التعاون الألماني
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Resilience - Oriented Indicators Overview

Yemen Water Sector Performance Indicators

of The Water and Sanitation Local Corporations in
Aden, Sana'a, Ibb, Taiz and Hodeidah

1st Quarter

January – March 2019

IBB-WSLC

SWSLC

Contents

1 Overview

The urban population in Yemen is supplied with drinking water through a large number of water supply systems. Most systems are public and managed through the LCs[1] and their affiliated water utilities and branches, and others are private like water tanker suppliers. Sewerage networks are available and cover only a certain percentage of the population.

Since the situation in Yemen has been greatly exacerbated by the conflict and its repercussion in 2015. The LCs are operating under different institutional, administrative, operational, and financial conditions. They are encountering several challenges to secure an enabling environment that allows for service quality improvement, cost recovery and financial sustainability. Network rehabilitation and extension projects funded by government and/or donor organizations, due to the prolonged conflict, have been suspended or completely terminated.

Given the significant impact of water and wastewater services on life and public health of the population, ensuring financial sustainability and good service quality is crucial. Hence, the ability of the LCs to provide acceptable services depends on a wide range of factors, such as adequate infrastructure, access to energy and consumables, qualified personnel, efficient financial and performance-oriented management. Likewise. The current situation confirmed that conflict and fragility can be extremely disruptive to these interrelated elements, and how the quality of service delivery could be degraded to a point of no return or perpetuating the "vicious cycle" of managerial, financial and operational deficiencies, and in due course, leads to customers' dissatisfaction with the services they receive, and low revenue collection due to their unwillingness to pay for those services, which sooner or later, undermines the resilience of the service delivery and providers.

One of the utmost consequences of poor sanitation and low access to clean drinking water has had catastrophic hygiene and health effects by forcing the vast majority of the urban population to rely on unsecured alternative water supplies, making them susceptible to water-borne diseases. The outbreak of cholera, on the other hand, has placed a burden on the social responsibility and mandate of the LCs. To confront and mitigate further severity of Cholera epidemic, the WASH Cluster and the other Humanitarian Societies have mobilized the possible resources to support the resilience of the LCs with urgent operational measures to secure the continuity of safe drinking water supply and wastewater treatment.

In fact, improving the performance of the LCs is challenging because the problems they face are multidimensional. Problems associated with dysfunctional and intricated business processes, cannot be overcome solely by short-term emergency measures. Achieving resilient and sustained service delivery requires a framework that integrates institutional measures with short/mid/long term investments to increase the efficiency and to reverse the dysfunctional equilibria in which the LCs operate.

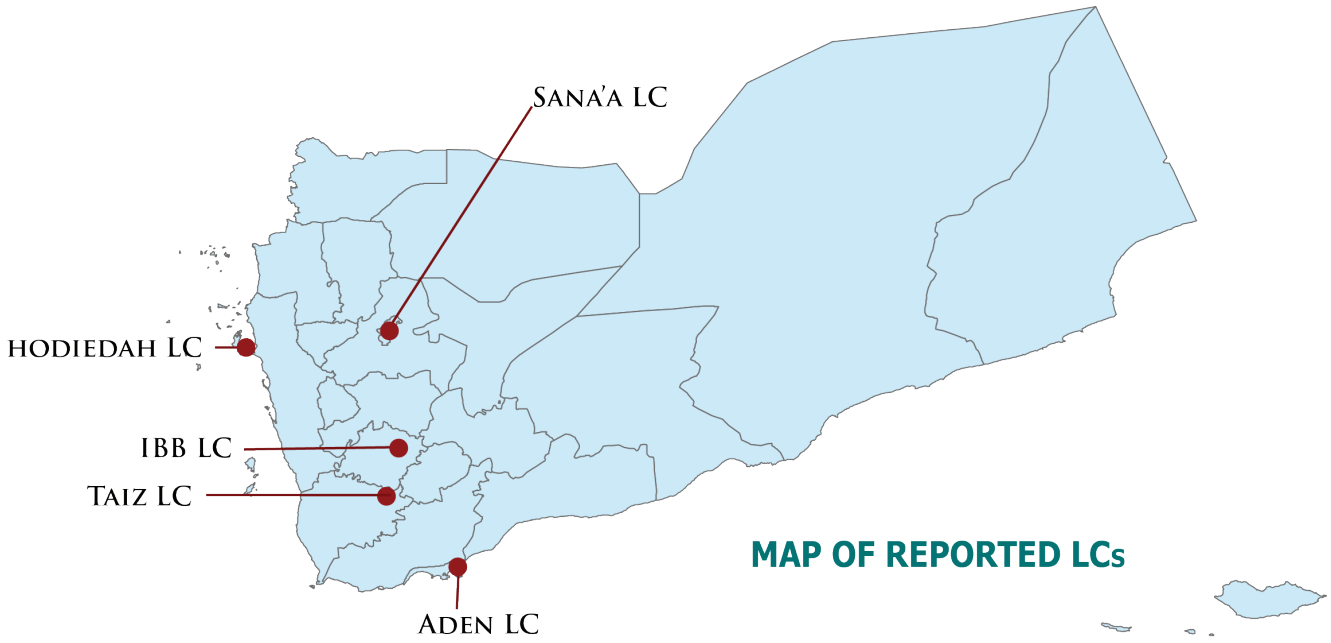
1. LCs = Water and Sanitation Local Corporations

2 Performance Monitoring Methodology

Since the conflict broke out in late March 2015, the MWE[2] with the assistance of the GIZ IDWS[3], has initiated a process to monitor and report key performance indicators of selected LCs serving in metropolitan cities of Sana'a, Aden, Taiz, Hodeidah and Ibb.

The periodicity of reporting takes place on a quarterly basis to assist MWE and other water sector stakeholders to address the real and potential trends of performance with respect to the operational, financial and managerial resilience of the LCs during the consequences of the current crises. In addition, further reviews were integrated in 2019, summing up from 23 to 39 resilience-oriented performance indicators adapted to fit with the contextual situation, monitoring purposes and constitutes a valuable reference for effective evaluation of the impact of relevant sector interventions

This report covers the period from January to March 2019, together with a brief technical analysis of key indicators on different ranges of performance of each reported LC. The reporting exercise should not be perceived only as unilateral monitoring by GIZ IDWS, the process was carried out with data submitted and signed by the LCs' management through appointed focal points. Many clarifications were sought on the data provided especially for consistency and reliability of data and indicators. In some instances, estimates were given by the LCs in the absence or lack of systematic information. Nevertheless, GIZ IDWS team made every effort to improve data quality by means of validation, analysis and subsequently, reviewing the results, if necessary, with the LCs for further quality assurance; thus, the data finally presented are the best that could be obtained in the circumstances.



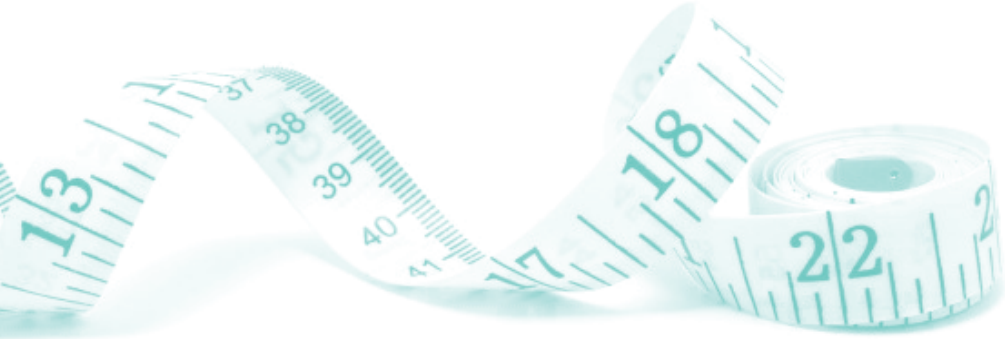
MAP OF REPORTED LCs

2. MWE = Ministry of Water and Environment
3. GIZ IDWS = GIZ Water Sector Program, Institutional Development of the Water Sector - Addressing Basic Needs

3 Emergency Water Sector Performance Indicators

This report measures the resilience of the LCs in terms of the following category of key resilience-oriented performance indicators:

a. Service Coverage, Service Levels and Quality - Piped Water Supply	1. Total population in service area (capita) 2. Number of IDPs in service area (capita) 3. Number of water connections (No.) 4. Number of population served through water supply network (capita) 5. Water supply service coverage = population served through water supply network vs total population in service area (%) 6. Number of service days of piped water supply per month (day/month)	7. Number of residual chlorine samples taken (No./month) 8. Number of residual chlorine samples according to standards (No./month) 9. Proportion of bacteriological quality samples of distributed water according to standards = Number of residual chlorine samples according to standards per total number of samples taken (%)
b. Service Coverage and Quality - Sewerage	10. Number of population served with sewerage connections (capita) 11. Number of sewerage connections (No.) 12. Sewerage connection coverage = population served through sewerage network vs total population in service area (%) 13. Number of BOD-samples of effluent of WWTP taken per month (No./month) 14. Number of BOD-samples of effluent of WWTP according to standards per month (No./month)	15. Proportion of effluent quality samples of wastewater treatment plants according to standards = Number of BOD samples according to standards per total number of samples taken (%) 16. Average BOD value of raw influent at WWTP (mg BOD_5/l) 17. Average BOD value of treated effluent at WWTP (mg BOD_5/l) 18. Treatment efficiency of WWTP regarding BOD (%)
c. Production and consumption	19. Total quantity of water produced (m^3/month) 20. Per capita quantity of water produced (l/cap/day) 21. Storage capacity (m^3) 22. Storage capacity share per capita (l/cap)	23. Energy costs per m^3 water produced (YER/m^3) 24. Effluent produced (m^3/month) 25. Effluent produced (l/cap/day) 26. Effluent treated in wastewater treatment plant (m^3/month)
d. Performance of Pumps and Generators	27. Total number of main pumps for the water supply system (No.) 28. Number of functional pumps in service (No.) 29. Number of working hours of all operating pumps of the water supply system (h/month) 30. Number of main functional pumps failures due to technical reasons (No./month)	31. Number of working generators in the operation of pumps (No.) 32. Number of working hours of all operating generators used to run the functional pumps of the water supply system (h/month)
e. Financial Sustainability	33. Total collected operational revenues (YER/month) 34. Total billed operational revenues (YER/month) 35. Total operational costs (YER/month) 36. Collection efficiency = Collected revenues vs. Billed revenues (%)	37. Actual operational cost coverage (%) 38. Monthly governmental subsidies (YER/month) 39. Percentage of basic monthly salaries paid (%)



4 Technical Analysis

a. Service Coverage, Service Levels and Quality - Piped Water Supply

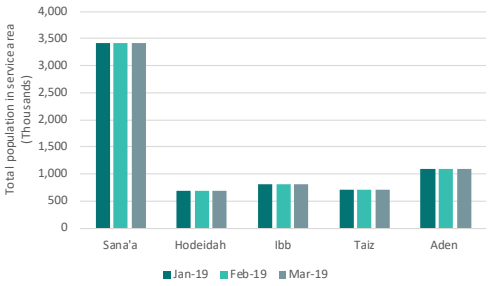
The water supply service coverage indicator aims for demonstrating the physical accessibility of households that are connected to the distribution system expressed as a percentage of total number of populations in the served area. While access to infrastructure has advanced slowly in some areas; access to reliable and sustainable water supply remains challenging in general.

In the service area of the reported LCs, an average of 54% of the total urban population (6,729,865) is connected only to the public water supply system. Water coverage varies from LC to LC given the urban expansion accompanied by rapid population growth - keeping the LCs barely able to keep pace with adequate service coverage. In this quarter, Aden LC was able to maintain 86% of service coverage as a logical consequence of financial support by the government and others to improve public services.

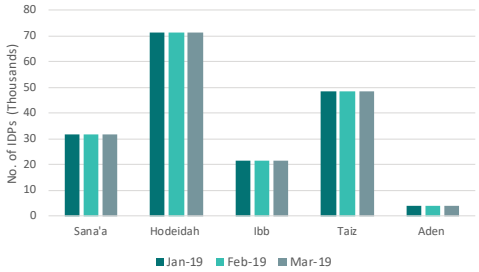
The massive influx of IDPs seeking safe areas and shelters had to a large extent aggravated the burden of the LCs to adequately comply with humanitarian aid efforts. However, within the efforts to accommodate displaced citizens, the Local council in Ibb has exerted pressure on the LC to extend services in this quarter by 370 new connections in host centers with gross coverage 60% compared to 87% in 2018. Taiz LC has reported 78% of coverage claiming to serve additional households surrounding the water sources and vast areas equipped with water distribution points for humanitarian purposes. The unresolved crisis situation in Hodeidah and other hot areas has kept large segment of people who have displaced to Sana'a to resettle for an indefinite term, exacerbating the potentials of Sana'a LC to augment the water service domain and connections (34% coverage) to keep pace with the prevailing population growth and household numbers.

On the other hand, the private sector is perceived to be a major source of alternative water supplies to other urban populations that are not connected, or a substitute resort for those having poor access to the public network. This coping option is adding the most suffer for many customers who cannot afford the dual system of their income. As a matter of fact, the water tariff charged by the LCs is approximately affordable and lower on average than those priced by the private suppliers.

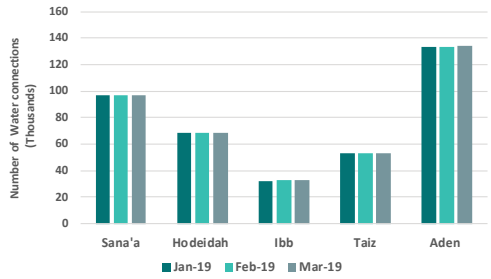
1. Total population in service area (capita)[4]



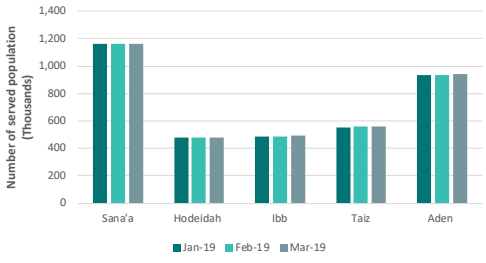
2. Number of IDPs in service area (capita)



3. Number of water connections (No.)



4. Number of population served through water supply network (capita)



5. Water supply service coverage = population served through water supply network vs. total population in service area (%)

4. The LCs do not have a reliable monthly population growth rate projection and were therefore estimated on the basis of an average of 2.5% of the annual growth rate. Furthermore, the population figures at the LCs of Sana'a and Ibb have increased significantly in 2019 compared to 2018 due to the fact of defining and adding 'settled' IDPs to the permanent residents, and hence considering them within the LC's scope of planning for service extensions and reporting.

Number of service days of piped water supply

The scarcity of water resources in Sana'a, Taiz and Ibb has kept the supply of water susceptible to poorly fulfill the pressing demands of the served customers. Sana'a LC, hereby, has a lower water supply frequency maintained by twice a month on average. Shortage of water supply in Sana'a city could be due to the low volume of water production compared to Aden and Hodeidah with average supply 14 and 25 days consecutively per month. Ibb LC also has been able to boost water supplies since 2018 from 15 to 19 days a month. Otherwise, water distribution has been scheduled once a month and every 45 days in some parts of the city due to the massive drop in the water level of wells. While Taiz LC is striving to constantly maintain water supplies in the service area up to 2-3 times of the distribution cycle with an average 6 days/month.

The policy of rationing the distribution of water varied among the LCs and is dictated mostly by financial and operational considerations. The data provided by the LCs, unfortunately, complicated the further analysis of the equity of water supply and distribution. Nevertheless, direct observations at least unfold that not all connected customers are receiving reliable services in certain areas, and this can be primarily regarded to some factors, three of which:

- Scarcity of water resources and frequent electric power cuts for adequate water production.
- The weakness of the network pressure that compromises fair distribution for those at the far end of the main pipelines.
- In perspective of the urgent need to collect cash revenues, some LCs deliberately schedule water supplies to zones and neighborhoods accommodated with better-off customers.

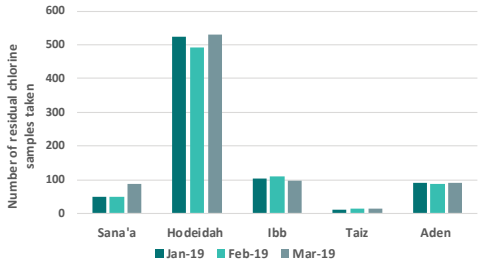
The frequency of the piped water supply is an indicator interlinked with other operational and financial performance, and alarming for a potential damage to the physical network and its components. In addition, the long interruption frequency of water supply exposes the consumers to high health risks from contamination entering distribution pipes during vacuum conditions.

Bacteriological quality samples of distributed water

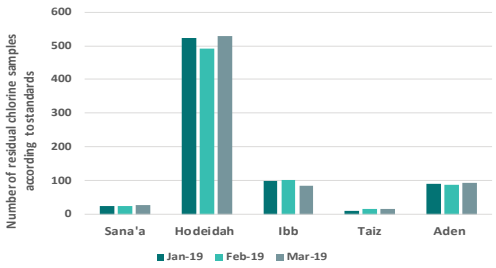
The water supply sourced by the LCs has been addressed as a suspicious causality of water-borne diseases if not treated, and the LCs were urged as preventive measures to carry our regular chlorination and tests for residual chlorine in the network to meet the required standards. Accordingly, some results raised by Sana'a LC regarding the bacteriological quality (50% average) were unsatisfactory and alarming alike. Other LCs (Hodeidah, Ibb and Aden) have shown compliance with bacteriological quality standards above 90% but remain doubtful unless the specific procedures and availability of measuring equipment and resources are verified. The water quality treatment facilities (Labs & equipment) were entirely demolished during the armed clashes in Taiz city. As a result, Taiz LC has managed to conduct water sample tests either in the labs owned to the National Authority of Water Resources (NWRA Taiz branch) or in Ibb LC.

6. Number of service days of piped water supply per month (day/month)

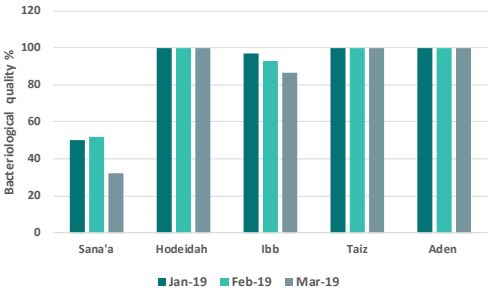
7. Number of residual chlorine samples taken (No./month)



8. Number of residual chlorine samples according to standards (No./month)



9. Proportion of bacteriological quality samples of distributed water according to standards = Number of residual chlorine samples according to standards per total number of samples taken (%)



b. Service Coverage and Quality - Sewerage

Most of the reported LCs have conventional sewer systems where about 45% of the population are served by the sewer networks. The remaining population discards their wastewater in privately owned cesspits where wastewaters are filtered and absorbed by the soil or pumped out with vacuum trucks either by the LC or by the private sector, given also that the concerned local authorities do not maintain any records of the properties with on-site sanitation.

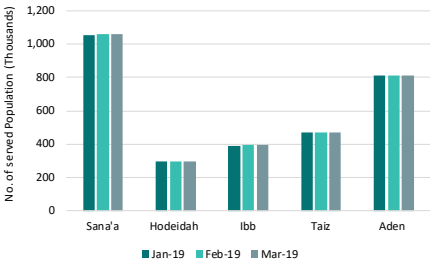
In this quarter, most LCs are lagging behind adequate sewerage coverage (Sana'a 31%, Ibb 48% and Hodeidah 42%) in view of high urbanization rates, lack of investment for sewer networks expansion and infrastructure rehabilitation, etc. All are representing critical factors that constraints the LCs to effectively collect, treat, dispose and/or reuse of wastewater. It is also evident that the amount of sewage that is collected by some WWTPs[5] is higher and beyond the design capacity; therefore, WWTPs failures effectively mean that sewage effluent is being discharged without proper treatment into open areas, waterways, and onto irrigation areas, constituting obvious health risks to residents and huge affected areas. However, this report depended on the BOD_5 (a measure of organic pollution)[6] of wastewater since the majority of the WWTPs' laboratories are either not equipped or dysfunctional to measure all test parameters.

The surrounding poor conditions of insufficient power supply, lack of maintenance and the high volume of wastewater flows that have exceeded the capacity of the WWTPs have imposed poor quality of wastewater treatment to comply with the national standards. To demonstrate the wastewater treatment efficiency of the WWTPs by means of BOD_5. The treatment efficiency of Sana'a WWTP is 73% on average and the BOD_5 samples according to standards is 0%. The BOD_5 concentrations in the incoming wastewater are higher (1,286 mg BOD_5/l average) than the BOD_5 design load (500 mg BOD_5/l). Additionally, the increase in BOD_5 concentrations could also be attributed to water scarcity and low production and supply frequency.

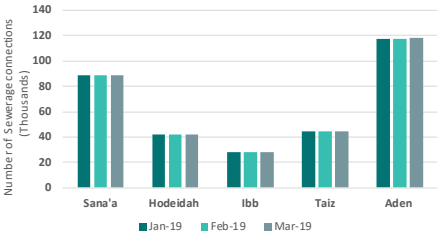
IBB WWTP was equally efficient in BOD_5 removal of produced effluent and test samples according to standards. Hodeidah WWTP, on the contrary, was out of service (Jan-Aug 2019) to interpret the null values of BOD_5 effluent treatment and quality samples. As for the WWTPs of Aden and Taiz, no tests for treatment efficiency were carried out since the laboratories are damaged and out of service, lacking the necessary apparatuses and materials; both appealing likewise for prompt and expanded assistance for restoration.

Given limited funding and resources, affordable 'assistance' projects could be adopted for addressing the challenges of sewerage treatment. Decisions on such smaller-scale treatment technologies including conventional and non-conventional models (e.g. constructed wetlands, biogas treatment plants, reed-bed systems, etc.) will be context-specific and require consideration of various selection criteria.

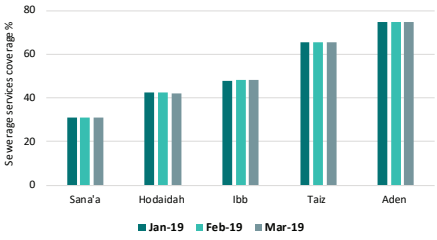
10. Number of population served with sewerage connections (capita)



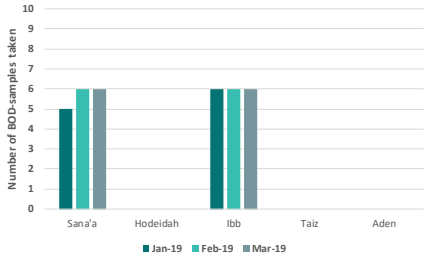
11. Number of sewerage connections (No.)



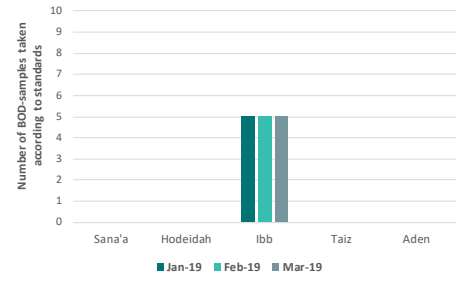
12. Sewerage connection coverage = population served through sewerage network vs. total population in service area (%)



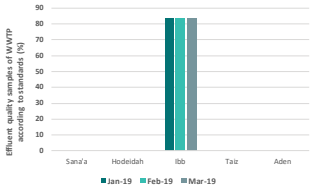
13. Number of BOD-samples of effluent of WWTP taken per month (No./month)



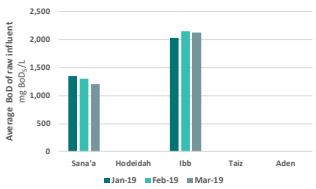
14. Number of BOD-samples of effluent of WWTP according to standards per month (No./month)



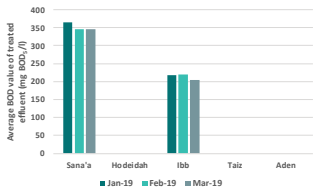
15. Proportion of effluent quality samples of wastewater treatment plants according to standards (%)



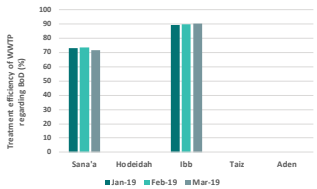
16. Average BOD value of raw influent at WWTP (mg BOD_5/l)



17. Average BOD value of treated effluent at WWTP (mg BOD_5/l)



18. Treatment efficiency of WWTP regarding BOD (%)



5. WWTPs = Wastewater Treatment Plants
6. BOD = Biological Oxygen Demand

c. Production and Consumption

The storage capacity shares per capita by the LCs of Sana'a, Hodeidah, Ibb, Taiz and Aden are respectively 31, 52, 8, 88 and 101 l/cap. In this regard, the LCs must plan for extending the storage facilities to secure storage and production capacity, frequent demand for water supply and to respond effectively to urgent circumstances.

This quarter varies significantly in average daily per capita of water production among the LCs. For instance, LCs of Aden and Hodeidah have posted the highest average share at 135 and 79 l/cap/day respectively. Whereas other LCs have quite low water production quantity per capita reaching an average of 24 l/cap/day, as is the case in Sana'a LC, 27 l/cap/day in Ibb LC, and 7 l/cap/day in Taiz LC. These results may undoubtedly be considered due to lack in the local water resources, inadequate operating and production capabilities.

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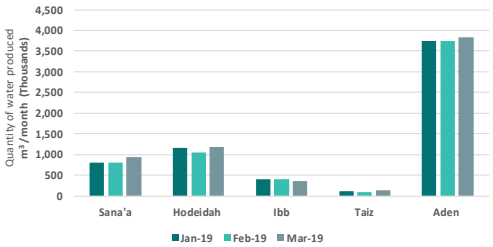
Energy costs per m³ water produced

The frequent/entire cut-off of the National Electrical Grid posed a genuine challenge for the LCs to rely on and obtain an adequate amount of fuel for the operation of electric power generators. In addition, strong interactions with the energy system lie not only in the inherent need for energy for water pumping and wastewater treatment but even more so with important implications for operational costs.

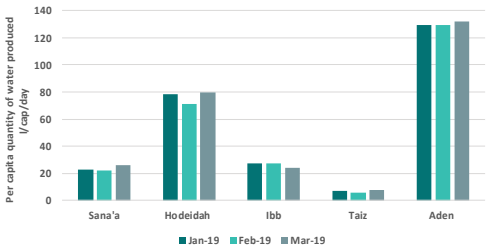
For a thorough assessment of financial performance, the analysis of the energy costs (diesel and electricity) in this report was based on distinguishing the actual costs incurred by the LCs from those subsidized by the Humanitarian Organizations. The LCs were, therefore, requested to split and report their energy costs accounts without computing the costs of subsidized fuel as operating costs. For instance, energy costs account for 0% of the total operating costs in LCs of Sana'a, Taiz and Hodeidah, since fuel is regularly supplied on a monthly basis and paid via the UNICEF, exempting these LCs from massive burdens of running costs and preserving their performance to meet other financial obligations. Unlike Ibb LC, which was self-reliance in obtaining fuel with an average cost 237 YER per m³ of water produced, overwhelming roughly 52% of the total operating cost.

Aden LC has arranged for a concessional agreement with the power company to connect electric lines dedicated for the water wells with affordable tariffs. This exceptional arrangement has held the LC immune from high energy costs at an average price of 15 YER/m³ of water produced compared to 208 YER/m³ incurred in 2018.

19. Total quantity of water produced (m³/ month)[7]

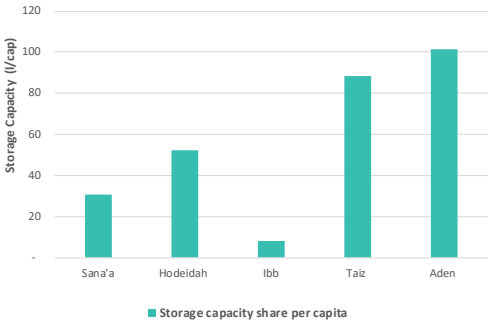


20. Per capita quantity of water produced (l/cap/day)[8]

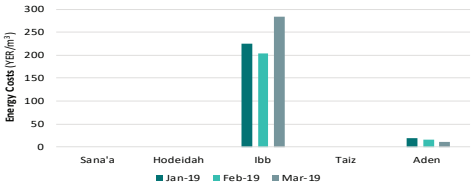


21. Storage capacity (m³)

22. Storage capacity share per capita (l/cap)



23. Energy costs per m³ water produced (YER/m³)[9]



7. The water quantity represents the production, not the billed water.
8. The calculation of per capita share of the water produced is based on the LCs figures. The water supply provided by the private sector and/or humanitarian agencies was not monitored by the LCs and hence was not calculated in this report.
9. 1 Euro € ≈ 623 YER
   1 US $ ≈ 547 YER (March, 2019)
   Source: InfoEuro (http://https://ec.europa.eu/budget/graphs/inforeuro.html)

Effluent treated in the WWTPS

The treatment efficiency of generated effluent varies among the LCs and depends on the WWTPs types and various stages of treatment for processing wastewater before disposal. Additionally, the available figures regarding the inflowing wastewater were estimated by the LCs since all the installed flow meters are either damaged or dysfunctional.

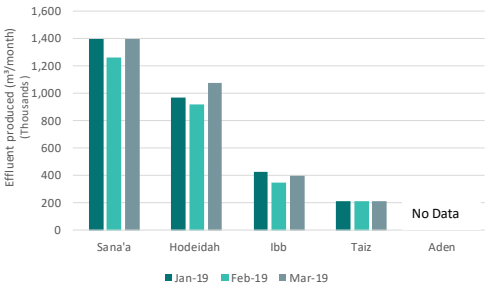
In this quarter, Sana'a WWTP has processed effluent on average 1,350,000 m^3/month (43 l/cap/day), which constitutes almost 100% of the produced effluent and 89% of the WWTP daily collection capacity. The design capacity (17,000 m^3/day) of Taiz WWTP is underutilized, and currently receiving only on an average estimation of inflow 7,000 m^3/day representing only 40% of the nominal capacity of the treatment plant. This explains the implications of many attacks by the farmers drilling holes in manholes and the main transmission line in order to install pumps to use wastewater for agriculture crops and irrigation.

The total effluent treated by Hodeidah WWTP is 987,367 m^3/month (112 l/cap/day), finding its way into the sea waters including 47% without any treatment. The existing capacity of Ibb WWTP is 5,300 m^3/day of sewage collection with average effluent generation 13,000 m^3/day, presenting 60% overload of the plant. The WWTP lab of Aden LC was damaged as referred to the armed conflict in 2015, causing entire termination of regular measurement of treated wastewater and quality. Anyhow, mapping of existing WWTP operations and particular processes is crucial to outline the current performance and to identify the appropriate rehabilitation measures.

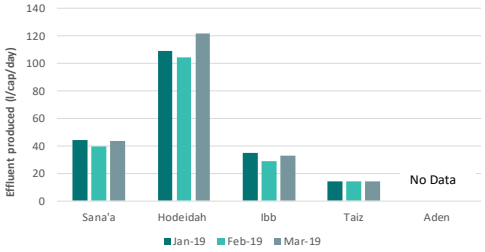
Treatment systems and capacity of the WWTPs

	WWTP	No. of WWTP	Nominal WWTP capacity m^3/day	Effluent produced m^3/day (Q1 2029)	Treatment system
1	Sana'a WWTP	2	50,500	45,000	Activated sludge
2	Ibb WWTP	1	5,300	13,065	Activated sludge
3	Hodeidah WWTP	1	54,000	32,912	Stabilization pond
4	Taiz WWTP	1	17,000	7,000	Oxidation pond
5	Aden WWTP	3	110,000	NA	Stabilization pond

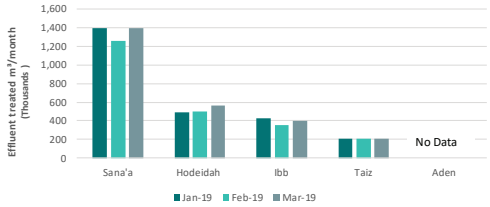
24. Effluent produced (m^3/month)



25. Effluent produced (l/cap/day)



26. Effluent treated in wastewater treatment plant (m^3/month)



d. Performance of pumps and generators

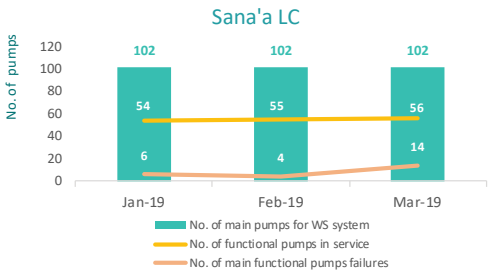
Most LCs have attempted with external fuel subsidies to overcome the power shortage by deploying additional electric generators to maintain the water supply. At the same time, full dependence on standby power has taxed excessive operating expenses beyond the LCs' financial capabilities. However, the solar water pumping system was a paradigm shift, introduced effectively in some areas to relieve stressful operational costs despite raising arguments about the future implications of renewable energy use on the local water resources.

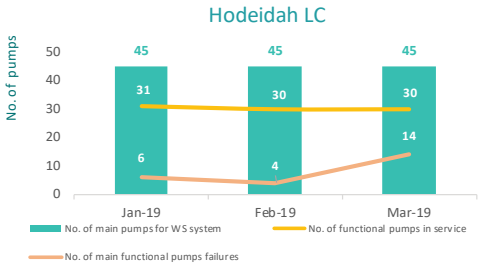
Generally, LC Sana'a has been supported, in addition to electric generators, with solar water pumping systems to reduce power failures and run 55 of 102 main pumps, showing improvement in pumping hours by 11 hours a day on average. In the meantime, Hodeidah LC has managed to operate up to 30 functional pumps, with remarkable recurrence of failures records. This can be assumed as a backlash of long-term pumping hours and overloads in severe temperatures.

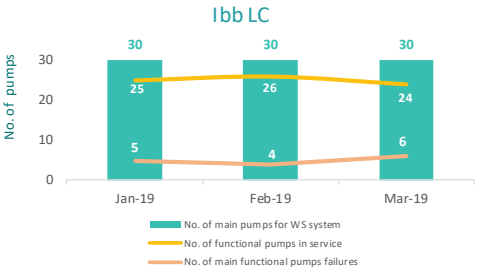
In an effort to cope with the water resource challenges, Ibb LC was able to maintain pumping capacity for most of the city at a rate of 21 hours per day. Likewise, Taiz LC was barely efficient to enhance water production by running 29 functional pumps with an average of 6 hours a day, thanks to additional electrical generators provided by international organizations.

Compared to other LCs, Aden LC operated about 94 of the 126 water pumps for water production on average 21 hours a day. This promising capacity was in virtue of the availability of affordable power system and the minimal dependence on standby generators.

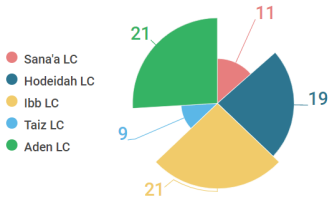
27. Total number of main pumps for the water supply system (No.)[10]
28. Number of functional water pumps in service (No.)
29. Number of main functional pump failures due to technical reasons (No./month)



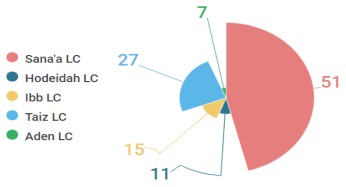


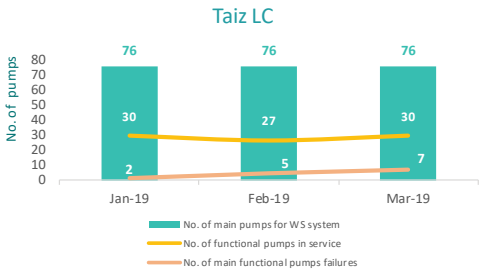


30. Number of working hours of all operating pumps of the water supply system (h/month)

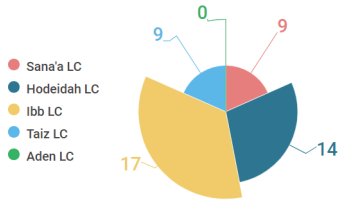


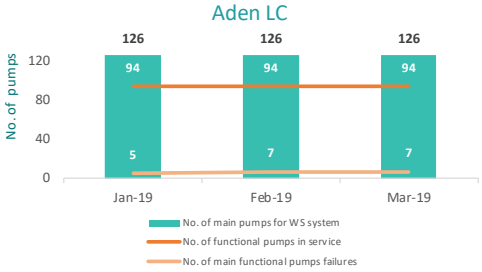
31. Number of working generators in the operation of pumps (No.)





32. Number of working hours of all operating generators used to run the functional pumps of the water supply system (h/month).





10. The number of pumps represent the pumps in well fields and in pumping station in network.

e. Financial Viability

The financial viability varies significantly among the service providers due to differences in operating contexts, some service providers do not reach cost recovery as a result of inadequate services or low tariffs. This becomes more challenging when coupled with a decline in revenue collection rates, causing an increase in receivables from customers and thus a shortage in liquidity.

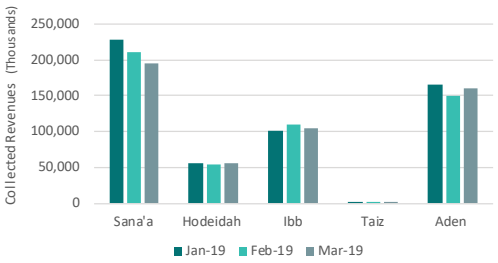
As a result of ongoing efforts to improve their financial resources, service charges were effectively billed by Sana'a LC since the beginning of 2018. In addition, with the support of GIZ IDWS, Sana'a LC has employed the on-site (PDA)[12] devices as an innovative approach to improve the quality of billing collection from the customers who ultimately realized the affordable costs of the services obtained compared with the private water market. This improvement was further translated by an increase in revenue collection by 29% compared to the last quarter of 2018 and unprecedented results in operational cost coverage tallying 123% on average. Ibb LC was capable to stabilize monthly collection efficiency along with persistent hardship in operational cost coverage indeed by 58% on average. The collection efficiency of Hodeidah LC is 45% on average, with a simultaneous deficiency in operational cost coverage 56%, far from aspirations for financial recovery.

Taiz LC, at this moment, does not rely on water sales and revenues to cover its operational cost since energy and salaries are mostly subsidized. The low collection efficiency of 3% is clearly expressing inactive reading and billing processes, lack/damage of meters connections and infrastructure. Such circumstances dictate mobilizing pivotal support for the rehabilitation of networks and the installation of new connections. In return, the LC must dynamically assume back business processes, inter alia, an effective billing and collection management.

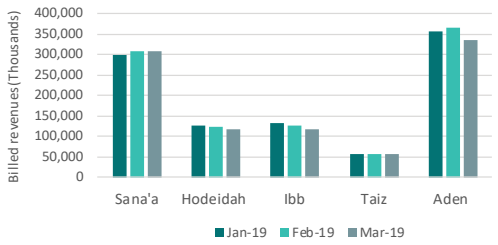
Though LC of Aden is striving to enhance the financial situation against the acceptable level of service provided to their customers. Poor customer management is the main culprit behind low collection efficiency 45% and operational cost coverage 38% in this quarter. For important considerations, the LC must gradually attempt to recover the state of underperformance and pursue to robust their financial footage to align with unexpected future tragedies such as discontinuity of external support.

So far, customer and billing management by the LCs of Sana'a and Ibb could serve as a role model for others, and to script a success story on how a water utility can achieve financial recovery within a constrained environment.

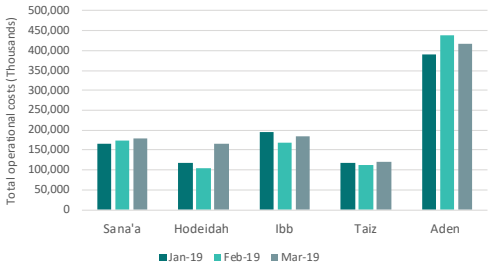
33. Total collected operational revenues (YER/month)[11]



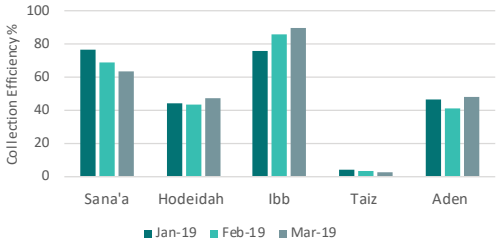
34. Total billed operational revenues (YER/month)



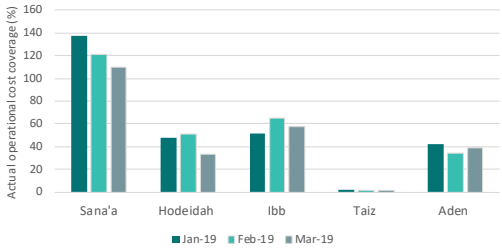
35. Total operational costs (YER/month)



36. Collection efficiency = Collected revenues vs. Billed revenues (%)



37. Actual operational cost coverage (%)

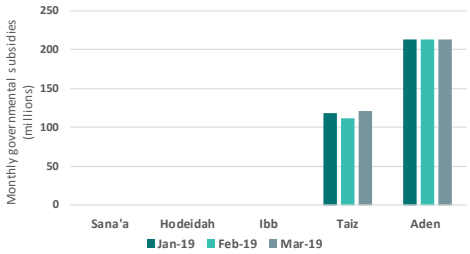


11. Revenues including domestic, commercial & governmental collection
12. PDA = Personal Digital Assistant

Monthly governmental subsidies

Given the fact that investment support from the government has dropped dramatically since 2015 due to deteriorating economic and financial conditions. In exclusive form, the LCs of Aden and Taiz were among fewer public institutions regularly receiving monthly allocations in kind of financial subsidies from the Ministry of Finance in Aden to pay staff salaries and other operating expenses, while other LCs depend merely on water sales.

38. Monthly governmental subsidies (YER/month)

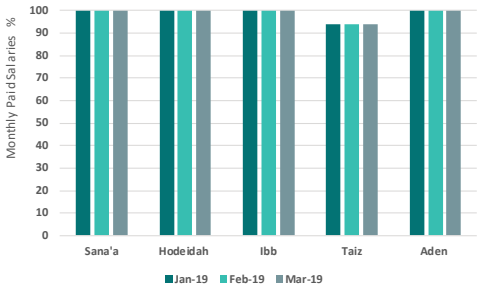


Percentage of basic monthly salaries paid

The eventual impact of external support and subsidies has gradually empowered the LCs in managing the salary expenses of employees. It should be noted that payroll is reported for the actual payments received monthly by the employees, regardless of the fact that some LCs reimburse late payments of the basic salaries retroactively.

Though most of the LCs were capable of paying 100% of the base salaries in this quarter, they are frequently in profound distress and vulnerable to secure the salaries and other heavy entitlements under volatile conditions and unpredictable continuity of external assistance.

39. Percentage of basic monthly salaries paid (%)



5 Resilience factors[13]

Disruptions of water supply and sanitation services can be caused by adverse effects on any one of the components that make up the service: people (e.g. skilled staff), hardware (e.g. infrastructure, equipment) and consumables (e.g. fuel, equipment, spare parts). Neither of these components is sufficient on its own. It is pointless having the spare parts required to repair electric generators, for instance, if the only technical staff able to install them are lacking the pertaining capacities and skills.

The LCs must increasingly strive to become more resilient and maintain services during/post-conflict. They must, therefore, address long-standing vulnerabilities in order to mitigate the cumulative effects of the conflict and gradually reduce their dependence on external short-term assistance.

At present, external assistance programmes, instead of sporadic crisis interventions, must seek to intervene in technical and investment measures. While these interventions may be essential during relief efforts, the resumption and strengthening of the LCs' capacity are equally synonymous with building resilience. It is the resilience that allows the LCs to maintain the reliable delivery of services in the short, medium and long-term. The table beside presents the identified resilience factors with their expected impact after the implementation of related activities.

RESILIENCE MEASURES AND IMPACT

Main Activity	Resilience Factor	Impact
Technical Assistance – Capacity building	Improve governance and management skills on top level.	• Support and guide the LC management during the crisis in the decision making of required actions and measures. • Enable managers and key staff to prepare and introduce customized policies and procedures to increase the performance of the utility. • Enhance the coordination and cooperation among the different stakeholders (donors). • Enhance monitoring, evaluation and accountability of the LC to increase the performance.
Technical Assistance – Capacity building, Financial support, Consultancy support, equipment support	Enhance the work capacity and skills of the employees. Human resource development	• Operate the utility more efficient and organized. • Improve coordination and cooperation among different departments. • Improve and increase the service for customers. • Manage professionally the exceptional work. Environment and the new technologies. • Reduce administrative water losses and increase revenue collection.
Technical Assistance – Financial support, Awareness building; Coaching, Investments	Strengthen the financial capacity of the utility.	• Ensure financial means at least to cover the minimum needs for operation of the utility. • Enable urgently needed repair and maintenance of the infrastructure. • Initiate pro-poor projects. • Keep motivated staff. • Enhance financial sustainability.
Technical Assistance – Awareness building, Operation Management Support	Improve customer management and customer relation.	• Increase service coverage and numbers of customers. • Enhance billing and collection procedures. • Increase collection efficiency and revenues. • Establish good customer relation to improve payment moral.
Investment – Rehabilitation, Maintenance, Extension	Increase water service coverage and supplied quantities.	• Increase water availability for urban residents. • Improve water supply condition. • Reduce physical water losses. • Increase number of customers. • Improve water quality.
Investment – Rehabilitation, Maintenance, Extension	Improve and extend sewer system.	• Improve hygiene and health situation for urban residents. • Protect environment and water sources. • Increase number of customers.
Investment	Provide renewable energy system (Photovoltaic).	• Operate water and sanitation facilities sufficiently. • Operate LC offices during working hours. • Reduce operation and maintenance costs.

13. GIZ IDWS/Damage Assessment Study DAS Stage 3 – Part 1: Resilience Strategy Report – Enhancing the Resilience of the LCs during Conflict and in Post-conflict Scenario - 2018

Annex 1 Resilience Emergency Indicators Sheet Jan-Mar 2019

Urban Water Sector - Sana'a LC, Aden LC, Hodeidah LC, Ibb LC & Taiz LC

No.	Data / Indicator	LC	Unit	1st Q		
				Jan-19	Feb-19	Mar-19
1	عدد السكان في المراكز الحضرية المخدومة من قبل مزود الخدمة (شهري في نهاية الشهر) Total population in service area	Sana'a	Cap	3,406,643	3,413,456	3,420,283
		Hodeidah		695,126	696,516	697,909
		Ibb		812,293	813,918	815,545
		Taiz		715,635	716,917	718,228
		Aden		1,086,867	1,089,041	1,091,219
2	عدد النازحين الى مناطق امتياز مزود الخدمة (شهري في نهاية الشهر) Number of IDPs in service area	Sana'a	Cap	31,512	31,512	31,512
		Hodeidah		71,169	71,169	71,169
		Ibb		21,504	21,504	21,504
		Taiz		48,545	48,545	48,545
		Aden		3,780	3,780	3,780
3	إجمالي عدد توصيلات المياه فى نهاية الشهر - يشمل المنزلي، التجاري، والحكومي وغيره Number of water connections	Sana'a	No.	96,910	97,042	97,089
		Hodeidah		68,488	68,490	68,542
		Ibb		32,265	32,560	32,635
		Taiz		52,896	52,935	52,973
		Aden		133,538	133,621	133,990
4	عدد السكان المخدومين بالمياه من قبل مزود الخدمة (شهري في نهاية الشهر) Number of population served through water supply network	Sana'a	Cap	1,162,920	1,164,504	1,165,068
		Hodeidah		479,416	479,430	479,794
		Ibb		483,975	488,400	489,525
		Taiz		555,408	555,818	556,217
		Aden		934,766	935,347	937,930
5	نسبة عدد السكان المخدومين بالمياه من قبل مزود الخدمة من اجمالي السكان (شهري في نهاية الشهر) Water supply service coverage = population served through water supply network vs total population in service area	Sana'a	%	34	34	34
		Hodaidah		69	69	69
		Ibb		60	60	60
		Taiz		78	78	77
		Aden		86	86	86
6	عدد ايام تزويد الخدمة خلال الشهر (تزويد المياه من خلال شبكة التوزيع) Number of service days of piped water supply per month	Sana'a	day/ month	2	2	2
		Hodeidah		25	25	25
		Ibb		15	21	21
		Taiz		5	6	6
		Aden		14	14	14
7	إجمالي عدد عينات الكلور المأخوذة من شبكة المياة خلال الشهر Number of residual chlorine samples taken	Sana'a	No./ month	50	48	87
		Hodeidah		524	492	529
		Ibb		102	110	98
		Taiz		10	15	15
		Aden		90	87	92

No.	Data / Indicator	City	Unit	1st Q		
				Jan-19	Feb-19	Mar-19
8	إجمالي عدد عينات الكلور الإيجابية المأخوذة من شبكة المياه والتي تتوافق مع المعايير Number of residual chlorine samples according to standards	Sana'a	No./ month	25	25	28
		Hodeidah		524	492	529
		Ibb		99	102	85
		Taiz		10	15	15
		Aden		90	87	92
9	درجة نقاوة المياة المزودة بكتورولوجيا Proportion of bacteriological quality samples of distributed water according to standards = Number of residual chlorine samples according to standards per total number of samples taken	Sana'a	%	50	52	32
		Hodeidah		100	100	100
		Ibb		97	93	87
		Taiz		100	100	100
		Aden		100	100	100
10	عدد السكان المخدومين بشبكات الصرف الصحى من قبل مزود الخدمة (شهري في نهاية الشهر) Number of population served with sewerage connections	Sana'a	Cap	1,057,248	1,058,712	1,059,096
		Hodeidah		294,679	294,700	294,819
		Ibb		389,835	393,330	394,275
		Taiz		469,413	469,602	469,875
		Aden		812,392	812,854	814,289
11	نسبة عدد السكان المخدومين بشبكات الصرف الصحى من قبل مزود الخدمة (شهري في نهاية الشهر) Sewerage connection coverage	Sana'a	%	88,104	88,226	88,258
		Hodeidah		42,097	42,100	42,117
		Ibb		25,989	26,222	26,285
		Taiz		44,706	44,724	44,750
		Aden		116,056	116,122	116,327
12	إجمالي عدد توصيلات الصرف الصحي - يشمل المنزلي، التجاري، والحكومي وغيره Number of sewerage connections	Sana'a	No.	5	6	6
		Hodeidah		–	–	–
		Ibb		6	6	6
		Taiz		–	–	–
		Aden		–	–	–
13	عدد عينات الـ (بي أو دي) المجمعة من محطات المعالجة خلال الشهر Number of BOD-samples of effluent of WWTP taken per month	Sana'a	No.	5	6	6
		Hodeidah		–	–	–
		Ibb		6	6	6
		Taiz		–	–	–
		Aden		–	–	–
14	عدد عينات الـ (بي أو دي) المجمعة من محطات المعالجة المطابقة لمعيار التدفق خلال الشهر Number of BOD-samples of effluent of WWTP according to standards per month	Sana'a	No.	0	0	0
		Hodeidah		–	–	–
		Ibb		5	5	5
		Taiz		–	–	–
		Aden		–	–	–

No.	Data / Indicator	City	Unit	1st Q		
				Jan-19	Feb-19	Mar-19
15	كفاءة المعالجة في محطات معالجة الصرف الصحي Proportion of effluent quality samples of wastewater treatment plants according to standards = Number of BOD samples according to standards per total number of samples taken	Sana'a	%	0	0	0
		Hodeidah		–	–	–
		Ibb		83	83	83
		Taiz		–	–	–
		Aden		–	–	–
16	متوسط قيمة ال (بي أو دي) للمياه المتدفقة (الخام) الى محطة معالجة مياه الصرف الصحي Average BOD value of raw influent at WWTP	Sana'a	mg BOD_5/L	1,349	1,301	1,207
		Hodeidah		–	–	–
		Ibb		2,024	2,153	2,127
		Taiz		–	–	–
		Aden		–	–	–
17	متوسط قيمة ال (بي أو دي) من المياه المعالجة (الخارجة) من محطة معالجة مياه الصرف الصحي Average BOD value of treated effluent at WWTP	Sana'a	mg BOD_5/L	364	346	346
		Hodeidah		–	–	–
		Ibb		218	219	204
		Taiz		–	–	–
		Aden		–	–	–
18	كفاءة المعالجة لمحطة مياه الصرف الصحي فيما يخص ال (بي أو دي) Treatment efficiency of WWTP regarding BOD	Sana'a	%	73	73	71
		Hodeidah		!DIV/0#	!DIV/0#	!DIV/0#
		Ibb		89	90	90
		Taiz		–	–	–
		Aden		–	–	–
19	إجمالي كمية المياه المنتجة Total quantity of water produced	Sana'a	m^3/ month	806,958	802,134	944,943
		Hodeidah		1,162,868	1,053,365	1,188,409
		Ibb		413,501	414,798	363,117
		Taiz		121,955	101,206	131,726
		Aden		3,748,355	3,748,356	3,842,791
20	نصيب الفرد من المياه المنتجة Per capita quantity of water produced	Sana'a	l/cap/ day	22	25	26
		Hodeidah		78	78	80
		Ibb		28	30	24
		Taiz		7	7	8
		Aden		129	143	132
21	الطاقة التخزينية الشهرية المتاحة Storage capacity	Sana'a	m^3	36,000	36,000	36,000
		Hodeidah		25,000	25,000	25,000
		Ibb		4,000	4,000	4,000
		Taiz		49,000	49,000	49,000
		Aden		94,700	94,700	94,700
22	نصيب الفرد من الطاقة التخزينية المتاحة Storage capacity share per capita	Sana'a	l/cap	31	31	31
		Hodaidah		52	52	52
		Ibb		8	8	8
		Taiz		88	88	88
		Aden		101	101	101

No.	Data / Indicator	City	Unit	1st Q		
				Jan-19	Feb-19	Mar-19
23	تكلفة الطاقة لكل متر مكعب منتج من المياه خلال الشهر Energy costs per m^3 water produced	Sana'a	YER/m^3	0	0	0
		Hodaidah		0	0	0
		Ibb		225	203	284
		Taiz		0	0	0
		Aden		20	16	10
24	كمية المياه المنتجة - المعالجة أو غير المعالجة - التي تتدفق من محطة معالجة الصرف الصحى Effluent produced	Sana'a	m^3/ month	1,395,000	1,260,000	1,395,000
		Hodeidah		965,400	920,780	1,075,920
		Ibb		425,006	350,461	400,370
		Taiz		210,000	210,000	210,000
		Aden		–	–	–
25	كمية المياه المنتجة - المعالجة أو غير المعالجة - التي تتدفق من محطة معالجة الصرف الصحى Effluent produced	Sana'a	l/cap/ day	44	40	44
		Hodeidah		109	104	122
		Ibb		35	29	33
		Taiz		14	14	14
		Aden		–	–	–
26	كمية مياه الصرف الصحي المعالجة التي تتدفق من محطة المعالجة Effluent treated in wastewater treatment plant	Sana'a	m^3/ month	1,395,000	1,260,000	1,395,000
		Hodeidah		495,550	500,650	568,650
		Ibb		425,006	350,461	400,370
		Taiz		210,000	210,000	210,000
		Aden		–	–	–
27	إجمالي عدد المضخات الرئيسية Total number of main pumps for the water supply system	Sana'a	No.	102	102	102
		Hodeidah		45	45	45
		Ibb		30	30	30
		Taiz		76	76	76
		Aden		126	126	126
28	عدد المضخات الرئيسية العاملة والتي تضخ المياه خلال الشهر Number of functional pumps in service	Sana'a	No.	54	55	56
		Hodeidah		31	30	30
		Ibb		25	26	24
		Taiz		30	27	30
		Aden		94	94	94
29	عدد ساعات عمل (تشغيل) المضخات (كل المضخات العاملة والتي تضخ المياه) في الشهر Number of working hours of all operating pumps of the water supply system	Sana'a	h/month	17,864	18,256	21,682
		Hodeidah		18,576	15,921	17,493
		Ibb		17,050	16,016	15,686
		Taiz		7,430	6,729	8,791
		Aden		60,974	58,265	59,955
30	عدد الأعطال الناتجة عن أسباب فنية خلال الشهر للمضخات الرئيسية العاملة في ضخ المياه Number of main functional pumps failures due to technical reasons	Sana'a	No./ month	6	4	14
		Hodaidah		15	18	20
		Ibb		5	4	6
		Taiz		2	5	7
		Aden		5	7	7

No.	Data / Indicator	City	Unit	1st Q		
				Jan-19	Feb-19	Mar-19
31	عدد المولدات العاملة في تشغيل المضخات Number of working generators in the operation of pumps	Sana'a	No.	51	51	52
		Hodaidah		11	11	12
		Ibb		15	15	15
		Taiz		27	25	30
		Aden		7	7	7
32	عدد ساعات عمل (تشغيل) المولدات (كل المولدات العاملة المستخدمة في تشغيل المضخات لضخ المياه) خلال الشهر Number of working hours of all operating generators used to run the functional pumps of the water supply system	Sana'a	h/ month	14,014	13,597	14,053
		Hodeidah		5,136	4,559	5,213
		Ibb		7,997	7,482	7,997
		Taiz		7,410	6,158	7,927
		Aden		8	16	27
33	قيمة الإيرادات الشهرية المحصلة Total collected operational revenues	Sana'a	YER/ month	227,961,311	211,187,096	195,519,108
		Hodeidah		55,449,739	53,257,311	55,303,666
		Ibb		100,489,981	109,014,961	105,270,862
		Taiz		2,363,450	1,955,792	1,511,040
		Aden		166,041,893	149,801,548	160,710,049
34	قيمة الإيرادات الشهرية المفوترة (قيمة مبيعات المياه الشهرية المفوترة) Total billed operational revenues	Sana'a	YER/ month	297,531,483	306,561,718	306,963,390
		Hodeidah		126,053,992	122,265,865	117,218,509
		Ibb		132,481,241	126,686,447	116,818,983
		Taiz		58,619,550	58,619,550	58,619,550
		Aden		357,487,359	365,443,278	334,104,507
35	إجمالي التكاليف التشغيلية Total operational costs	Sana'a	YER/ month	166,251,157	174,054,048	178,085,133
		Hodeidah		117,033,070	104,505,536	165,851,380
		Ibb		195,594,514	168,698,732	184,111,317
		Taiz		119,061,520	111,533,440	121,194,280
		Aden		390,108,970	437,952,566	415,992,899
36	نسبة التحصيل Collection efficiency = Collected revenues vs. billed revenues	Sana'a	%	77	69	64
		Hodeidah		44	44	47
		Ibb		76	86	90
		Taiz		4	3	3
		Aden		46	41	48
37	التغطية التشغيلية المحصلة للكلفة Actual operational cost coverage	Sana'a	%	137	121	110
		Hodeidah		47	51	33
		Ibb		51	65	57
		Taiz		2	2	1
		Aden		43	34	39

No.	Data / Indicator	City	Unit	1st Q		
				Jan-19	Feb-19	Mar-19
38	قيمة الإعانات (المعونات) الحكومية الشهرية لمزود الخدمة Monthly governmental subsidies	Sana'a	YER/ month	0	0	0
		Hodaidah		0	0	0
		Ibb		0	0	0
		Taiz		119,061,520	111,533,440	121,194,280
		Aden		212,994,678	212,994,678	212,994,678
39	نسبة الرواتب الأساسية الشهرية المدفوعة للموظفين Percentage of basic monthly salaries paid	Sana'a	%	100	100	100
		Hodaidah		100	100	100
		Ibb		100	100	100
		Taiz		94	94	94
		Aden		100	100	100

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