

**STATUS  
OF  
WATER MDGs ACHIEVEMENT IN THE ARAB REGION**



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## 1. INTRODUCTION

From household and boardroom to regional and global fora, water generated debate in 2003 among the rich and poor, corporate and public sectors, and industrialized and developing countries. Water was not only topical but also defined the sustainable development agenda during the year. It will remain a major issue in the decades to come, because water is life - for people and the environment. At the beginning of this century, world leaders declared their intention to work for a world in which people would be free from want and fear. This focus on a sustainable future included "confronting the water crisis".

The Millennium Declaration, adopted by 189 Heads of State and Government at the United Nations Millennium Summit in September 2000, presented eight goals and 18 underlying targets. Target 10 of Goal 7 focuses specifically on freshwater: it aims to halve the proportion of people without sustainable access to safe drinking water by the year 2015. But this is not the only goal where water has a role to play. Freshwater is relevant and important for achieving all eight development goals contained in the Millennium Declaration.

### **MDGs: Goal 7/ Target 10:**

Although direct human consumption and sanitation are among the smallest uses of fresh water on an absolute scale, providing freshwater of the quantity and quality required is one of humanity's greatest continuing challenges. The global population is now more than 6.3 billion people, and the number is growing by about 77 million people every year (UNDP 2003). The availability of safe drinking water is critical to meeting the goals for enhancing human well-being and security.

The proportion of people served with some form of improved water supply rose from 78 percent in 1990 to 82 percent in 2000. Over the same period the world's population with access to improved sanitation increased from 51 percent to 61 percent (WHO and UNICEF 2003). Despite these gains, about 1 billion people in the world lacked access to safe drinking water in 2000, while another 2 billion lacked access to improved sanitation. As expressed by the UN Secretary – General Kofi Annan in 2000: "No signal measure would do more to reduce disease and save lives in the developing world than bringing safe water and adequate sanitation to all" (UN 2000).

## 2. REPORTING TERMS

The overall objective of this reports to discuss the status of Arab's World countries with regard to the Water Millennium Development Goals (MDGs), target 10 which aims at reducing by half the proportion of people without sustainable access to safe drinking water and basic sanitation by year 2015. To assess the achievement level, of towards the above mentioned MDGs in the Arab Countries, the consolidated information received (from the ministries of water and other sources) was analyzed. The report includes recommendations of indicators for the evaluation of progress and follow up on achievement.

UNICEF has prepared preliminary estimates for the specific cost of reducing by half, by 2015, the proportion of people without sustainable access to drinking water and basic sanitation, based on unit cost derived from four different sources<sup>1</sup>. As can be estimated, global financing costs range from \$50-102 billion for water supply and from \$23-42 billion for sanitation for the period 2001-2015. Taking an average would yield \$68 billion for water and \$33 billion for sanitation, for a total of \$101 billion or \$6.7 billion per year. Based on the reference estimates, the drinking and sanitation services costs were as follows: (a) urban coverage: average water supply cost: \$87.5 per person (assuming 75% standpipes, and 25% separate household connections) and average sanitation facilities: \$137.5 per person. (b) Rural coverage: average water supply: \$15 per person and average sanitation: \$10 per person; and (c) average wastewater treatment cost: \$63 per person and O & M; 15% of investment costs. Therefore, the present report used the cost of providing access to water supply as €105 per capita. For sanitation facilities, the report considered the highest cost of four different technologies (€390).

The related information was gathered through correspondences with the concerned entities in the countries where few have not responded so the missing data of those countries were obtained through the internet and/or published documents. Because of the higher cost of sanitation services, environmental problems related to municipal

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<sup>1</sup> “Vision 21: A shared vision for Hygiene, Sanitation and Water Supply and a framework for action (also forming the “Water for people” component for the World Water Vision)”, WSSCC, 2000; “JMP: Global Water Supply and Sanitation Assessment 2000 Report”, UNICEF/WHO, 2000; “Costs and Resources for WES in the 1990s” by Ashok Nigam and Gourisankar Ghosh, WaterFront, Special Issue, 1994; “Financing Agenda 21: Freshwater”, John Briscoe and Mike Garn, The World Bank, February 1994.

wastewater in rural communities are mainly due to fact that sanitation services lag behind water supply services by 10 years or more. Compared with the progress in supplying drinking water, the achievements in targeted sanitation level are less in spite of massive investments diverted towards establishment of sanitation systems.

In the present report, access to domestic water supply is defined as “access to sufficient drinking water of acceptable quality and sufficient quantity of water for hygienic purposes.” The definition of access to basic sanitation is “access to, and use of, excreta and sullage<sup>2</sup> disposal facilities and services that provide privacy and dignity while at the same time ensuring a clean and healthful living environment both at home and in the immediate neighborhood of users.”

### 3. INTERNAL WATER CHALLENGES

The Arab States Region is composed of twenty two members of the League of Arab States. The region has a large expanse of land consisting of 1300 million ha (13 M km<sup>2</sup>), which lies mostly in the arid and semi arid zones of West Asia and North Africa. Due to moderate to severe water limitations, only less than 5.5% of this land is arable, representing an area of 58 million ha. At the start of the third millennium, the Region is burdened with a population of 280 million, rising at the highly alarming rate of 3% annually.

Water availability in this region has played a very dominating role in determining human activities, settlements, socio-economic interactions and growth. More than 85% of the Arab Region is classified as arid and hyper arid, receiving an average annual rainfall of less than 250 mm. Average annual precipitation for the Arab nations varies considerably, between 18 mm/year in Egypt and the Gulf countries, and 827 mm/year in Lebanon. The Regions renewable freshwater availability is estimated at about 338 km. More than 55% of this amount originates from outside the region.

In 1950 the average annual share per inhabitant of renewable water resources in the Arab region exceeded 4000 m<sup>3</sup>/cap/year. The later share decreased dramatically to 1,312 m<sup>3</sup>/cap/year by 1988 and to 1233 m<sup>3</sup>/cap/year in 1995 and is projected to drop

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<sup>2</sup> Defined as domestic sewage or wastewater resulting from bathing and washing of dishes and clothes in-house.

to 547 m<sup>3</sup> /cap/year in 2050. Due to the scarcity of water resources in the region, non-conventional water supplies have been widely adopted in the form of desalination plants, and wastewater reuse programmes.

A number of international rivers exist in this region. These include the Nile River (Burundi, Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda) and its tributaries, Senegal River (Guinea, Mali, Mauritania, Senegal), the Juba and Shebeli rivers (Ethiopia, Kenya, Somalia), the Tigris and Euphrates (Syria, Turkey, Iran, Iraq), and their tributaries. About 20 different aquifer systems prevail throughout the Asian Arabian countries, comprising of semi-confined/shallow aquifers, and deep confined aquifer systems of different geological formation. Eight of these- basins are considered as shared aquifers. A number of large shared aquifers also exist in African Arab countries where initiatives and regional cooperation programmes are taking place for their management; these are the Nubian Sandstone Aquifer System and the North Western Sahara Aquifer System.

There is a wide disparity in economic and social development aspects in the region. Five countries are considered among the highest countries, ranking from 43rd to 64th in the world on the UNDP human development index (HDI), a list that totals 174 countries for the year 2000. While the remaining countries are either at a low or medium level of human development, they are ranking from 66th to 157th of the same list.

The Region is facing the most critical water related challenges emanating from intrinsic and internal causes, which are manifested in:

- Continuously rising water scarcity due to the shortages of natural renewable water resources in the region.
- Dependencies on rivers and groundwater shared with countries outside the region.
- Decreasing capacity to provide food, secure it for future generations, and continual reduced rates of rural employment and agriculture development opportunities.
- Deterioration of quality of surface and groundwater at alarming levels due to weak pollution control and lack of wastewater treatment standards and facilities
- Lack of access to clean drinking water and adequate sanitation for the majority of the population, thus affecting their health, quality of life, and standards of



living.

- Low level of indigenous water technology and reliance on imported equipment, technology, modern management, and contemporary know-how.
- Absence of regional approach, common vision, and coherence in regional, national, and local water policies and programs.
- Inability of the public sector to cope with the challenges and failure of the private sector to fill in the gap.

#### 4. ACTUAL WATER SITUATION AND PERSPECTIVES

According to the latest analysis (FAO, 2003), the total available water resources in the Arab world amount to approximately 313.2 km<sup>3</sup>/year that actually corresponds to 1047 m<sup>3</sup>/person/year. The greatest part of it (54 %) represents the external water inflow while the rest is subdivided between the renewable internal surface water (40%) and groundwater (6%) with an overlap of resources amounting to about 21.6 km<sup>3</sup>/year. This points out two main factors describing the complex situation and scarce water availability in the region: a) very low precipitation which generates only 123.9 km<sup>3</sup>/year of internal runoff, and b) very strong dependency on external inflow of water of 169.7 km<sup>3</sup>/year. The Renewable water resources in the Arab States Region is shown in Figure (1).

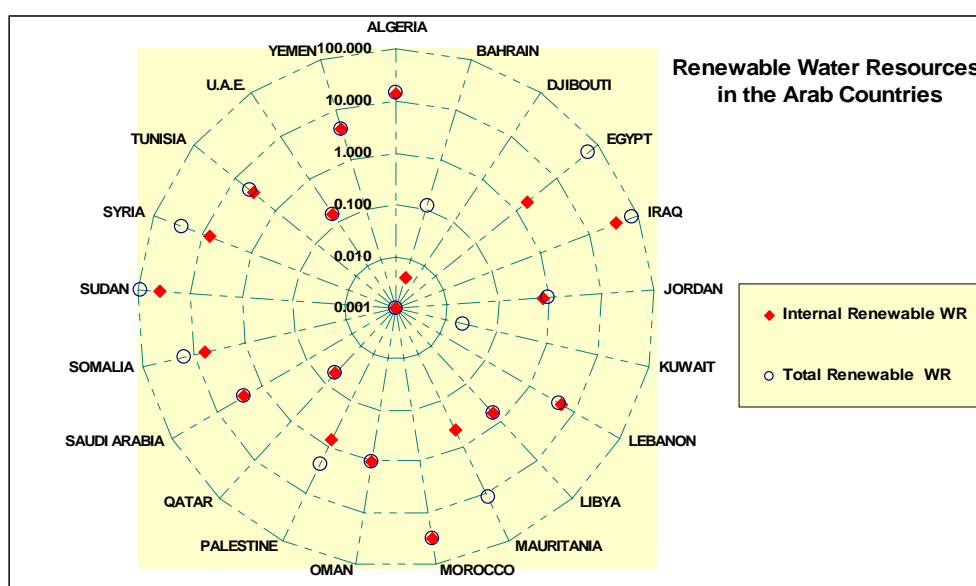


Figure (1) Renewable water resources in the Arab World

Actual water withdrawal in the Region is about 182.78 km<sup>3</sup>/year, which represents 58.4% of total water availability and corresponds to actual water supply of 611 m<sup>3</sup>/ person/ year. The greatest part of this withdrawal is directed

to the agricultural sector (89%) whereas to domestic water use and industry are forwarded only 6% and 5%, respectively. The withdrawal per each country is shown in Figure (2).

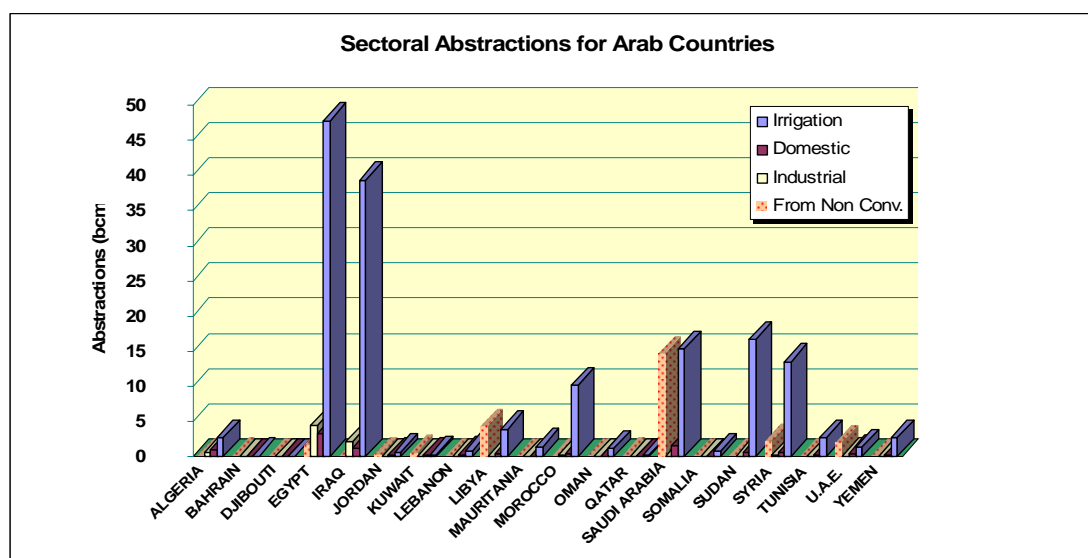


Figure (2) Sectoral abstraction of water in the Arab states region

Perspectives of water use in the Arab World in the twenty-first century rely on two main factors: already existing and well-documented overall water scarcity and very high population growth that has called special attention especially during the last decade. In fact, the Region's annual population growth rate is among the highest in the World and amounts to 2.7% with respect to 1.5% for the less-developed world as a whole (Population Reference Bureau, 2003).

Notwithstanding the recent positive results aimed at stabilizing population growth trend in the Arab countries, the Population Reference Bureau reported that population of the Arab World will increase from 298.5 millions in 2003 to 479.4 millions in 2025 and then in 2050 it will be more than double amounting to 656.4 millions (Figure 3). This means an average growth rate of 7.5 millions per year which, according to the actual rate of water withdrawal in the Region, means an increase of water supply of about 4.6 km<sup>3</sup> every year.

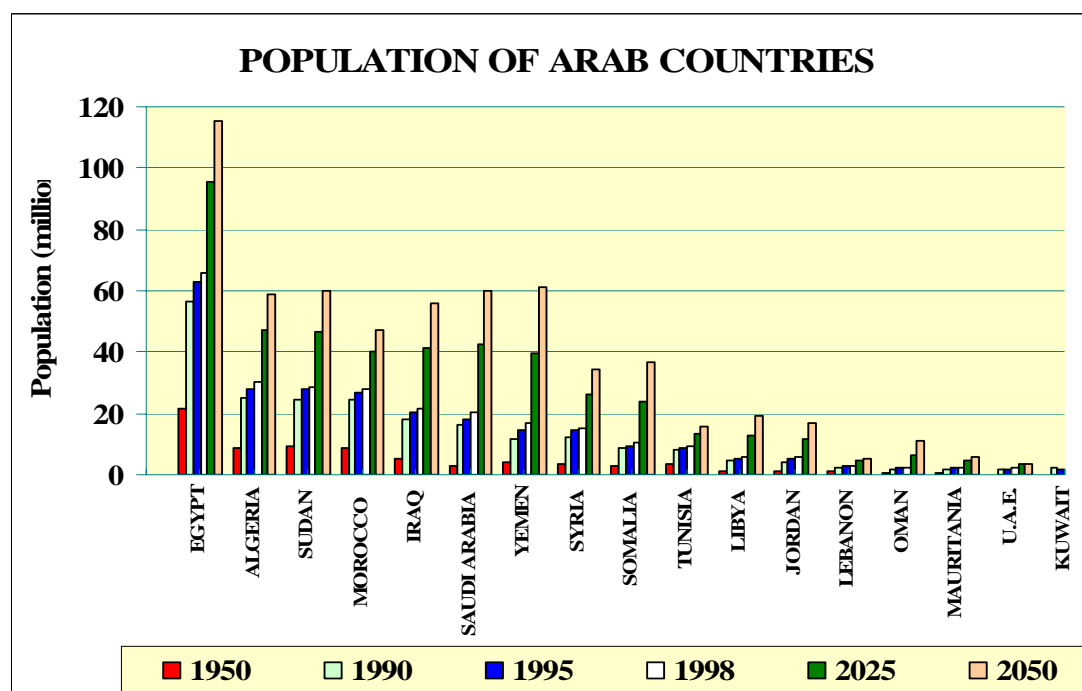


Figure (3) Population growth for the Arab Countries (1950-2050)

In the future years, the population growth will be one of the principal causes for the worsening of the already serious situation in water availability in the region. In fact, water availability will decrease from the actual 1051 m<sup>3</sup>/person/year to 674 m<sup>3</sup>/person/year in 2025 and then, it will drop to 476 m<sup>3</sup>/person/year. This means that by the middle of this century, the whole region will experience absolute water stress and almost all countries of the region (except Mauritania and Iraq) will suffer chronic water stress with water availability below 1000 m<sup>3</sup>/person/year. Moreover, in many countries of the region water availability will be only few hundreds of m<sup>3</sup> per person annually.

## 5. WATER SUPPLY AND SANITATION COVERAGE IN THE ARAB STATES

The decade of the 1990's witnessed major progress in the Arab region in expanding the access to water supply and sanitation. This progress was not only to achieve the MDG goals but also as the water supply and sanitation has become the main pillar for development and has recently raised to the top of the agenda. As will be highlighted in the analysis of each country. The tables in annex (i) and (ii) present the collected data for the water supply and sanitation as well as the total investment needed to achieve the MDGs targets. However, the collected data presents the total investment needed to cover the whole country with water supply and sanitation service.

The following figures show the population percentage supplied by drinking water and sanitation coverage based on three estimating stages: 1) the population that was served by the actual coverage of water supply and sanitation in 1990 and 2005; 2) the planned coverage by the government based on the national plan; 3) The population without access to safe drinking water and basic sanitation aims to be reduced by the year 2015 according to the water MDGs.

## ALGERIA

The actual water supply coverage for the year 1990 is 71% and the actual water supply coverage for the year 2005 is 88% while that planned for the year 2015 is 95% and according to the MDGs the target for the year 2015 is 85.5%. According to Figure (4), it is clear that the planned and the actual are above the target to be achieved to meet the MDGs in the water supply sector.

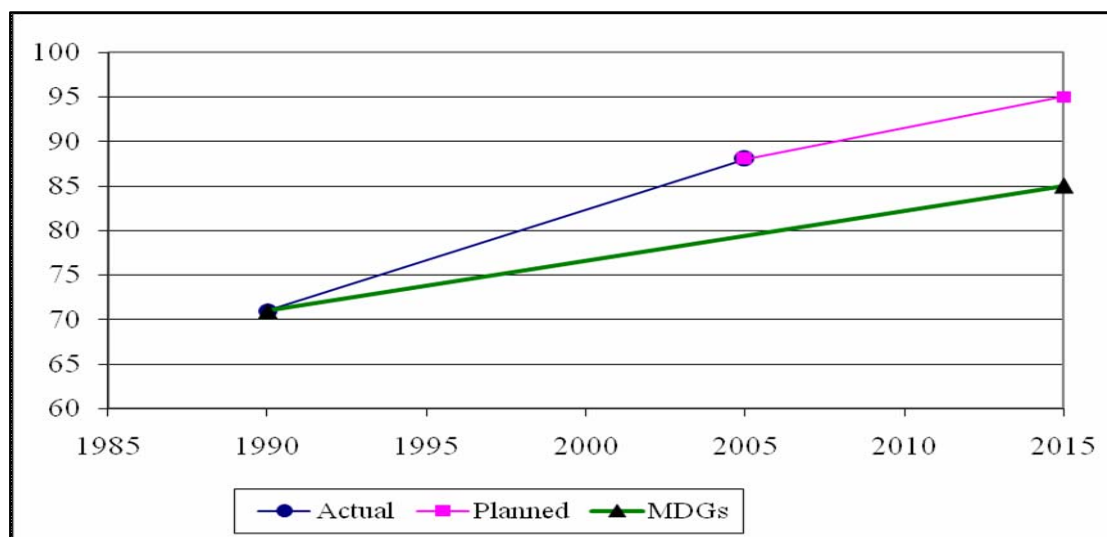


Figure (4) water supply coverage in Algeria

The actual sanitation coverage for the year 1990 is 69% and the actual sanitation coverage for the year 2005 is 88% while that planned for the year 2015 is 93% and according to the MDGs the target for the year 2015 is 84.5% (Figure 5). The planned and the actual is above the target to be achieved to meet the MDGs.

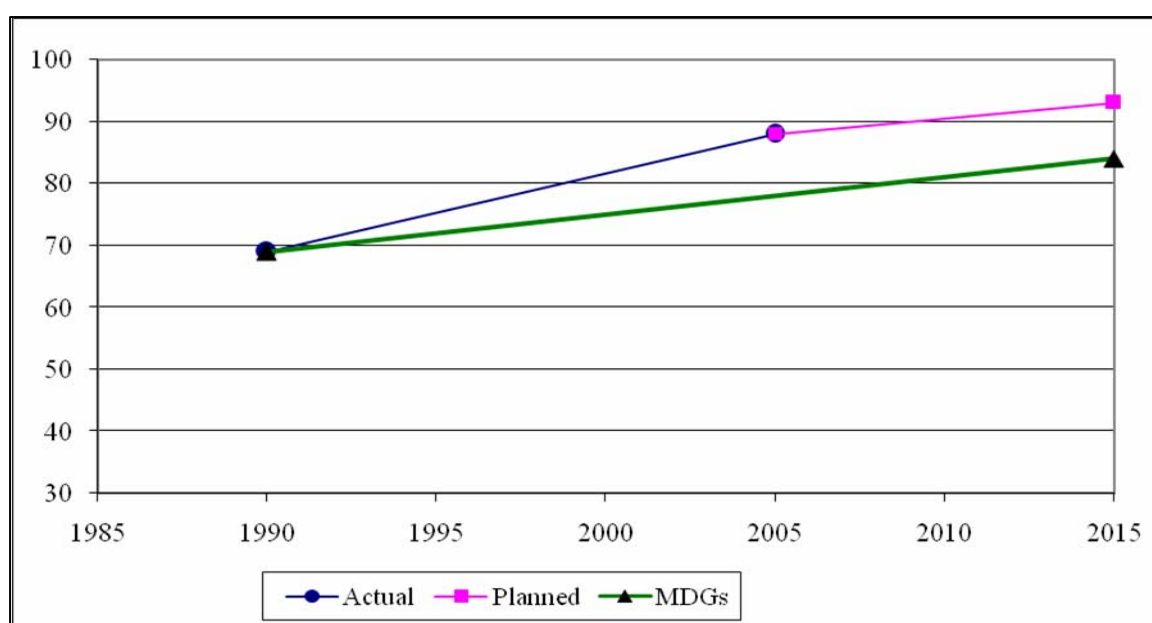


Figure (5) Sanitation coverage in Algeria

## BAHRAIN

The actual water supply coverage for the year 1990 is 88% and the actual water supply coverage for the year 2005 is 100% while that planned for the year 2015 is 100% and according to the MDGs the target the year 2015 is 94%. The planned and the actual is above the target to be achieved to meet the MDGs. Thus Bahrain is in the right track towards achieving the target of the water supply and sanitation coverage set by the MDGs for 2015.

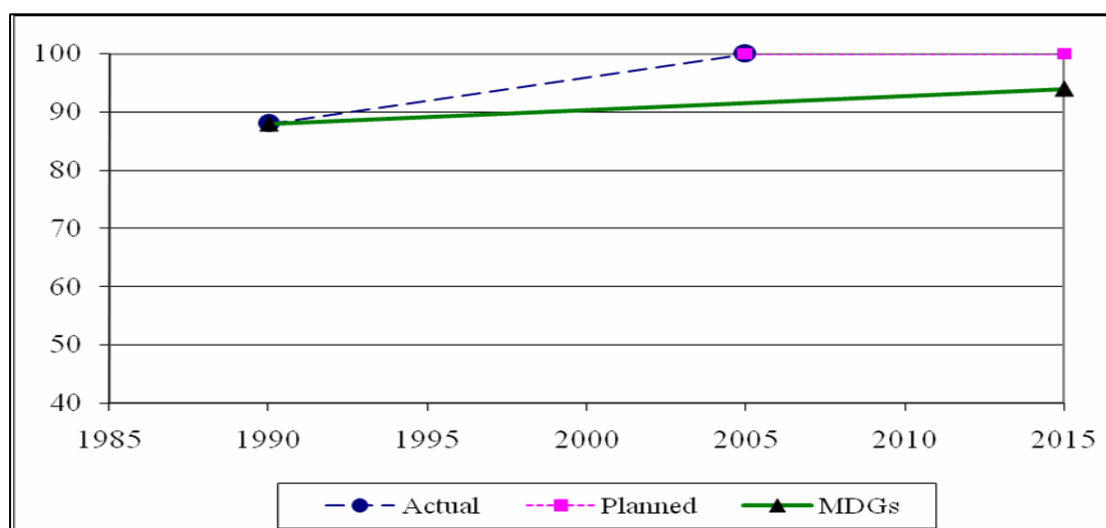


Figure (6) Water supply coverage in Bahrain

The actual sanitation coverage for the year 1990 is 50% and the actual sanitation coverage for the year 2005 is 87% while that planned for the year 2015 is 98% and according to the MDGs the target the year 2015 is 75%. The planned and the actual is above the target to be achieved to meet the MDGs. Thus Bahrain is in the right track towards achieving the target of the water supply coverage set by the MDGs for 2025.

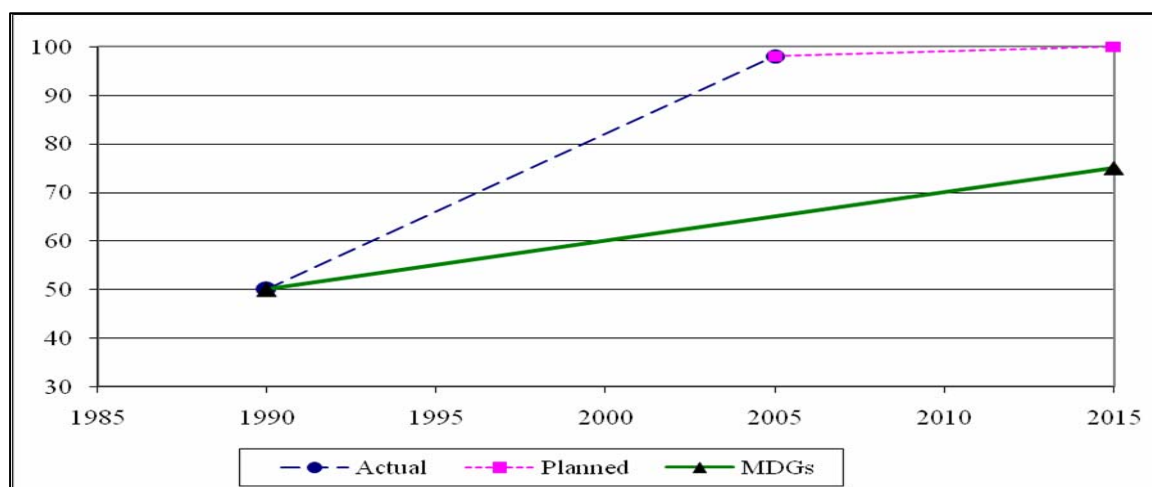


Figure (7) Sanitation coverage in Bahrain

## EGYPT

In the year 1990, a total of about 35 % of Egypt population lacked access to improved water supply. In Egypt attaining the MDGs was declared one of the main objectives of the long term plan that aims at reducing the people without proper water supply and sanitation to halve. Based on year 2000 coverage levels (along with projected population figures), the number of people that must be reached with water and sanitation facilities is estimated 82%. of the population by 2015 in order to meet the Millennium Development targets (Figure 8). Thus, the actual water supply coverage (82% of the population) for the year 2005 and the planned (100% of the population) for the year 2007 are above the target of the MDGs target by 2015.

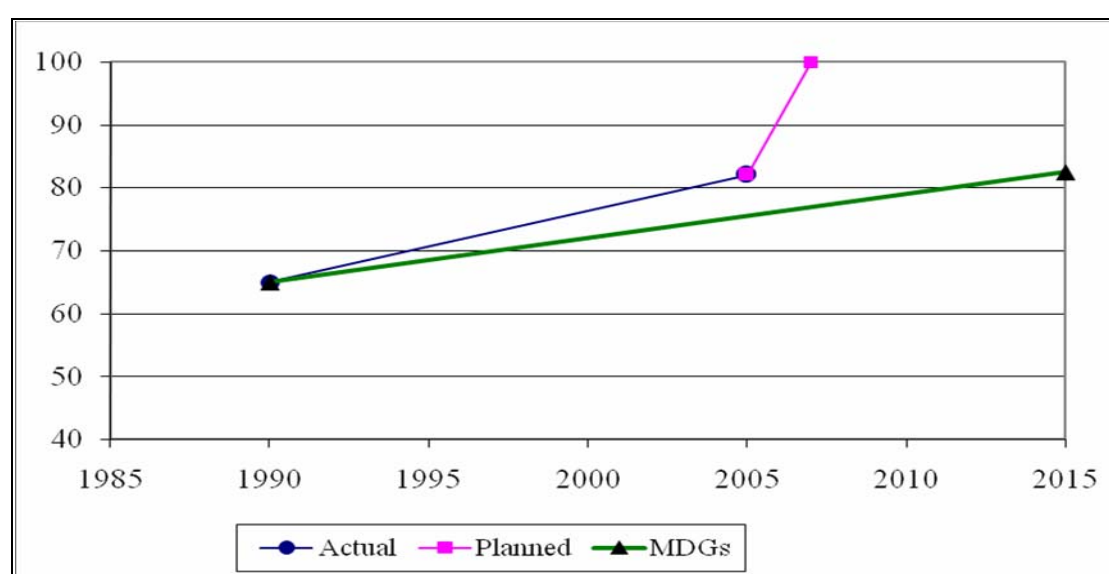


Figure (8) water supply coverage in Egypt

In the case of sanitation in year 1990 (Figure 9), coverage rates were lower, where 61 percent of people were without access to improved services. For year 2015, meeting the target requires that services be extended to 69.5% of the population. The actual sanitation coverage for the year 2005 is 46% while that planned for the year 2007 is 83%. From figure (9), it is clear that the planned is above the target of the MDGs, While the actual is lagging behind.

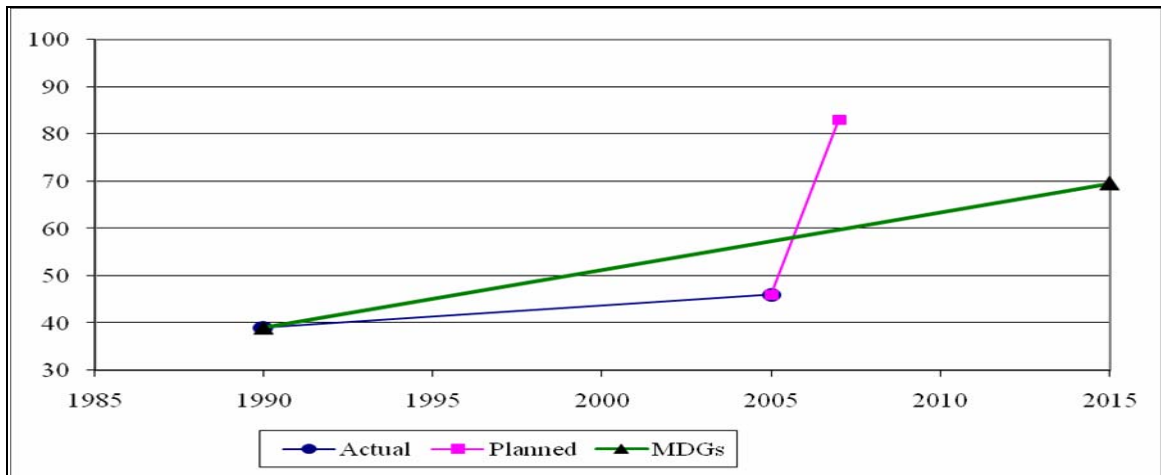


Figure (9) sanitation coverage in Egypt



## LIBYA

As shown in Figure (10), the actual water supply coverage for the year 1990 is 45% while the actual water supply coverage for the year 2005 is 84%. The planned coverage for the year 2015 is 100% and according to the MDGs the target for the year 2015 is 72.5%. It is clear that planned and the actual is above the target to be achieved to meet the MDGs. Thus, Libya is in the right track towards achieving the MDGs target by 2015.

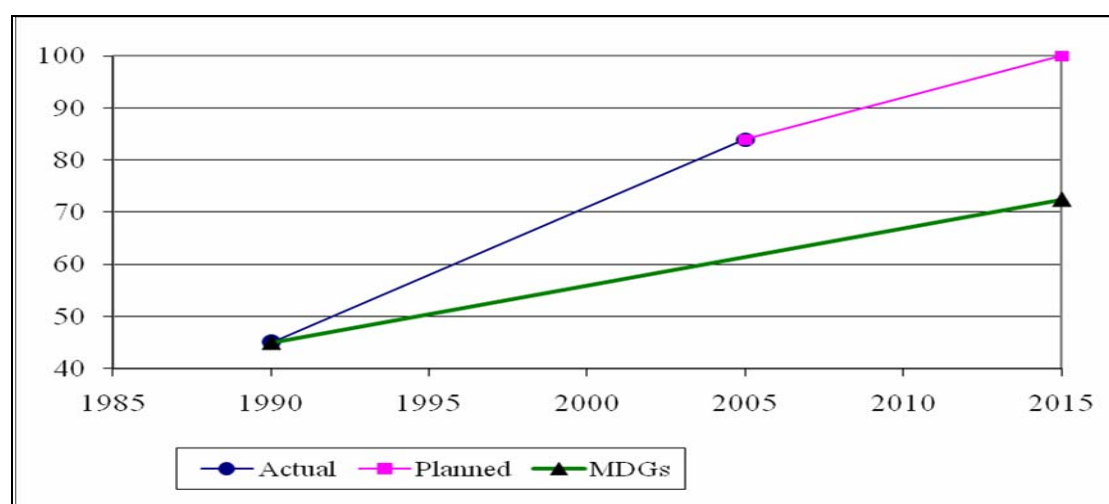


Figure (10) water supply coverage in Libya

The actual sanitation coverage for the year 1990 is 85% and the actual sanitation coverage for the year 2005 is 97% while that planned for the year 2015 is 100% and according to the MDGs the target for the year 2015 is 92.5%. Figure 11 show that the planned and the actual is above the target to be achieved to meet the MDGs.

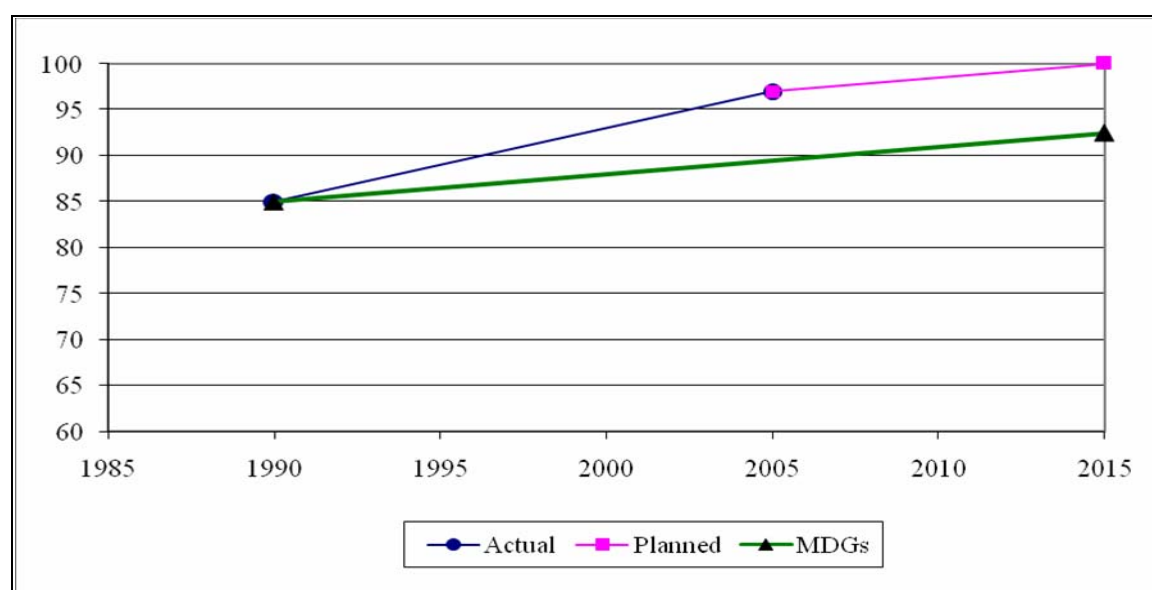


Figure (11) Sanitation coverage in Libya

## MOROCCO

The actual water supply coverage for the year 1990 is 50% and the actual water supply coverage for the year 2005 is 98% while that planned for the year 2015 is 100% and according to the MDGs the target the year 2015 is 94%. From the figure it is clear that the planned and the actual are above the target to be achieved to meet the MDGs. Thus Morocco is in the right track towards achieving the target of the water supply and sanitation coverage set by the MDGs for 2025.

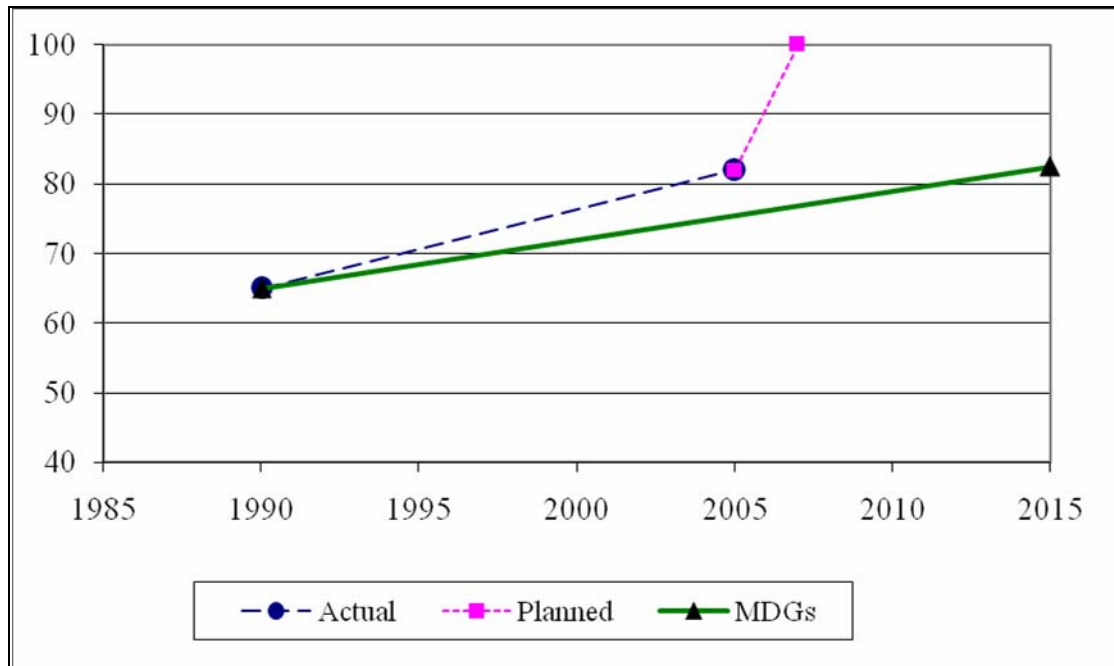


Figure (12) Water supply coverage in Morocco

### SAUDI ARABIA

In the year 1990, a total of about 15 % of Saudi Arabia population lacked access to improved water supply. Based on year 2005 coverage levels (along with projected population figures), the number of people that must be reached with water and sanitation facilities is estimated 100 % of the population by 2015 in order to meet the Millennium Development targets (Figure 4). Thus, the actual water supply coverage (90 % of the population) for the year 2005 and the planned (94 % of the population) for the year 2007 will be above achieving the target of the MDGs target by 2015.

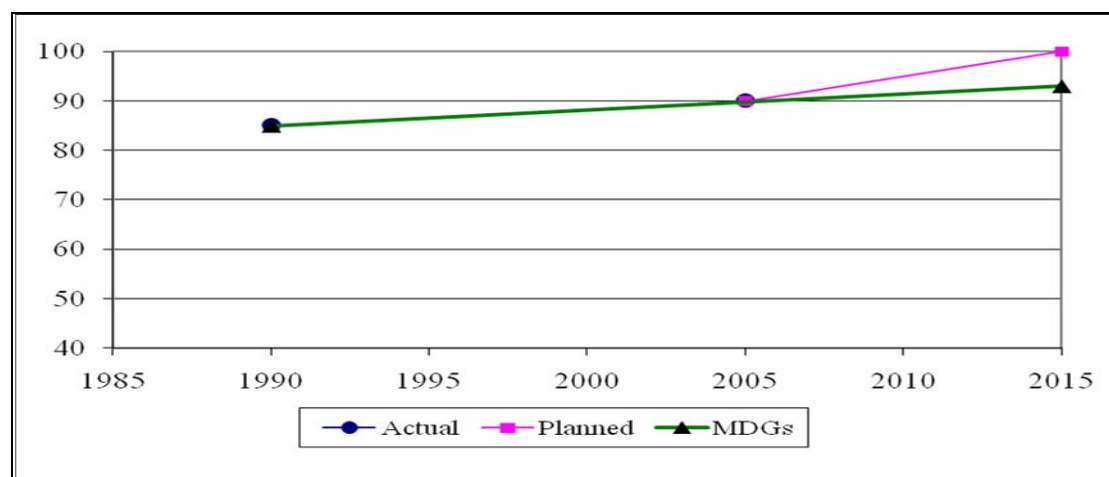


Figure (13) water supply coverage in Saudi Arabia

In the case of sanitation in year 1990 (Figure 14), coverage rates were lower, where 80 percent of people were without access to improved services. For year 2015, meeting the target requires that services be extended to 60 % of the population. The actual sanitation coverage for the year 2005 is 41% while that planned for the year 2007 is 62%. From figure (14), it is clear that planned is above the target of the MDGs, while the actual is lagging behind.

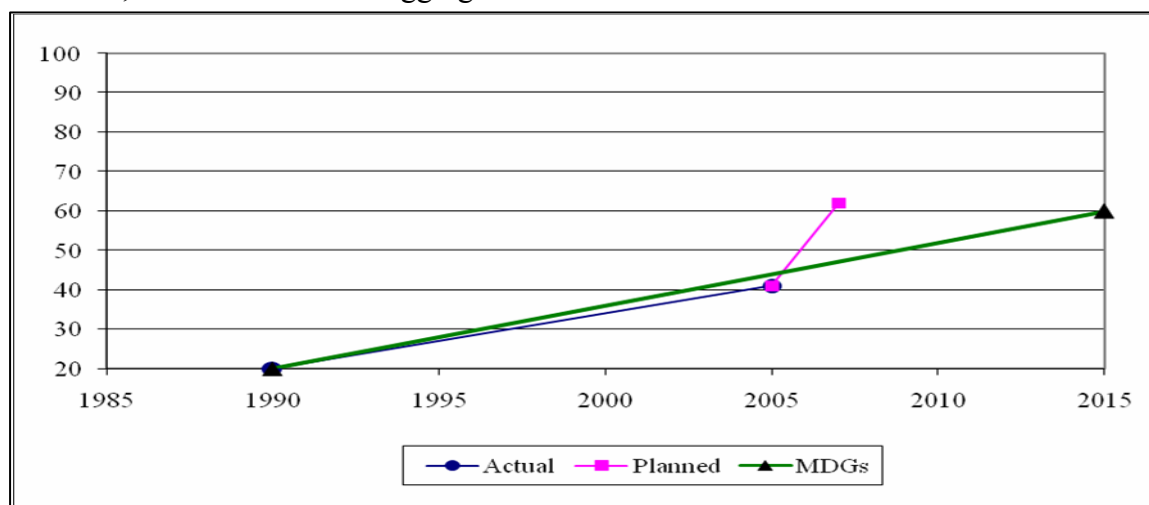


Figure (14) sanitation coverage in Saudi Arabia

**TUNISIA**

The actual water supply coverage for the year 1990 is 75% and the actual water supply coverage for the year 2005 is 96% while that planned for the year 2015 is 100% and according to the MDGs the target for the year 2015 is 88 %. From figure 15, it is clear that the planned and the actual are above the target to be achieved to meet the MDGs in the water supply sector.

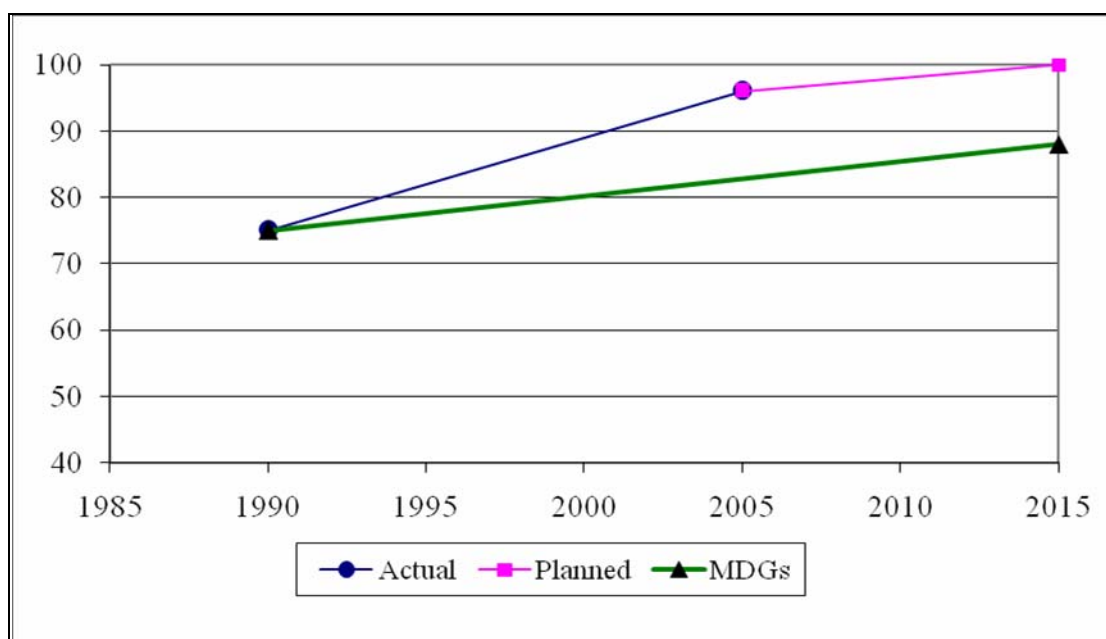


Figure (14) Water supply coverage in Tunisia

**UAE**

The actual water supply coverage for the year 1990 is 100% and the actual water supply coverage for the year 2005 is 100% while that planned for 2015 is consequently 100% coverage which is already achieved. From the figure it is clear that the UAE has already attained the MDGs water supply and sanitation goals.

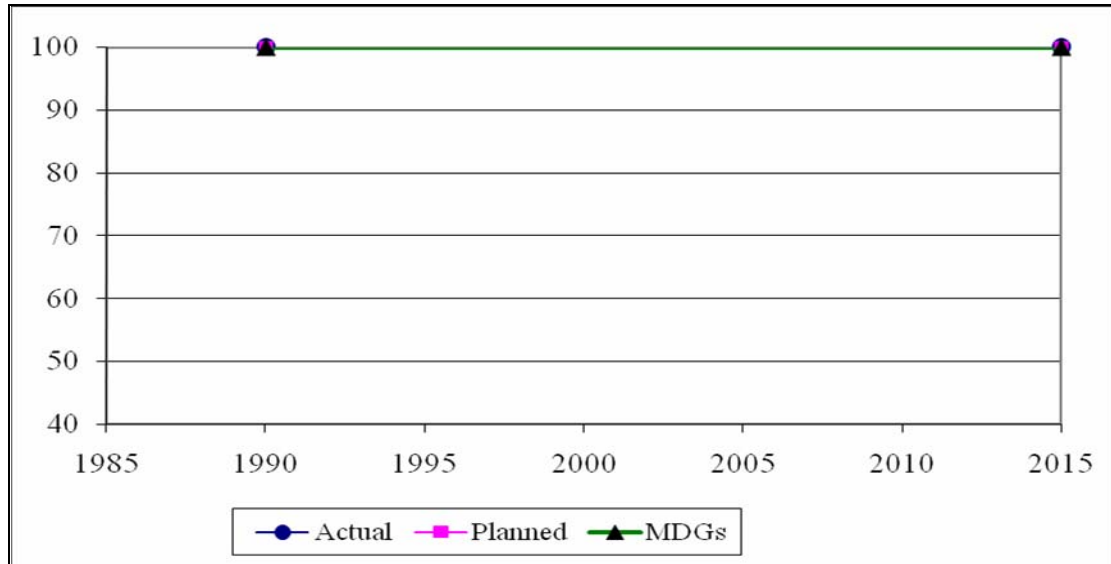


Figure (15) Water supply coverage in UAE

The actual sanitation coverage for the year 1990 is 100% and the actual sanitation coverage for the year 2005 is 100% while that planned for the year 2015 is 100%. UEA has already achieved the MDG goals in both the water supply and sanitation.

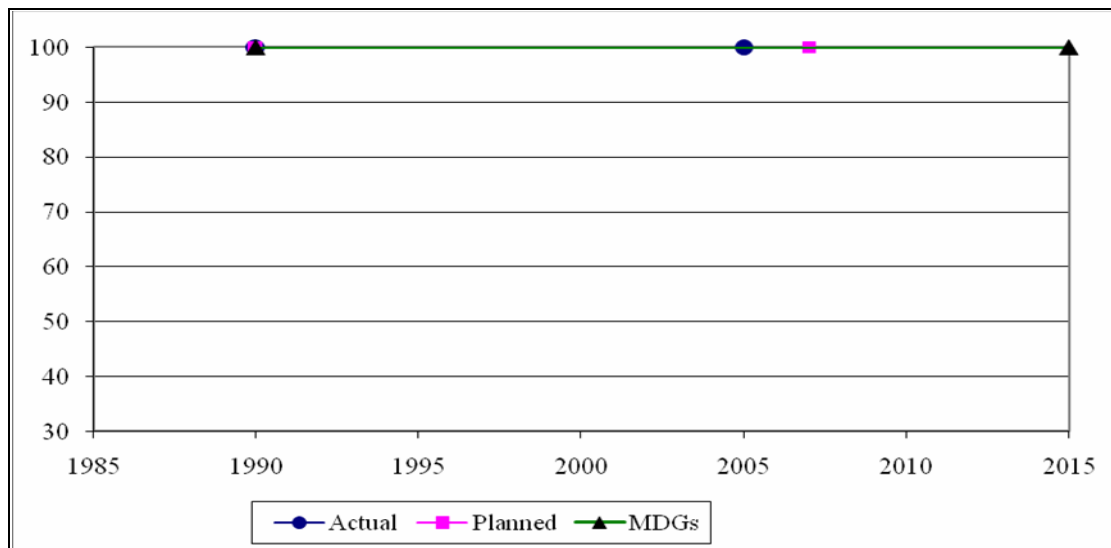


Figure (16) Sanitation coverage in UEA

### 6. OVERALL PERSPECTIVES AND COST ANALYSIS

The recorded figures for access to safe drinking water are highly variant from one reference to the other. Figure (18) shows the present percentage of Arab countries population without access to safe drinking water and proper sanitation. U.A.E and Bahrain countries exhibit the highest percentage of population with access to safe drinking water (more than 90%) and also sanitation services. The lowest accessibility to both services is encountered in Djibouti, and Yemen.

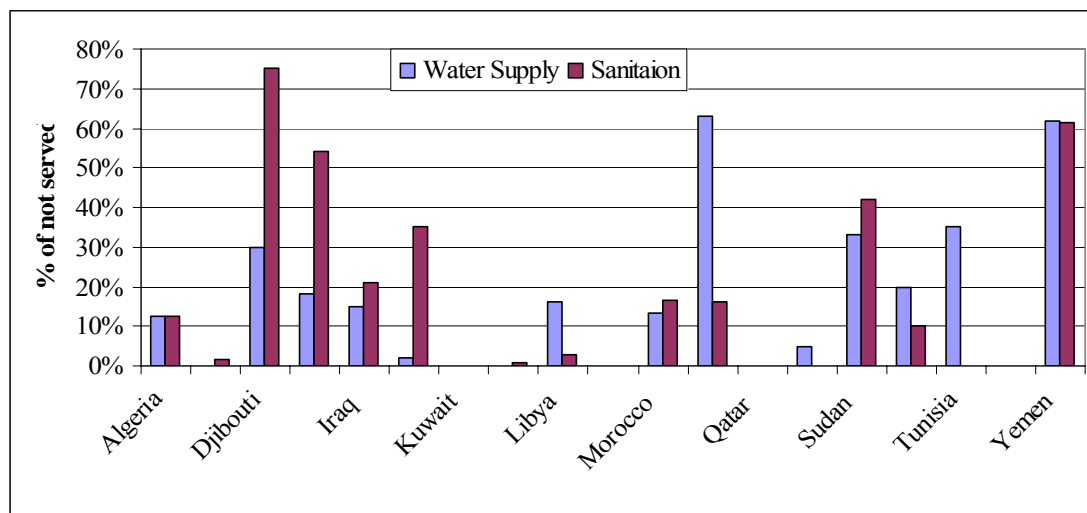


Figure (17) Arab countries population without access to safe drinking water and proper sanitation (2005)

To achieve the MDGs of reducing by half the people with no access to drinking water, 24 million people in Arab region need to be supplied with safe water by 2005. Figure (19) shows the 1990 and 2005 percentage of population without access to safe water in each Arab country. Compared with the target year, Libya and Morocco exhibit the highest progress in achieving safe drinking water services.

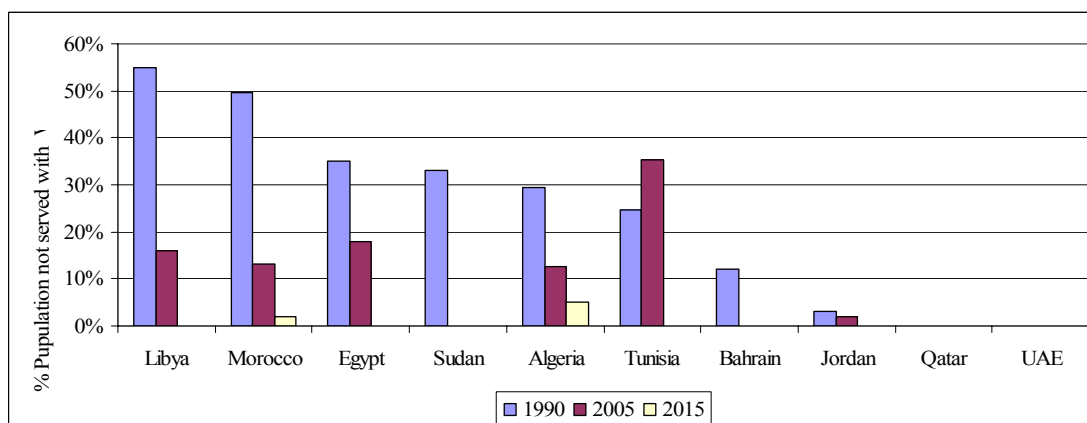


Figure (18) Arab countries population without access to safe drinking water (1990, 2005, 2015)

To achieve the MDG of reducing by half the people with no access to proper

Sanitation, 96 million need to be provided with sanitation services by 2005. Figure (20) shows the percentage of population without access to sanitation services in each Arab country. It compares years 1990 and 2005 with the target year 2015. Bahrain has already achieved MDGs target, while Jordan and Algeria has achieved exhibit the highest progress towards reaching projected year.

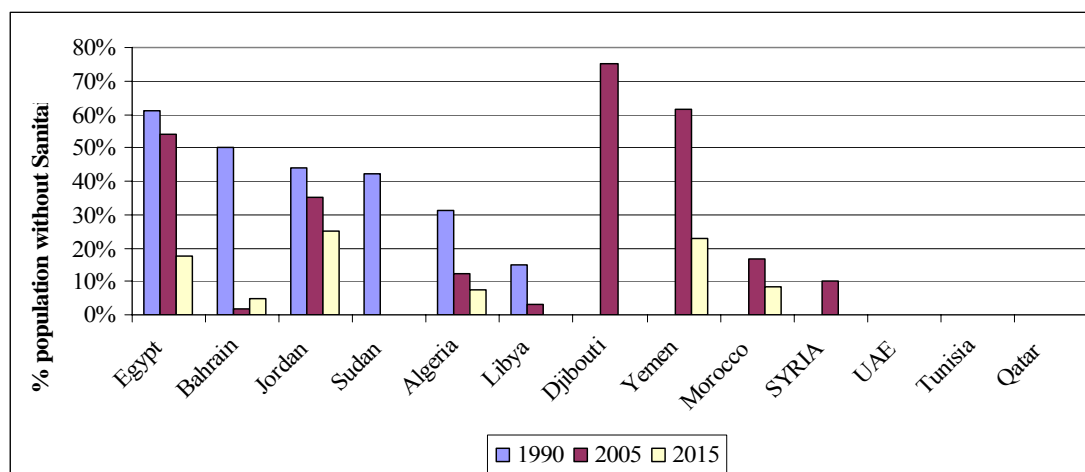


Figure (19) Arab countries population without access to proper sanitation (1990, 2005, 2015)

Generally, environmental problems related to municipal wastewater in rural communities are mainly due to fact that sanitation services lag behind water supply services by 10 years or more. Compared with the progress in supplying drinking water in Egypt, the achievements in targeted sanitation level are less in spite of massive investments diverted towards establishment of sanitation systems.

The cost of providing water supply and sanitation services differs from town to town and from country to another and also from region to other. According to many references and data centers on the internet, the cost of such services differs completely. Also the criteria of defining the services are different from place to other. However, according to the Global Water Supply and Sanitation Assessment 2000 report indicates that improved water supply which have (piped water into dwelling plot yard, public tap/standpipe, tube well/borehole, protected dug well, protected spring, rainwater collection). The basic sanitation should also include flush or pour-flush to piped sewer system/ septic tank/ pit latrine, ventilated improved pit latrine, pit latrine with slab, composting toilet.

According to number of references, the average urban water supply costs: \$87.5 US dollars per person (assuming 75% standpipes, and 25% separate household connections). Average urban sanitation facilities: \$137.5 per person. Average rural

water supply: \$15 per person. Average rural sanitation: \$10 per person. Average wastewater treatment costs: \$63 per person. O & M is at 15% of investment costs. In Egypt for example, it is proposed that the cost of treating one cubic meter is almost 1000 Egyptian pound which is about \$200 and the cost of treating one cubic sewage water is almost 4000 Egyptian pound which is about \$800 before dumping the water in the drainage waterway systems.

Concerning the Arab countries, data has been collected from various countries which show that big discrepancy has been existed in estimating the cost of connecting the water supply and sanitation services.

Table (1) Countries estimated cost for water supply in dollar

Country	Cost \$	Country	Cost \$	Country	Cost \$
Yemen	46.6	Tunisia	167.8	Libya	844.6
Egypt	98.3	Morocco	448.1	Qatar	1244.7
Algeria	100	Jordan	598.4	Djibouti	3209.2

Table (1) presents each country's estimation for providing water supply services for each individual. According to each country national plan, the expected population to be covered with service and the total cost were reported. Dividing them, the estimated cost for proving the service for each person was computed. Discrepancy among countries has been observed; as for Yemen the estimation amount is approximately 47 dollar for each individual, whether for Djibouti is approximately 3210 dollars that indicating an average of 802 dollar for each individual as shown in figure (21). On the contrary, this average is higher than the international estimations which record approximately 100 dollar for each individual.

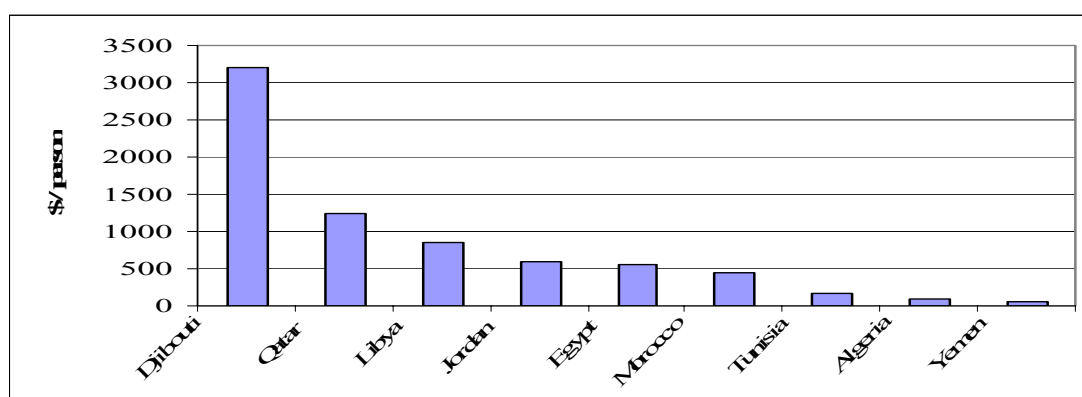


Figure (20) Countries estimated cost for water supply in dollar



For calculating the total cost of Arab countries requirements to cover water supply services, number of scenarios has been proposed. Table (1) presents the summary of results as the following:

The first scenario is based on the cost of connecting each individual to the services according to the commonly proposed average which is approximately \$100 to cover the whole population without access water supply services in year 2005 which is the year of collecting the data for this report. According to table (2) the total cost is 7.84 billion dollars for this scenario.

Table (2) total cost for providing the water supply according to the different scenarios

Scenario		Expected Cost (Billion)
\$100 per person	All population without access	7.84
\$100 per person	To achieve MDGs	13.30
Average cost according to collected data (\$751)	All population without access	58.90
Average cost according to collected data (\$751)	To achieve MDGs	99.87
Average cost according to collected data without Djibouti Record (\$444)	All population without access	59.04

The second scenario presents the case of the individual cost is about \$100 but to achieve the Millennium Development Goals in covering the population. The population has been computed according to following equation.

$$\text{Population to achieve MDGs in year 2015} = (P_{15} * (1 - G_{90}/2) - P_{05} * (1 - G_{05}))$$

Where :

$P_{15}$  = Total population in 2015

$P_{05}$  = Total population in 2005

$G_{90}$  = Percentage of population without access to the services in year 1990

The term ( $P_{05} * (1 - G_{05})$ ) presents the population that has access to the services in year 2005 and the term ( $P_{15} * (1 - G_{90}/2)$ ) presents the population that should have an access to the service in year 2015. The difference between the two terms presents the population should be covered with service from 2005 up to year 2015. Population of year 2015 has been computed and reported in Table (I-1, I-2). Table (I-1) also presents the served and non-served population of water supply and table (I-2) presents

the served population with sanitation. The total cost for this scenario is 13.3 billion dollars. It should be mentioned that this cost computed in year 2005 which is the time of collecting the data writing this report.

The third scenario is based on the whole estimated basic average which is 751 dollar according to table (2). In this scenario, it also proposed to cover all population without the services. The total cost in such scenario is about 59 billion dollars. The fourth scenario is similar to the third scenario but to cover the portion of the population to achieve the MDGs target. The total cost in such scenario is about 100 billion dollars. The cost of this scenario is very high because it takes into account the target population to year 2015.

However, it has been noticed that the average is high somewhat due to the rising cost of Djibouti which may indicates a special case or wrong estimate, especially that the Djibouti population are very small compare to the total population of the whole Arab countries and in contrary it has a considerable effect on the average due to the limited records of cost estimates. In such case, another scenario has been suggested which investigates the cost average without the estimated cost of Djibouti's. In such case the average was estimated as \$444. In this scenario, it also proposed to cover all population without the services. The total cost in such scenario is about 56 billion dollars.

Thus, differences of estimating the cost of connecting the services for individuals are not always attributable to wrong estimation but it may be due to the different costs of materials used or labor rates in those countries. Also, the criteria of estimating the cost may be the reasons behind the discrepancies that crucially affects the cost; such as the type of service, pipes type and water pressure in the network, the source water quality and the quality of the provided water, availability of the service along the day, the return cost of each cubic meter of water.

With regard to the sanitation, also numbers of scenarios were proposed to compute the total budget needed to cover the whole population without access to the sanitation service as well as the portion of population that should have to access to service just to achieve the Millennium Development Goals target. Similar to the analysis that have been done to compute the cost of connecting one individual to water supply services,

table (3) presents the cost of connecting one individual to the sanitation service based on the collected data from different Arab countries. The cost of connecting one individual to the sanitation service in Yemen is about 22 dollars where it is about 1376 in Libya. It ranges between 200 and 300 dollars in Jordan, Algeria and Djibouti. Figure (22) presents the cost of providing the sanitation services to each individual in number of Arab countries based on the collected data.

Figure (21) Cost of sanitation service

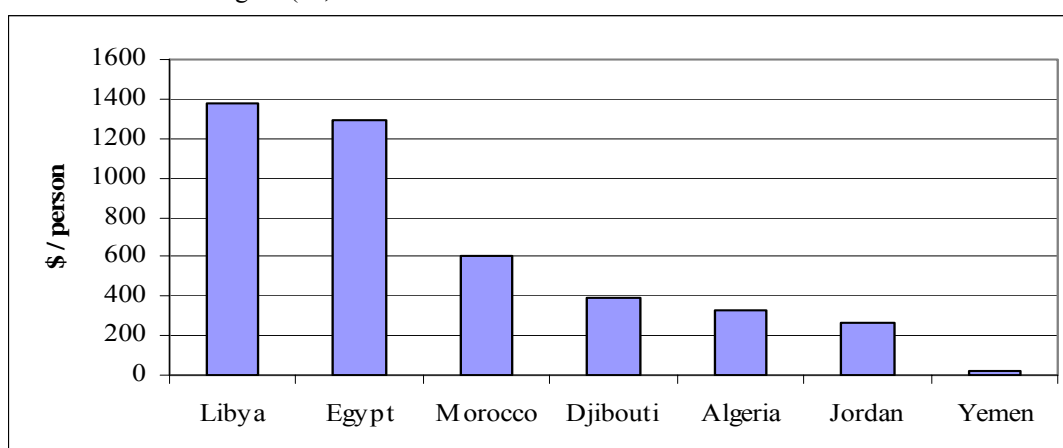


Table (3) total cost for providing the sanitation according to the different

Country	\$	Country	\$	Country	\$
Yemen	21.8	Djibouti	387.1	Libya	1376.1
Jordan	262.3	Morocco	603.3		
Algeria	333.3	Egypt	1293.3		

Figure (23) presents a comparison between the costs of providing a water supply service against connecting to sanitation service. It is clear from the graph that the cost of both service are changing with same trend. The cost of water supply and sanitation are very low in Yemen (W.S.=\$47, S=\$22), they are medium in Morocco (W.S.=\$448, S=\$603), in Jordan (W.S.=\$598, S=\$262), and they are high in Libya (W.S.=\$845, S=\$1346). However, the cost of water supply in some countries is greater than sanitation such as Yemen and Jordan where the cost of water supply is lower than the sanitation such as Morocco and Egypt. This inconsistency of the reported data is due to the lack of unique criteria for collecting the data. The cost of providing the sanitation service is much higher than the cost of providing the water supply services. The total cost of providing the sanitation services should include the cost of getting rid of the collected wastewater.

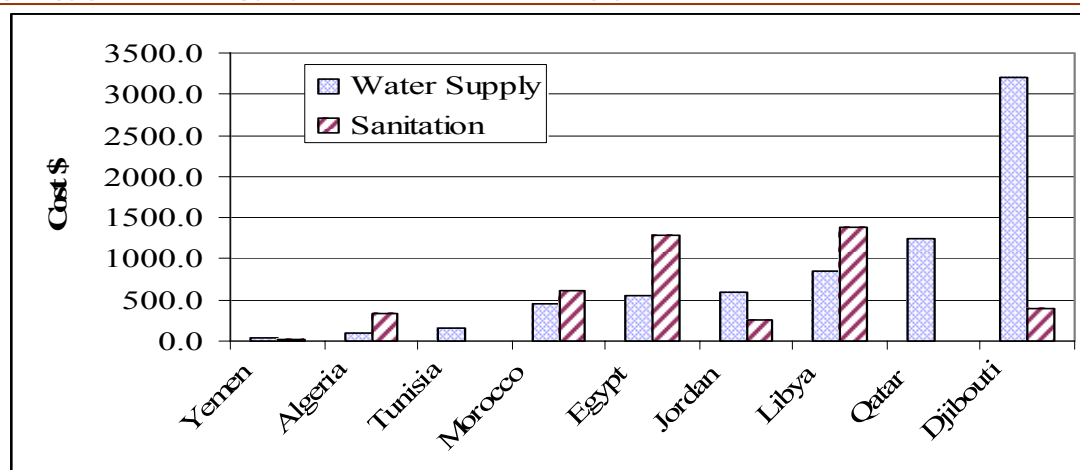


Figure (22) Cost of providing a water supply / sanitation service.

Numbers of scenarios have been introduced to compute the total budget needed to cover the population with the sanitation services. The first scenario investigates the total needed budget based on the individual cost according to the commonly proposed average which is approximately 150 dollar that covers the whole population without sanitation services. According to table (4) the total cost may reach 21 billion dollars.

Table (4) total cost for providing the sanitation according to the different scenarios

Scenario		From	Expected total Cost (Billion)
\$150 per person	All population without access	2005	21
\$350 per person	All population without access	2005	50
\$350 per person	To achieve MDGs	1990	47
Average cost according to collected data (\$459)	All population without access	2005	66
Average cost according to collected data (\$459)	To achieve MDGs	2005	62

The second scenario is similar to the first scenario but the cost of connecting the services to one individual is assumed 350 dollar. The cost in this scenario is high because it is assumed that the sanitation services should include the cost of wastewater treatment. In some references the cost of such sanitation service is four times the treatment cost of pure drinking water. Moreover, in some other references, the cost of treatment of one cubic meter of wastewater is fifteen times the treatment of one cubic meter for drinking water. In this scenario it is computed based on covering the whole population without access to the services. The total cost for this scenario is 50 billion dollars

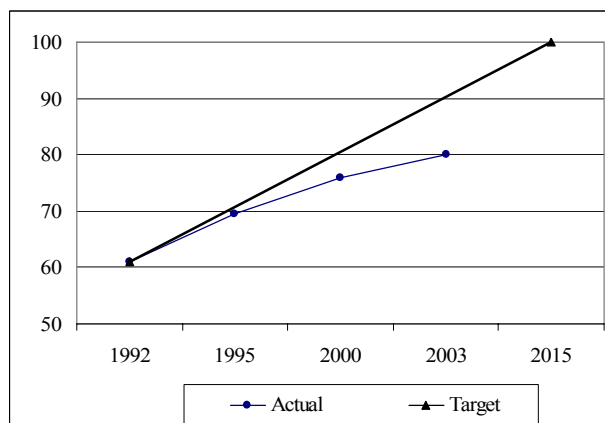
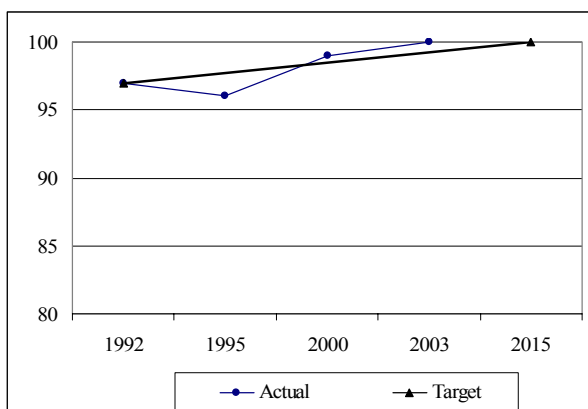
The third scenario presents the case of the individual cost is about 350 dollar but to achieve the millennium's goals target in covering the population. The population has been computed using the same equation used in computing the water supply service. The total cost for this scenario is 47 billion dollars. The fourth scenario is based on the whole estimated basic average which is 459 dollar according to table (4). In this scenario, it also proposed to cover all population without the services. The total cost in such scenario is 66 billion dollars. The fifth scenario is similar to the fourth one except for it is based on portion of the population to achieve the MDGs target. The total cost in such scenario is 62 billion dollars

## 7. ASSESSMENT AND EVALUATION INDICATORS

### **Urban/Rural and Governorate Level:**

To attain the sustainability of achieving the water supply and sanitation system, it is recommended to perform the analysis on urban/ rural and governorate levels. The indicators recommended to monitor progress under this target are the proportion of population with sustainable access to an improved water source (urban/rural and governorate) and the proportion of population with access to improved sanitation (urban and rural). The proportion of households with sustainable access to an improved water source has increased. The proportion of people with access to improved sanitation has increased over the period from 1995 to 2003.

Egypt is taken as an example of using the indicators for the evaluation of progress and follow up on achievement. The Government policy has been directed to increase the efficiency of water utilities and implement a National Water Quality Management Program. Recent figures for 2004 reveal continuous improvement as piped water services are extended to all urban population and to 95% of rural population (Figure 23). However, with the lack of information these figures do not reveal the disparities that exist between governorates.



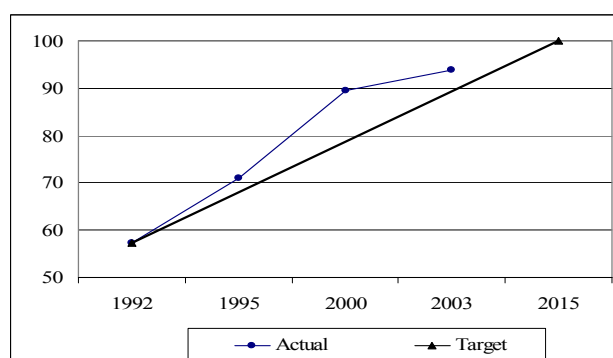
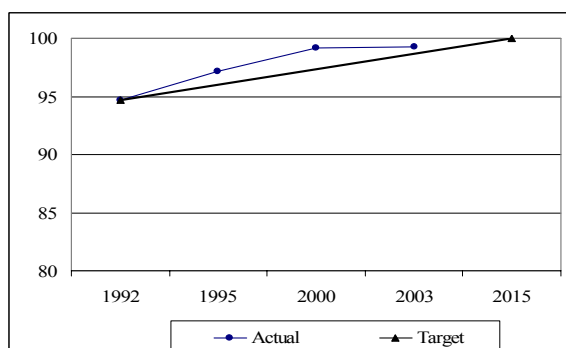
a. Urban

b- Rural

Figure (23) Actual and targeted percentage of households with access to pipe water

As for the status of water and sanitation on the level of governorates, the proportion of households with sustainable access to an improved water source has increased over the years 1986, 1996, and 2001 for all governorates. As of 2001, the governorates with the largest access were Cairo and Suez at almost 100 per cent. The worst were Beni suef (72.1 per cent) and Menofia (75.4 percent). It is projected that by 2015 almost all Egyptian governorates will reach full access to improved water resources.

The proportion of urban people with access to improved sanitation (Figure 24) has increased over the period from 1995 to 2003. The improvement affects all governorates, with Port Said, Suez, Damietta, Dakahlia, Kalyubia, and Ismailia at 100 percent. The worst access to sanitation was in Souhag (92.4 percent), and South Sinai (92.5%). Again, it is projected that by 2015 all governorates will have reached 100 percent.



a. Urban

b Rural

Figure (24) Actual and targeted percentage of households with access to improved sanitation

**Government / Privatization initiatives:**

Privatization of water supply and sanitation is often seen as a way to improve services and lighten the burden on scarce public finances. Although the aim is to provide water and sanitation services more efficiently through market mechanisms, several high profile privatization initiatives in developing countries have actually resulted in price increases that made the cost of access to safe water and sanitation prohibitive for the poor. The more vulnerable members of society, particularly poor women, are the worst affected by such changes to water and sanitation pricing, and stresses that cause to people's livelihoods. The financial estimation for achieving the water supply and sanitation project can be recommended to privatization and governmental progress.

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9. ANNEX (WATER SUPPLY AND SANITATION DATA)

Table 1: shows the percentage of Arab countries population with and without accesses to safe drinking water (1990, 2005, 2015) and cost in millions reported and calculated

Country	Population (Thousand)			Population (thousand)						Population %						Population		Cost (Million \$)					
	1990	2005	2015	Served			Not Served			Served			Not Served			2015	MDGs	Reported		Calculated		Per / Person	
				1990	2005	2015	1990	2005	2015	1990	2005	2015	1990	2005	2015			2005	2015	2005	2015		
1 Algeria	29,000	32,000	40,000	20,500	28,000	38,000	8,500	4,000	2,000	71%	88%	95%	29%	13%	5%	15%	11,517		1,000	100.0	850	1,200	1152
2 Bahrain	484	724	902	426	718	902	58	6	0	88%	99%	100%	12%	1%	0%	6%	211				6	18	21
3 Comoros	527	779	947	464	748	947	63	31	0	88%	96%	100%	12%	4%	0%	6%	205				6	20	20
4 Djibouti	517	779	947	455	748	947	62	31	0	88%	96%	100%	12%	1%	0%	6%	205		100	3209.2	6	20	20
5 Egypt	70,350	75,989	98,011	45,728	62,311	98,011	24,623	13,678	0	65%	82%	100%	35%	18%	0%	18%	31,466	702	3,509	98.3	2,462	3,570	3147
6 Iraq	18,078	25,634	30,671	15,366	21,788	26,070	2,712	3,845	4,601	85%	85%	85%	15%	15%	15%	8%	6,582				271	888	658
7 Jordan	3,470	5,720	7,260	3,356	5,606	7,260	114	114	0	97%	98%	100%	3%	2%	0%	1%	1,603		990	598.4	11	165	160
8 Kuwait	2,143	2,229	2,401	2,143	2,229	2,401	0	0	0	100%	100%	100%	0%	0%	0%	0%	172				0	17	17
9 Lebanon	2,555	3,646	18,186		3,354			292			92%			8%		0%	14,540				0	1,483	1454
10 Libya	4,000	6,000	8,000	180	5,040	8,000	3,820	960	0	45%	84%	100%	55%	16%	0%	28%	3,100		2,500	844.6	382	296	310
11 Mauntania	2,026	2,991	2,991	750	1,106	2,991	1,276	1,884	0	37%	37%	100%	63%	63%	0%	32%	942				128	188	94
12 Morocco	24,200	30,300	34,800	2,808	26,280	34,090	21,392	4,020	710	50%	87%	98%	50%	13%	2%	25%	10,895		3,500	448.1	2,139	852	1089
13 Oman	1,785	2,648	3,674	660	1,033	0	1,125	1,615	3,674	37%	39%		63%	61%	100%	32%	1,537				112	264	154
14 Palestine	1,712	3,841	5,260		1,536			2,305			60%			40%		0%	1,419				0	372	142
15 Qatar	419	786	1,256	419	786	1,256	0	0	0	100%	100%	100%	0%	0%	0%	0%	470		585	1244.7	0	47	47
16 Saudi Arabia	15,456	22,174	28,442	13,146	20,406	28,442	2,310	1,767	0	85%	90%	100%	15%	10%	0%	7%	7,452				231	804	745
17 Somalia	7,773	11,259	13,583		3,153			8,106			28%			72%		0%	2,324				0	1,043	232
18 Sudan	24,062	32,204	37,632	16,122	24,153	37,632	7,940	8,051	0	67%	75%	100%	33%	25%	0%	17%	9,846				794	1,348	985
19 Syria	12,386	17,995	21,734	0	2,879	0	12,386	15,115	21,734		80%		100%	20%	100%	50%	10,867				1,239	1,885	1087
20 Tunisia	8,147	10,081	11,716	6,140	9,726	11,716	2,007	355	0	75%	96%	100%	25%	4%	0%	12%	2,675		334	167.8	201	199	268
21 UAE	1,844	4,320	5,971	1,844	4,320	5,971	0	0	0	100%	100%	100%	0%	0%	0%	0%	1,651				0	165	165
22 Yemen	12,000	19,800	26,600		7,540	20,409	12,000	12,260	6,191	0%	38%	77%	100%	62%	23%	50%	13,300		600	46.6	1,200	1,906	1330
<b>Sum</b>	<b>242,934</b>	<b>311,896</b>	<b>400,981</b>	<b>130,506</b>	<b>233,460</b>	<b>325,044</b>	<b>100,388</b>	<b>78,437</b>	<b>38,909</b>	<b>54%</b>	<b>75%</b>	<b>81%</b>	<b>46%</b>	<b>25%</b>	<b>19%</b>	<b>132,977</b>			<b>13,118</b>	<b>6,758</b>	<b>10,039</b>	<b>16,752</b>	<b>13,298</b>

Table 2: shows expected total cost for different scenarios for drinking water supply

Scenario		Expected total Cost (Billion)
\$100 per person	All population without access	7.84
\$100 per person	To achieve MDGs	13.30
Average cost according to collected data (751)	All population without access	58.90
Average cost according to collected data (751)	To achieve MDGs	99.87
Average cost according to collected data without Djibouti Record (444)	All population without access	59.04

Table 3: shows the percentage of Arab countries population with and without accesses to sanitation services (1990, 2005, 2015) and cost in millions reported and calculated

Country	Population (Thousand)			Population (Thousand)						population %						Population		Cost (million \$)					MDGs	
	1990	2005	2015	Served			Not Served			Served			Not Served			2015	2005	2015	Per / Person	Calculated				
				1990	2005	2015	1990	2005	2015	1990	2005	2015	1990	2005	2015					2005	2015			
1 Algeria	29,000	32,000	40,000	20,000	28,000	37,000	9,000	4,000	3,000	69%	88%	93%	31%	13%	8%	16%	11,724		3,000	333.3	3,150	4,200	1575	
2 Bahrain	484	724	902	242	601	857	242	123	45	50%	83%	95%	50%	17%	5%	25%	315				85	105	42	
3 Comoros	527	779	947	516	763	928	10	15	19	98%	98%	98%	2%	2%	2%	1%	174				4	64	2	
4 Djibouti	517	779	947		465			155	341		75%		0%	25%	100%	0%	168	60		387.1	0	169	181	
5 Egypt	70,350	75,989	98,011	27,437	34,955	81,349	42,914	41,034	16,662	39%	46%	83%	61%	54%	17%	31%	38,482	10,526		226.9	15,020	22,070	7510	
6 Iraq	18,078	25,634	30,671		20,250			5,383			79%			21%		0%	5,037				0	3,647	6327	
7 Jordan	3,470	5,720	7,260	1,943	3,718	5,445	1,527	2,002	1,815	56%	65%	75%	44%	35%	25%	22%	2,460	453		262.3	534	1,240	267	
8 Kuwait	2,143	2,229	2,401		2,095			134			94%			6%		0%	172				0	107	750	
9 Lebanon	2,555	3,646	18,186		2,479			1,167			68%	1%		32%		0%	14,540				0	5,497	894	
10 Libya	4,000	6,000	8,000	3,400	5,820	8,000	3,400	5,820	8,000	85%	97%	100%	15%	3%	0%	8%	2,300	3,000		1376.1	1,190	763	105	
11 Mauritania	2,026	2,991	2,991		1,136			1,914			38%		30%	62%		15%	449				0	649	603	
12 Morocco	24,200	30,300	34,800	0	21,210	27,840	0	21,210	27,840	70%	80%		30%	20%	0%	4,500		4,000		603.3	0	4,757	8470	
13 Oman	1,785	2,648	3,674		2,224			424			16%			84%		0%	1,026					507	625	
14 Palestine	1,712	3,841	5,260		1,728			2,112			45%			55%		0%	1,419					1,236	599	
15 Qatar	419	786	1,256	419	786	1,256	0	0	0	100%	100%	100%	0%	0%	0%	0%	470				0	165	0	
16 Saudi Arabia	15,456	22,174	28,442	3,100	9,070	13,830	12,325	13,603	4,344	20%	41%	49%	80%	59%	51%	40%	12,626				4,314	6,780	2162	
17 Somalia	7,773	11,259	13,583		3,153			8,106			28%			72%		36%	5,541					3,651		
18 Sudan	24,062	32,204	37,632		16,746			15,458			42%	52%		58%	48%	29%	13,193				0	7,310	5979	
19 Syria	12,386	17,995	21,734		16,195			1,799			10%			90%		0%	3,739				0	1,938	4335	
20 Tunisia	8,147	10,081	11,716		8,065			2,016			80%			21%		0%	1,635				0	1,278	2851	
21 UAE	1,844	4,320	5,971	1,844	4,320	5,971	1,844	4,320		100%	100%	100%	0%	0%	0%	0%	1,651				645	578	0	
22 Yemen	12,000	19,800	26,600		7,620	18,604		12,180	7,996	0%	38%	70%	100%	62%	30%	50%	13,300	239		21.8	0	6,643	2100	
Sum	242,934	311,896	400,981	58,901	191,400	201,080	71,262	142,976	70,062	24%	61%	50%	76%	39%	50%		134,919		21,278	3,211	24,942	73,353	45,379	
																		Average		458.692				

Table 4: shows expected total cost for different scenarios for sanitation coverage

Scenario		Expected total Cost (Billion)
\$150 per person	All population without access	21.45
\$350 per person	All population without access	50.04
\$350 per person	To achieve MDGs	47.22
Average cost according to collected data (459)	All population without access	65.58
Average cost according to collected data (459)	To achieve MDGs	61.89

Table 5 & figure1 shows: Expected total cost for different scenarios for drinking water supply

Scenario	Expected total Cost (Billion)
Scenario 1	7.84
Scenario 2	13.30
Scenario 3	58.90
Scenario 4	99.87
Scenario 5	59.04

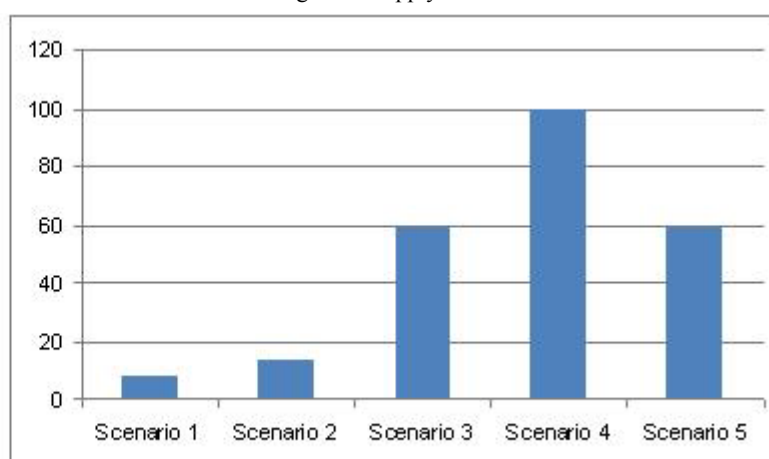


Table 6 & figure2 shows: Expected total cost for different scenarios for sanitation coverage

Scenario	Expected total Cost (Billion)
Scenario 1	7.84
Scenario 2	13.30
Scenario 3	58.90
Scenario 4	99.87
Scenario 5	59.04

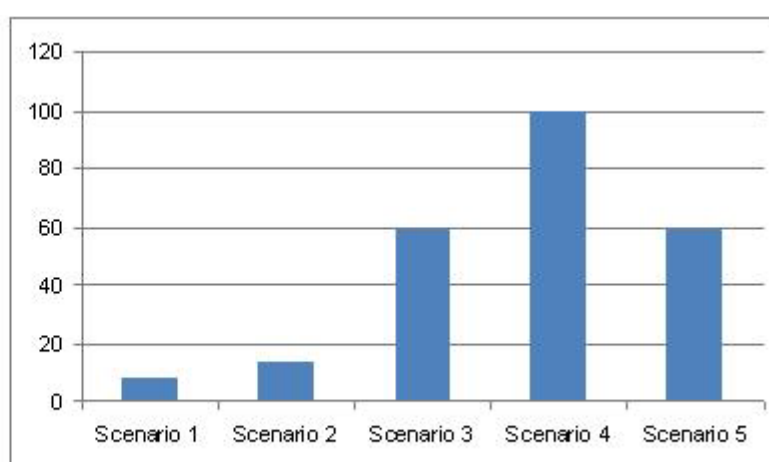


Table 6: shows countries estimated cost for water supply in dollar

Yemen	46.6
Egypt	98.3
Algeria	100.0
Tunisia	167.8
Morocco	448.1
Jordan	598.4
Libya	844.6
Qatar	1244.7
Djibouti	3209.2
<b>Average</b>	751
<b>Average</b>	444

Table 7: shows countries estimated cost for sanitation services in dollar

Country	\$
Yemen	21.8
Egypt	226.9
Jordan	262.3
Algeria	333.3
Djibouti	387.1
Morocco	603.3
Libya	1376.1
Average	<b>459</b>

Table 8: shows the cost of providing a water supply / sanitation service.

	Water Supply	Sanitation
Yemen	46.6	21.8
Egypt	98.3	226.9
Algeria	100.0	333.3
Tunisia	167.8	
Morocco	448.1	603.3
Jordan	598.4	262.3
Libya	844.6	1376.1
Qatar	1244.7	
Djibouti	3209.2	387.1

Table 9: total population and population with access to water supply, and the percentage of population with access to safe drinking water (1990, 2005, 2015)

No	Country	Total Population (Thousand)			Population (thousand)			Population %		
		1990	2005	2015	1990	2005	2015	1990	2005	2015
1	Algeria	29,000	32,000	40,000	20,500	28,000	38,000	71%	88%	95%
2	Bahrain	484	724	902	426	718	902	88%	99%	100%
3	Comoros	527	779	947	464	748	947	88%	96%	100%
4	Djibouti	517	779	947	455	748	947	88%	96%	100%
5	Egypt	70,350	75,989	98,011	45,728	62,311	98,011	65%	82%	100%
6	Iraq	18,078	25,634	30,671	15,366	21,788	26,070	85%	85%	85%
7	Jordan	3,470	5,720	7,260	3,356	5,606	7,260	97%	98%	100%
8	Kuwait	2,143	2,229	2,401	2,143	2,229	2,401	100%	100%	100%
9	Lebanon	2,555	3,646	18,186		3,354			92%	
10	Libya	4,000	6,000	8,000	180	5,040	8,000	45%	84%	100%
11	Mauritania	2,026	2,991	2,991	750	1,106	2,991	37%	37%	100%
12	Morocco	24,200	30,300	34,800	2,808	26,280	34,090	50%	87%	98%
13	Oman	1,785	2,648	3,674	660	1,033	0	37%	39%	
14	Palestine	1,712	3,841	5,260		1,536			60%	
15	Qatar	419	786	1,256	419	786	1,256	100%	100%	100%
16	Saudi Arabia	15,456	22,174	28,442	13,146	20,406	28,442	85%	90%	100%
17	Somalia	7,773	11,259	13,583		8,106			72%	
18	Sudan	24,062	32,204	37,632	16,122	24,153	37,632	67%	75%	100%
19	Syria	12,386	17,995	21,734	0	2,879	0		80%	
20	Tunisia	8,147	10,081	11,716	6,140	9,726	11,716	75%	96%	100%
21	UAE	1,844	4,320	5,971	1,844	4,320	5,971	100%	100%	100%
22	Yemen	12,000	19,800	26,600		7,540	20,409	0%	38%	77%
	<b>Sum</b>	242,934	311,896	400,981	130,506	238,414	325,044	54%	76%	81%

Table 10: total population and population with access to sanitation services, and the percentage of population with access to sanitation services (1990, 2005, 2015)

No	Country	Total Population (Thousand)			Population (thousand)			Population %		
		1990	2005	2015	1990	2005	2015	1990	2005	2015
1	Algeria	29,000	32,000	40,000	20,000	28,000	37,000	69%	88%	93%
2	Bahrain	484	724	902	242	601	857	50%	83%	95%
3	Comoros	527	779	947	516	763	928	98%	98%	98%
4	Djibouti	517	779	947		465			75%	
5	Egypt	70,350	75,989	98,011	27,437	34,955	81,349	39%	46%	83%
6	Iraq	18,078	25,634	30,671		20,250			79%	
7	Jordan	3,470	5,720	7,260	1,943	3,718	5,445	56%	65%	75%
8	Kuwait	2,143	2,229	2,401		2,095			94%	
9	Lebanon	2,555	3,646	18,186		2,479			68%	1%
10	Libya	4,000	6,000	8,000	3,400	5,820	8,000	85%	97%	100%
11	Mauritania	2,026	2,991	2,991		1,136			38%	
12	Morocco	24,200	30,300	34,800	0	21,210	27,840	0%	70%	80%
13	Oman	1,785	2,648	3,674		2,224			16%	
14	Palestine	1,712	3,841	5,260		1,728			45%	
15	Qatar	419	786	1,256	419	786	1,256	100%	100%	100%
16	Saudi Arabia	15,456	22,174	28,442	3,100	9,070	13,830	20%	41%	49%
17	Somalia	7,773	11,259	13,583		3,153			28%	
18	Sudan	24,062	32,204	37,632		16,746		42%	52%	
19	Syria	12,386	17,995	21,734		16,195			10%	
20	Tunisia	8,147	10,081	11,716		8,065			80%	
21	UAE	1,844	4,320	5,971	1,844	4,320	5,971	100%	100%	100%
22	Yemen	12,000	19,800	26,600		7,620	18,604	0%	38%	70%
	Sum	242,934	311,896	386,441		191,400			61%	

Table11: shows percentage of population with access to water supply

Water supply				
Country	Population % Served			
	1990	2005	2015	
	1	Kuwait	100%	100%
2	Qatar	100%	100%	100%
3	UAE	100%	100%	100%
4	Jordan	97%	98%	100%
5	Bahrain	88%	99%	100%
6	Comoros	88%	96%	100%
7	Djibouti	88%	96%	100%
8	Saudi Arabia	85%	90%	100%
9	Iraq	85%	85%	85%
10	Tunisia	75%	96%	100%
11	Algeria	71%	88%	95%
12	Sudan	67%	75%	100%
13	Egypt	65%	82%	100%
14	Morocco	50%	87%	98%
15	Libya	45%	84%	100%
16	Oman	37%	39%	
17	Mauritania	37%	37%	100%
18	Yemen	0%	38%	77%
19	Lebanon		92%	
20	Syria		80%	
21	Palestine		60%	
22	Somalia		28%	

Figure 3: shows percentage of population with access to water supply

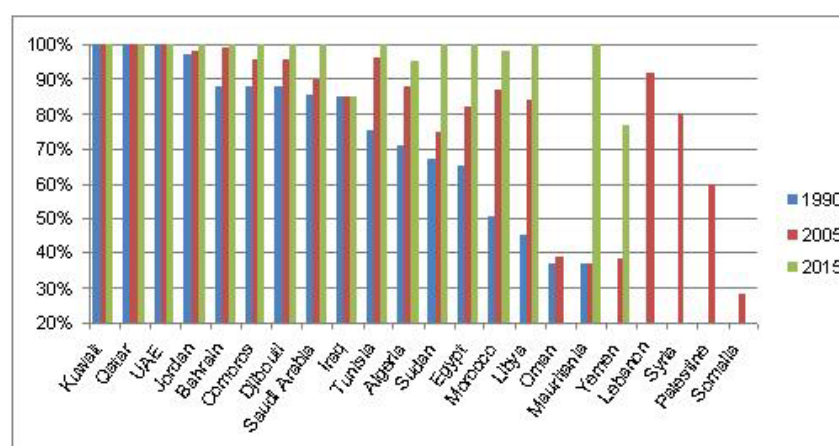




Table12: shows percentage of population with access to sanitation services

Sanitation data				
Country	population %			
	Served			
	1990	2005	2015	
2	Qatar	100%	100%	100%
3	UAE	100%	100%	100%
4	Comoros	98%	98%	98%
5	Libya	85%	97%	100%
1	Kuwait		94%	
6	Algeria	69%	88%	93%
7	Jordan	56%	65%	75%
8	Bahrain	50%	83%	95%
9	Sudan	42%	52%	
10	Egypt	39%	46%	83%
11	Saudi Arabia	20%	41%	49%
12	Yemen	0%	38%	70%
13	Tunisia		80%	
14	Iraq		79%	
15	Djibouti		75%	
16	Morocco		70%	80%
17	Lebanon		68%	1%
18	Palestine		45%	
19	Mauritania		38%	
20	Somalia		28%	
21	Oman		16%	
22	Syria		10%	

Figure 4: shows percentage of population with access to sanitation services

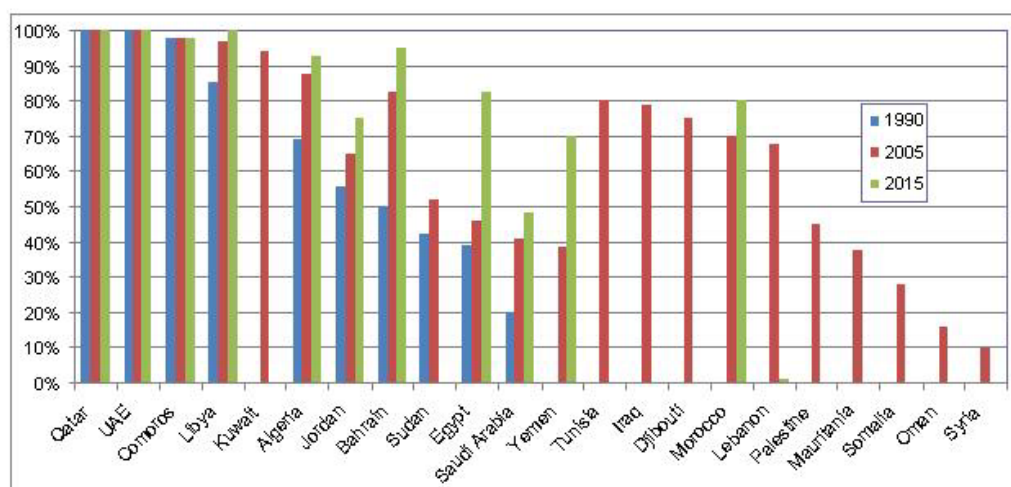


Table13: shows percentage of population with access to drinking water and sanitation services

	Country		
1	Qatar	100%	100%
2	UAE	100%	100%
3	Kuwait	100%	94%
4	Bahrain	99%	83%
5	Jordan	98%	65%
6	Tunisia	96%	80%
7	Comoros	96%	98%
8	Djibouti	96%	75%
9	Lebanon	92%	68%
10	Saudi Arabia	90%	41%
11	Algeria	88%	88%
12	Morocco	87%	70%
13	Iraq	85%	79%
14	Libya	84%	97%
15	Egypt	82%	46%
16	Syria	80%	10%
17	Sudan	75%	52%
18	Palestine	60%	45%
19	Oman	39%	16%
20	Yemen	38%	38%
21	Mauritania	37%	38%
22	Somalia	28%	28%

Figure 5: shows percentage of population with access to drinking water and sanitation services

