Review of domestic water conservation practices in Saudi Arabia

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Abstract The Kingdom of Saudi Arabian (KSA) has a substantial water shortage problem where water demand far exceeds water resources sustainable yields. This fact has motivated the Ministry of Water and Electricity (MOWE) to launch a massive water conservation awareness program to enhance water-using efficiency in the country. The MOWE among other water awareness activities has introduced a four-stage program of free distribution of water conservation tools. This research reviewed the domestic water conservation awareness program in Saudi Arabia and assessed the program performance through conducting questionnaire surveys. The latter was designed and implemented in Al-Khobar city in the Eastern Province to measure public awareness regarding water issues. The survey started on April 28, 2012, and continued for 3 weeks. A total of 197 questionnaires were completed. The survey results showed a relatively low awareness among respondents about water shortage problem in the Kingdom. A low percentage of respondents have water conservation tools installed in their houses, but a high percentage is willing to buy and install water conservation tools. The majority of respondents consider the water price low and are willing to pay more for water. The

respondents' feedback highlighted the need to improve the current water conservation awareness program.

Keywords Saudi Arabia · Water shortage · Water conservation program · Questionnaire survey

Introduction

The Kingdom of Saudi Arabia (KSA) is located at the Middle East between the Red Sea and Arabian Gulf with a total area of about 2 million km² as shown in Fig. 1 (Saudi Geological Survey 2012). The population of the KSA is about 27 million and has been growing at an average growth rate of 3.4 % for the last four decades. Most of the Saudi population are living in urban areas of which there are five urban centres with a population of more than one million: Riyadh 5.2 million, Jeddah 3.4 million, Makka 1.5 million, the Eastern area (Dammam, Al-Khobar, Dhahran) 1.3 million, and Maddinah 1.1 million (Saudi Central Department of Statistics and Information 2012). The country owns the largest crude oil reserves in the world and is currently the largest crude oil producer. The crude oil revenue has resulted in a major increase in country-wide standards of living and urbanization. Consequently, the country's modernization has resulted in ever increasing water consumption in the agricultural, municipal and industrial sectors (FAO 2009).

The country is located in a desert environment with cross-country average annual rainfall of less than 100 mm (Saudi Central Department of Statistics and Information 2012; Abderrahman 2006; World Bank 2004; World Bank 2005; Al-Zahrani 2010; Al-Zahrani and Baig 2011). The Kingdom does not have any permanent surface water resources. Flash floods (Wadis) are occasionally running for a short duration depending on temporal and spatial variations in rainfall

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Fig. 1 Kingdom of Saudi Arabia location map. Source: *The Encyclopedia of the Earth*

patterns. The water from flash floods is captured in 260 irrigation dams collecting annually an estimated 0.6 billion m³ (Al-Zahrani and Baig 2011; Ouda 2013a). But flash floods cannot be considered as a source for municipal water. Municipal water demand is mainly met by the utilization of groundwater and sea water desalination. Groundwater consists of both renewable and non-renewable aquifers and is considered the only reliable natural water source in the country. The sustainable yield of groundwater sources is estimated to be 3.85 billion m³/year (World Bank 2005; MOWE 2012). The groundwater total dissolved solid (TDS) values range from 300 to more than 10,000 part per million (ppm) (MOWE 2012). The second source for potable water is desalinated water where the KSA is ranked at the top of the ladder of the desalinated water producers in the world. The Saline Water Conversion Corporation (SWCC) is responsible for managing and operations of 30 desalination plants located on the Red sea and Arabian Gulf. The desalination plants production capacity increased from 200 million m³/year in 1980 to about 1,050 million m³/year in 2010 (SWCC 2010; Al-Zahrani and Baig 2011; MOWE 2012). The SWCC is planning to increase the desalination plants production capacity to about 2.07 billion m³/year by the year 2014 (MEP 2010). The total production and transmission cost of desalinated water was about 1.09 US\$/m³ in 2010 (SWCC 2010; Ouda 2013b). The KSA utilizes treated waste water for landscape and agricultural irrigation. About 240 million m³ of the treated waste water was used across the country in 2010, which forms 34 % of the generated treated waste water (MOWE 2012). Water resources, sustainable yields, and total water demand per sector for the year 2010 are summarized in

Table 1. This table shows a total water demand versus supply gap of about 11.5 billion m³/year. This gap is typically covered by groundwater over abstraction and depletion. The Saudi Nine National Development Plan is estimating that domestic and industrial water demand will increase by 2.1 and 5.5 % annually from 2010 to 2014 (MEP 2010).

The world water community has agreed on four governance principles for country level water resources management during the International Conference on Water and the Environment (ICWE) in Dublin, Ireland, January 1992. The second principle stated “*Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels*” (International Conference on Water and Environment 1992). Intensifying general public and policy maker awareness of water shortage problem is an integral component of the participatory approach (International Conference on Water and Environment 1992). The general public and policy maker awareness of water shortage problem will facilitate water conservation practices and implementation. Water conservation in countries with extreme water scarcity problem such as KSA is not an option anymore; it is a must. Saudi Ministry of Water and Electricity (MOWE) is the governing authority of water services sector in the Kingdom. MOWE has initiated and implemented a challenging general public water conservation awareness program in 2004.

This research reviews MOWE program towards promoting water conservation practices among general public and assessing the program performance to-date based on literature review and questionnaire survey.

Table 1 KSA sustainable water resources yields and water demand in the year 2010

	Quantity (million m ³ /year)
Water resource sustainable yields	
Groundwater	3,850
Surface water	1,300*
Total conventional sources	5,150
Treated wastewater	240
Desalinated water	1,050
Total non-conventional sources	1,290
Total water resource yields	6,440
Water demand per sector	
Domestic	2063
Industrial	800
Agricultural	15,000
Total water demand	17,863
2010 Water demand vs. supply gap	11,423

Bold indicates significant values

* Annually variable depending on rainfall pattern

The water conservation program in Saudi Arabia

The current use of the Kingdom's water resources is unsustainable. This issue can be seen from two viewpoints: the unrestricted and uneconomical use of irrigation water and the fiscal burden generated by the water supply and sanitation. The current level and tariff structure for urban water paid by consumers provides no incentive to conserve water and causes an inconsistent level of per capita consumption with the water scarcity condition in the Kingdom. Moreover, the low pricing of water is a disincentive for utility companies to diminish water loss along the pipe networks. Other evidence of the lack of incentives to conserve water is the imbalance between the treated waste water supply and its minimum reuse, disregarding an important supply of water that can be reused for irrigation in industry and even in urban areas. Important, too, is that fact that the sector where conservation efforts are most needed is irrigated agriculture—the sector which is the largest water consumer but also the one with the lowest water efficiency.

Unless corrective measures are taken, the long-term viability of these resources will be jeopardized. The main challenge that faces decision makers is to stop the degradation of the natural resource of water while materializing the national vision that demands “Sustainable development and management of the Kingdom's water resources” (MOWE 2012). These factors have motivated the Ministry of Water and Electricity (MOWE) to restructure the water sector and to prepare a National Water Strategy (NWS) to be used as a roadmap towards sustainable water usage.

The backbone of the NWS is water sustainability which starts by considering non-renewable groundwater as a strategic resource that must be protected for future generations. Thus, it is imperative to promote the efficient usage of water that will generate the maximum economic benefits along with the other major sectors of oil, land, labour, and capital. As a result, the KSA Council of Ministers has introduced a resolution (KSA 2007; Al-Hussayen 2007) that enforces a more orderly use of water resources, removes the incentives for wheat and fodder production and establishes mechanisms for better control and protection of all water resources. Consequently, the KSA government has mounted a national campaign for residential water conservation with the following objectives:

- Identifying the current and future water situation and emphasizing on the importance of conservation for sustainability;
- Taking practical measures and adopting a clear and direct approach to inform and educate the public about conservation and addressing all sections of society;
- Highlighting the Kingdom's high per capita consumption and the low tariff paid by consumers for water compared to other countries;

- Acquainting the public with the conservation tools and encouraging them to use them.

In an effort to achieve the objectives of the national campaign, the NWS has introduced a four-stage program of free distribution of water conservation tools. The first three stages targeted the residential sector, government/public sectors, and private sector. Moreover, the fourth stage is aimed at the distribution of water saving showerheads at nominal prices (MOWE 2012). Parallel with the introduction effort, the government has mounted a widespread media campaign to increase the awareness of the public regarding water conservation. Also, a woman's permanent exhibition for water conservation has been established. The aim of the exhibition is to convey the message of the necessity for water conservation to the women in the Kingdom. Documentary films on water conservation have been screened and practical demonstrations of conservation tools held. A women's symposium on water conservation was organized on November 22, 2005 (MOWE 2012). The symposium received considerable media coverage and public recognition.

The first stage of the campaign was announced and the first conservation tools bag handed out on February 10, 2004. A total of more than 34 million conservation tools were distributed to around 18 million residents, which is equivalent to 80 % of occupied residences (MOWE 2012). The water conservations tools bag includes water saving showerheads and faucets, 3-l sized toilet-tank-bank replacement bags, and leak detection pills. This campaign is considered to be the largest water conservation campaign of its kind in the world in terms of quantity and quality. The average savings have been 30 % of house water consumption, which is estimated to be 524,000 m³/day (MOWE 2012). The expected annual financial saving resulting from the installation of these tools is estimated at about SAR 900 million (MOWE 2012). The second stage that targeted public sector facilities such as government buildings, schools, mosques, parks, and airports was inaugurated on March 15, 2005. Almost 2.1 million conservation tools were distributed and installed (MOWE 2012). The third stage that targeted the private sector facilities such as hotels, furnished flats, and residential compounds was inaugurated on September 21, 2005. More than 2.5 million conservation tools were distributed and installed (MOWE 2012). In the fourth stage, private sector facilities such as hotels, furnished flats, and residential compounds were targeted. A number of sale points were opened for distributing the water saving showerheads at a nominal price to encourage their usage by the public. More than 592,000 water saving showerheads have been distributed and installed (MOWE 2012).

The contribution of private sector and non-governmental organization (NGOs) to water conservation programs in the Kingdom is very limited. Saudi Aramco, the largest crude oil producer in the world, which is located in the Eastern Province

of the Kingdom, has initiated a water conservation program in their facilities and residential compound. Saudi Aramco's program is the only noticeable private sector contribution to the water conservation program in the Kingdom.

The recently issued Saudi Building Code sanitary section (2007) recommends the installation of water conservation tools including an efficient toilet flushing system, faucets, and showerheads. Being recently issued, the code does not require installing water meters in new buildings. However, it is recommended extending the code requirements to all maintenance and renovation activities and to amend the code to include the enforcement of advanced water meter installation. The code amendment should be prepared based on participatory approach, where key stakeholders such as real estate developers, government officials, and engineering associations should be consulted. Their feedback and recommendations should be incorporated in the code amendment. The generated code amendment implementation should be coupled with a comprehensive consumer education campaigns.

In sum, then the MOWE has exerted substantial efforts towards enhancing domestic water conservation practices in the Kingdom but with limited private sector and NGO contributions. Private sector and NGOs should be encouraged to contribute to the water conservation program. The main challenge that remains is how to make sure that the policy options and instruments provided by the NWS reach inside and outside the water sector, so as to integrate water resources management with all water-consuming sectors of the Kingdom.

Survey design and distribution

A questionnaire survey is an appropriate method to gain insight and to measure public awareness regarding water issues, ultimately to assist in the development of an effective water awareness program for the country. Survey results will establish a baseline understanding of the key issues involved in implementing the current water awareness program. The results may be used to provide a benchmark when monitoring the effectiveness of the MOWE efforts to raise residents' awareness of water conservation initiatives.

On this appreciation, a questionnaire survey was developed and distributed to residents of Al-Khobar city in the Eastern Province of Saudi Arabia, a copy of the utilized questionnaire is included in the “Appendix”. Al-Khobar is a middle-sized city with a population of about 580,000 consisting of both Saudi citizens and international expats. Indeed, the latter form 56 % of Al-Khobar population, while 44 % of the population are Saudis. Most of the international expats are singles making 60 % of Al-Khobar's population male (Saudi Central Department of Statistics & Information 2012).

The municipal water consumption in Al-Khobar is about 400 l per capita per day which is much higher than the KSA national average of 205 l per capita per day (Ouda 2013b). Al Khobar is the hometown of Prince Mohamed Bin Fahd University; this fact facilitated the students' conducting of the questionnaire survey. The survey distribution goal was to collect as much feedback from the public as possible. The survey was distributed to Al-Khobar residents using two methods: online and in person. The survey was made available online. A digital link was made available to the public and university employees through e-mail distribution. The same survey was conducted in person at a university campus, two shopping malls, three hospitals, and various construction sites, to ensure a diversity of respondents. The survey questions were designed in multiple choice formats. The questions were divided into two main groups to measure the public awareness of the water shortage problem in the KSA and their access and usage of water conservation tools at their residence.

Results and analysis

The survey started on April 28, 2012, and continued for 3 weeks. Out of a total of 197 questionnaires completed, 157 were in person and 42 received online. Collected questionnaires were compiled into a PASW SPSS Statistics 18.0 database and Excel Spread Sheet software for analysis and interpretation.

Respondents' demographics

Demographic data were collected from the survey respondents and correlated with the city of Al-Khobar's population. Demographic data include gender, education level, type of house, family size, and family average monthly income. The demographic profile of respondents showed a good correlation with the city's demography. As shown in Fig. 2, the majority of respondents have a high education level, a bachelor degree or higher. This meets the characteristics of Al-Khobar where the majority of the population are well educated international expats and local Saudis working in major petrochemical companies in the area.

Results from the survey show that the majority (60 %) of the respondents are living in apartment buildings as shown in Fig. 3 below: 35 % are living in single houses, and 5 % are living in townhouses. These percentages match the existing housing characteristics of Al-Khobar and Saudi Arabia in general.

Men constitute 60 % of Al-Khobar residents. Saudi culture is conservative and it is hard to conduct a questionnaire with women respondents. The research team tried its utmost to conduct the survey with women but there was a low return of female respondents (13 %), where male

Fig. 2 Respondents education level

Fig. 3 Respondents residence type

returns were 87 %. These are acceptable returns if we consider male-dominant Saudi culture.

Domestic water sources

The KSA has very limited natural water resources and the water demands far exceed the sustainable yield of natural resources, as shown in Table 1. To measure the public awareness of the water resources in the Kingdom, the survey respondents were asked about the main sources of water in the country. The majority of respondents (57 %) believed that desalination plants were the main source as shown in Fig. 4. This is far away from reality as desalination plants provide only about 5 % of the total water demand and about 35 % of municipal and industrial water demand. This result indicates a low level of Al-Khobar residents' knowledge of their tap water sources.

Water shortage

The respondents were asked if they think the KSA has a water shortage problem. About 52 % of respondents answered Yes, 37 % answered No, and 11 % did not know. This result shows a very low respondents' awareness of the country's water shortage issue. The respondents were asked about the best solution for water shortage problem among three options:

Fig. 4 Result of the question: what are the sources of water in KSA

increase sea water desalination plant capacities, expand the utilization of groundwater, or water conservation. Most of respondents (52 %) considered water conservation the best option. This is considered a reasonable starting point for water conservation campaigns but not a good result if we consider the fact that the water conservation program has been in place for the last 9 years in Saudi Arabia. Increasing sea water desalination plant capacities was considered the best solution by 35 % of respondents; the remaining 12 % considered expanding the utilization of groundwater as the best option.

Water meters and water bills

The current level and tariff structure for urban water paid by consumers provides no incentive to conserve water and causes an inconsistent level of per capita consumption with the water scarcity condition in the Kingdom. The KSA is adopting block rate water tariff system where water price increases in a systematic way according to consumer consumption rate. The block rate system is a very efficient water demand management tool if it is well structured and water is efficiently metered. The tariff per cubic meter of domestic water is US\$0.027 for the first 50 m³, US\$0.04 for the next 50 m³, US\$0.53 for the next 100 m³, US\$1.07 for the next 100 m³, and US\$1.6 for any consumption above 300 m³ (Ouda 2013b). The survey results showed that about 33 % of respondents have a water meter installed in their houses and received a monthly water bill. This is a very low percentage and more work is needed towards installing a water meter for each consumer to enhance water conservation practices. 52 % of respondents that do not have a water meter installed in their houses are willing to install a water meter. The remaining preferred to keep the current practices of including their water cost in their monthly house lease cost. The respondents were asked if they pay a lot of money for water. The majority (59 %) answered No, while 12 % answered Yes, and 29 % answered they were not sure. Most of the respondents who received monthly water bill pay less than US\$10 per month for water as shown in Fig. 5. The following pie diagram shows the potential to gradually increase the water price in

Fig. 5 Results of the question: how much is your average monthly water bill

the KSA towards a sustainable price and to install a water meter for every consumer.

Water conservation practices

In 2004, the KSA government mounted a national campaign to promote residential water conservation practices. The campaign includes among other activities a spread media campaign to increase the awareness of the public regarding water conservation and provisions for the distribution of a free supply of water conservation tools. As already indicated, the water conservations tools bag includes a water-preserving showerhead and faucet, a 3-l sized toilet-tank-bank replacement bag, and leak detection pills. The respondents were asked about the merit of water conservation practices and in reply the vast majority (88 %) considered water conservation as valuable and an important issue and 65 % of them said they are willing to pay for water conservation tools cost. When asked if they have any water conservation tools installed in their houses, 57 % of respondents answered Yes, while 43 % answered No. This is again a good coverage if not considering the massive free distribution program of water conservation tools implemented by MOWE since 2004 to date. Respondents, having installed water conservation tools in their houses, were asked to specify the tools. A list of free distributed MOWE's conservation tools were presented to the respondents. The respondents select the tools that he/she has already installed in his/her house. Figure 6 shows that 34 % is the highest rate for showerhead-preserving tools. The relatively low percentage of installed tools raises the question about the efficiency of the MOWE free conservation tools distribution program.

Conclusions and recommendations

The Kingdom of Saudi Arabia has a substantial water shortage problem where water demand far exceeds the sustainable yields of both conventional and non-conventional water resources. This fact has galvanized the

Fig. 6 Percentage of installed water conservation tools

Ministry of Water and Electricity to restructure the water sector and to prepare a National Water Strategy (NWS) to be used as a roadmap towards sustainable water usage. This research has reviewed the water conservation awareness program in Saudi Arabia and assessed the program performance through conducting questionnaire surveys.

A questionnaire survey was designed and implemented in Al-Khobar city in the Eastern Province to measure public awareness regarding water issues and ultimately to assist in the development of an effective water awareness program for the country. Furthermore, the results of the survey we conducted can help establish a baseline understanding of key issues regarding the currently implemented program. The survey started on April 28, 2012, and continued for 3 weeks. Out of a total of 197 questionnaires completed, 157 were done in person and 42 received online. The survey results showed a relatively low awareness among respondents about the water shortage problem in the Kingdom. Although a low percentage of respondents have water conservation tools installed in their houses a high percentage are willing to buy and install water conservation tools. The majority of respondents consider the water price low and are willing to pay more for water. Overall, the respondents' feedback highlighted the need to improve the current water awareness program.

In conclusion, water conservation program is very important to the country and it is economically justified where the only accessible source of potable water is the costly desalinated sea water. In the future, water conservation programs should be locally tailored to meet Saudi cultural, socioeconomic, religious, political and legal characteristics. This includes scientifically identifying historical water conservation practices in the Kingdom and encourages its implementation; and highlights the religious value of water and water conservation practices. Awareness campaigns should be expanded through school

programs, via the media and other means. Awareness is the responsibility of the private sector and NGOs too—their contribution is crucial. The Saudi Building Code promotes water conservation and should be implemented strictly and amended based on participatory approach to include water metering requirements. Also, a periodic review of water conservation programs is highly recommended. The review should include a questionnaire survey to assess the program performance on which basis modifications suggested.

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Appendix: questionnaire

The questionnaire aims to assess residential water consumption practices in Al-Khobar city. The gathered data shall be used for Academic purposes only.

The Questionnaire aims to assess residential water consumption practices in Al Khobar City. The gathered data shall be used for Academic purposes only.

1. What are the main sources of water in KSA?

- ☐ I don't know ☐ Ground Water ☐ Surface water ☐ Desalination
- ☐ Other, please specify: _____

2. Do you think KSA has a water shortage problem?

- ☐ Yes ☐ No ☐ I don't know

3- If yes, what do you think is the best solution?

- ☐ More desalination ☐ Use more ground water ☐ Apply water conservation
- ☐ Other, please specify: _____

4. If you chose desalination, how much do you think it costs to desalinate a cubic meter? (SAR)

- ☐ 0.1 – 1 ☐ 1 – 2 ☐ 3 – 4 ☐ 4 – 5 ☐ More than 5

5. Is water conservation important to you?

- ☐ Yes ☐ No

6. Are you willing to purchase water conservation tools?

- ☐ Yes ☐ No

7. Which of the following conservation tools have you installed in your home?

- ☐ High-pressure facets ☐ Save showerheads ☐ Toilet tank bank
- ☐ Leak detection pills ☐ None

8. What should be the cost of water (utilized) on a monthly basis? (SAR)

- ☐ 0 – 20 ☐ 20 – 50 ☐ 50 – 120 ☐ 120 – 250
- ☐ 250 – 500 ☐ 500 – 1000

9. Do you have a garden at home? If no, go to question 13

- ☐ Yes ☐ No

10. Do you have an irrigation system?

☐ Yes ☐ No

11. How many times do you irrigate per week?

☐ 1 – 2 ☐ 3 – 4 ☐ 5 – 7

12. Are your plants suitable for the weather conditions in Al-Khobar, in-terms of water required?

☐ Yes ☐ No

13. Have water leakages ever occurred at your home at any given time?

☐ Yes ☐ No

14. If yes, could you mention the period of time taken to fix it? (Days)

☐ 0 – 2 ☐ 3 – 5 ☐ 5 – 8 ☐ 9 – 11

15. Do you own a swimming pool? If no, go to question 18

☐ Yes ☐ No

16. How often before you change the water in your pool?

☐ Bi-weekly ☐ Monthly ☐ Bi-monthly ☐ Semi-annually ☐ Annually

17. What is the volume of your swimming pool? (m³)

☐ 50 – 80 ☐ 80 – 120 ☐ 120–160 ☐ 160–200 ☐ More than 200

18. How many cars do you own?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

19. How often do you wash your car?

☐ Daily ☐ 2 Days ☐ 3 Days ☐ Weekly ☐ Bi-weekly

20. How do you usually wash your car?

☐ Bucket ☐ Hose ☐ Carwash station

21. Do you have a yard in your house?

☐ Yes ☐ No

22. How do you clean your yard?

☐ Hose ☐ Mob ☐ Other, please specify

23. Do you own / lease your house?

☐ Own ☐ Lease

24. What kind of house is it?

☐ Apartment ☐ Single house ☐ Townhouse

25. How many bathrooms do you have?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ More than 5

26. How many kitchens do you have?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

27. How many bedrooms do you have?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ More than 5

28. How many residents occupy your home ?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ More than 10

29. Do you have a water meter installed at your house?

☐ Yes ☐ No

30. If no, are you willing to install a water meter?

☐ Yes ☐ No

31. If no, could you explain why?

Please specify: _____

32. Are you connected to the municipality water supply network? If no, go to question 37

☐ Yes ☐ No ☐ I don't know

33. If yes, how regular is the water supply?

☐ Daily ☐ 3 Days ☐ Weekly ☐ Bi-weekly

34. Is the water supply sufficient to satisfy your needs?

☐ Yes ☐ No

35. Do you have a water pump installed in your house?

☐ Yes ☐ No ☐ I don't know

36. If yes, when was it installed?

☐ This year ☐ Last year ☐ 2 – 5 years ☐ 5 – 10 years
☐ More than 10 years ago ☐ I don't know

37. Do you use water tankers?

☐ Yes ☐ No

38. If yes, how many tankers/week would be required?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

39. What is the tanker's volume? (m³)

☐ 2.5 ☐ 18 ☐ 36 ☐ Other, please specify: _____

40. How much is the cost per tanker? (SAR)

Please specify: _____

41. Do you receive a monthly bill for your water consumption?

☐ Yes ☐ No

42. If no, who pays your water bill?

☐ My employer ☐ Included in the rent ☐ I don't know

☐ Other, please specify: _____

43. If yes, how much is your average monthly bill? (SAR)

☐ 0 – 50 ☐ 50 – 100 ☐ 100 – 250 ☐ 250 – 500

☐ More than 500

44. Do you think you pay a substantial amount for water per month?

☐ Yes ☐ No ☐ I am not sure

45. How much is the family's monthly income? (SAR)

☐ 2,000 – 5,000 ☐ 6,000 – 11,000 ☐ 12,000 – 18,000 ☐ More than 20,000

46. What is your level of your education?

☐ High school ☐ Diploma ☐ Bachelor ☐ Masters ☐ PhD

47. Gender:

☐ Male ☐ Female

48. Extra information:

- Occupation:
- Age:
- City:
- District:

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