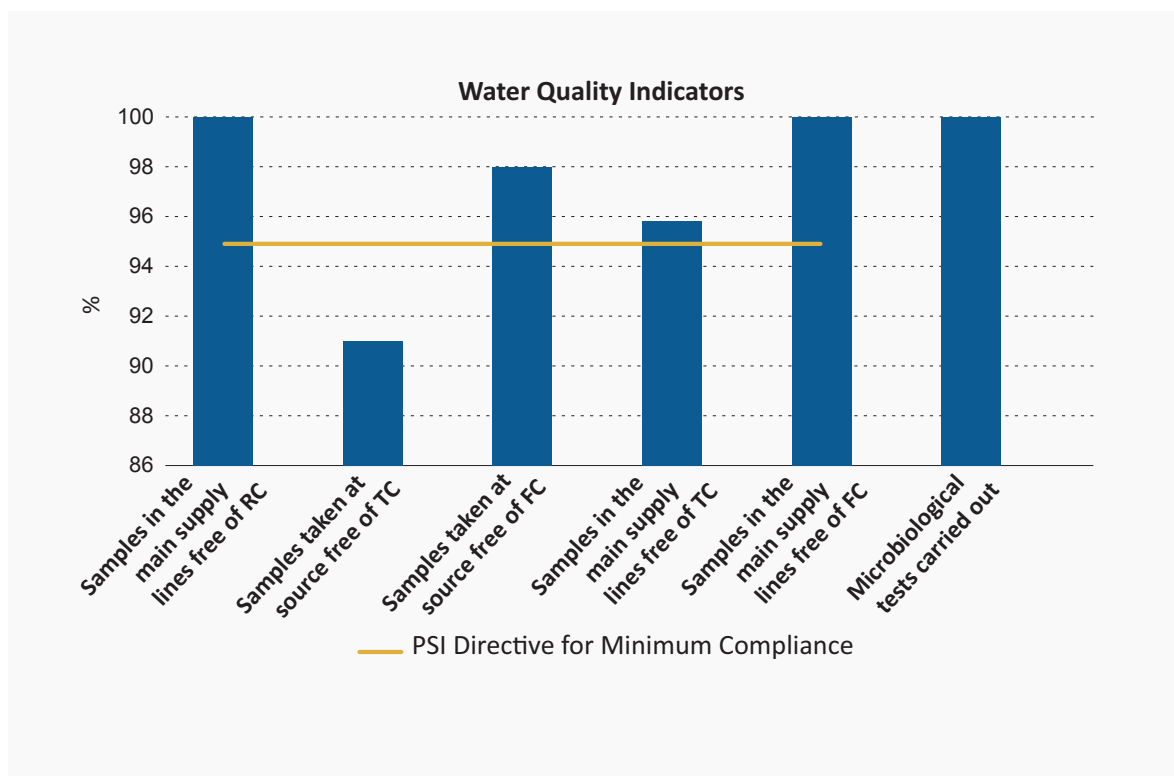
KPI	Value	Unit
Working ratio	1.12	No.
Collection efficiency	52.91	%
Non-Revenue Water by volume	12.78	%
Staff productivity index	0.58	No.
Water Losses per km in the supply lines per year	16,175.80	m ³
Samples (in the main supply lines) containing free chlorine residual	100.00	%

Samples (taken at source) free from total coliform contamination	80.00	%
Samples (taken at source) free from fecal coliform contamination	98.00	%
Samples (in the main supply lines) free from total coliform contamination	95.83	%
Samples (in the main supply lines) free from fecal coliform contamination	100.00	%
Microbiological tests carried out	100.00	%

It must be noted that the WBWD functions under special circumstances where several technical issues, mainly water losses in Area C, occur where the WBWD has no civil or security jurisdiction. Additional operation costs are also forcibly charged to WBWD by Israel for the water department of the Israeli Civil Administration. The low collection efficiency, the high amount of water losses in supply mains mainly in Area C, the additional charges incurred for the water department of the Israeli Civil Administration, and the direct subsidy in the selling price for water, resulted in a high annual deficit in 2011. The working ratio for the WBWD is greater than 1 due to the high operation costs.

The water quality indicators signal total coliform (TC) contamination in the sources and this requires regular monitoring and chlorination. Water samples taken within the main supply lines are compliant with Palestinian standards and are safe for consumption.

Figure 15: Water Quality Indicators of the West Bank Water Department





Chapter Four

Recommendations



4.0 GENERAL CONCLUSIONS

This report has provided some insight into the performance of water service providers in Palestine. Most of the service providers have shown good performance results however efforts must be exerted to ensure that all indicators show improvement and positive trends in the future. This is the main way to ensure that water service provision is improved and meets the needs of the Palestinian people. The results of this assessment show that collection efficiency in some providers is exceptionally good, while in others requires significant improvement. Non-revenue water should be improved in all service providers and water losses within the networks must be reduced. These issues need special focus since any small improvements can lead to significant positive effects in service provision. Major investment in infrastructure continues to be a need in the water sector. However, new investments must be linked to corresponding improved levels of service provision.

Major strides in improving water service provision are anticipated in light of the new orientation of the water sector as outlined in the National Water Policy and National Water Strategy for Palestine. The National Water Policy and Strategy will also act as a platform for ensuring close collaboration and cooperation among all water-related agencies and stakeholders at the national, governorate, municipal and local levels. As such, the National Water Policy and Strategy will further strengthen the national framework and reflect water management at all levels.

One of the aims of the National Policy is to establish a framework for the coordinated development, regulation and financial sustainability of water supply and wastewater services to ensure concerted efforts towards improved water systems management, rehabilitation and maintenance. It is a national policy to support the regular collection of all hydrological and other water-related data in a centralized data base and to make this information available to the public, in order to ensure the efficient management of water in Palestine and to document priority investments in the sector.

It is the National Water Policy of Palestine to: ensure that the abstraction, transmission and distribution of water, together with wastewater collection and treatment, is financially sustainable and that providers of these services can demonstrate their financial reliability in regards to the full recovery of operation, maintenance, capital investment and capital replacement costs; define and enforce clear regulations for revenue collection by utilities (including customer debts), as collecting these debts is key to ensuring the financial viability / sustainability of water and wastewater utilities; define and enforce regulations to deal with illegal connections to water systems and sewers; ensure that the services' proposed financing and funding requirements reflect the approved financial objectives and cost profiles of each service provider and that, where these tariffs do not provide full cost recovery, all sources of funding required to meet this gap are clearly identified and secured; and to encourage water service providers to reduce the quantity of non-revenue water in order to increase the availability of scarce resources to customers and improve their operational efficiency to progressively meet national targets.

PWA will continue to collate information and further develop water service provision benchmarks and will continue to work with all stakeholders to enhance performance in the water sector.

4.1 RECOMMENDATIONS

This assessment has shown that there are critical actions needed to be taken by many water service providers to generally improve their service provision and to enhance data availability. Each service provider in Palestine controls supplying and treating water (and sewerage in some), the network of water supply pipes (and sewers), and selling water service (and sewerage service) to their customers. It is essential to better understand their performance, to envision targets for improvement, to open a line of communication with customers, and increase transparency in water and wastewater services. The following are seen as essential measures to be taken by the service providers:

- **Adoption of accrual basis for accounting:** Some water service providers use a cash basis of accounting while others have adopted an accrual basis for accounting. All providers are strongly encouraged to adopt or transition to the accrual basis for accounting. Reporting on an accrual basis of accounting is favored because it: shows how a utility financed its activities and met its cash requirements; allows users to evaluate a utility's ongoing ability to finance its activities and to meet its liabilities and commitments; shows the financial position of a utility and changes in financial position; provides a utility with the opportunity to demonstrate successful management of its resources; and is useful in evaluating a utility's performance in terms of its service costs, efficiency, and accomplishments. The information contained in reports prepared on an accrual basis of accounting is useful both for accountability and decision-making.
- **Separation of Accounts:** Many Palestinian water service providers are financially and administratively embedded within the municipalities. Therefore, the costs and revenues associated with water (and sewerage) services are accounted for and regulated together. This means that it is difficult to get accurate information about the costs involved for each activity in the delivery of water (and sewerage) services. Separation of accounts means that the accounts (costs, revenues, and assets) for the different activities would be independent of municipal accounts and reported to PWA separately.
- **Improvements in asset management:** The success or failure of a service provider can be substantially measured by the availability and quality of infrastructure services. As such, all assets under the control of the municipality/service provider should be identified, and asset values should be assigned and updated. Asset data must be incorporated in a structured asset register and the register must be maintained and updated on an ongoing basis.
- **Improving billing practices:** Some providers, although they bill some public institutions, such as fire stations, municipality buildings, etc. do not collect from these institutions, or they do not bill them at all, leading to lower collection efficiency. All providers, except JWU, give various promotional discounts for customers who pay their bills on

time. It is recommended that these providers should start billing and collecting from all customers and should not offer any promotional discounts in this regard.

- Adhering to the tariff setting bylaw: Presently the various municipalities in the West Bank and Gaza employ different tariff structures based on the limited data available and with limited application of basic tariff design principles. The PWA thus developed a Water Tariff Bylaw and supporting guidelines for its application. As of January 2013, a Water Tariff Bylaw was approved and endorsed by the Palestinian Ministerial Council. The bylaw should be applied by all water service providers in updating or adjusting water tariffs. The tasks and activities in tariff design, the tariff models to be used, quantified standards and criteria to be followed, technical and financial data required, and other supporting information, can all be found in the guidelines.
- Improvement of water quality at the sources: Water of adequate quality and quantity is central to the integrity of our environment and it is essential to ensure we have sufficient drinking water to supply our needs. Thus the utmost care must be given to our limited water sources. Water providers are strongly encouraged to developing plans for the improvement of the water quality at the sources and to reduce pollution being released into aquatic ecosystems. More effort is needed in monitoring the sources and establishing protection zones to protect their viability.