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The Politics of Assessment: Water and Sanitation MDGs in the Middle East

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ABSTRACT

The Middle East and North Africa (MENA) is generally considered to be making adequate progress towards meeting Target 10 of the Millennium Development Goals (MDGs), which calls for halving the proportion of the population with inadequate access to drinking water and sanitation. Progress towards achieving Target 10 is evaluated by the Joint Monitoring Programme (JMP), run by UNICEF and WHO. This article shows that the assessment methodologies employed by the JMP significantly overstate coverage rates in the drinking water and sanitation sectors, by overlooking and 'not counting' problems of access, affordability, quality of service and pollution. The authors show that states in MENA often fail to provide safe drinking water and adequate sanitation services, particularly in densely populated informal settlements, and that many centralized water and sanitation infrastructures contribute to water pollution and contamination. Despite the glaring gap between the MDG statistics and the evidence available from national and local reports, exclusionary political regimes in the region have had few incentives to adopt more accurate assessments and improve the quality of service. While international organizations have proposed some reforms, they too lack incentives to employ adequate measures that gauge access, quality and affordability of drinking water and sanitation services.

INTRODUCTION

Improving access to potable water and sanitation in developing countries is an integral part of the United Nations Millennium Development Goals (MDGs), endorsed by 189 states in 2000. The MDGs sought to halve the proportion of the world's population living in poverty, reduce child mortality, improve maternal health, combat major diseases, increase gender equality, provide universal primary education, form a global partnership for development and improve environmental sustainability (UN, 2009). Under Goal 7, improving environmental sustainability, Target 10 sought to halve

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the proportion of people worldwide without adequate access to safe drinking water. In 2002, the objective of halving the proportion of those living without access to safe sanitation was added to the target.[1]

To monitor progress towards achieving Target 10, the UN established the Joint Monitoring Programme (JMP) for Water Supply and Sanitation between UNICEF and the World Health Organization (WHO). In 2008 and again in 2010, the JMP concluded that with few exceptions the Middle East and North Africa (MENA)[2] was on track towards meeting Target 10 (Progress on Drinking Water and Sanitation, 2008, 2010). However, as this article demonstrates, the JMP's current assessment techniques for measuring access to water and sanitation systematically overstate coverage rates, while not adequately capturing the extent to which water is unsafe and sanitation inadequate. The JMP measures coverage rates by distinguishing between technologies that deliver 'improved' water and sanitation and those that do not. As we will show, some of these technologies do not deliver 'improved' water, but polluted, unsafe and intermittent drinking water. Similarly, 'improved' sanitation facilities are often inadequate, contributing to rapidly increasing groundwater and surface water pollution.

We argue that the JMP's reliance on classifying 'improved' and 'unimproved' water and sanitation infrastructure, through infrequent household surveys, has produced misleading assessments that fail to capture the extensive water quality and sanitation problems plaguing the MENA. In fact, when considering the safety of water available to households and the safety of sanitation services in protecting people or ecosystems, many MENA states are failing to address the needs of the most vulnerable populations.

With less than five years to go until the 2015 deadline for meeting the MDGs, we seek to draw attention to the most problematic issue. That is, even if states in the MENA achieve Target 10 according to the current MDG assessments, we will not know to what extent these states actually provide safe drinking water and sanitation services.[3] Consequently, it is essential to consider whether current assessment methods actually measure achievement towards expanded access in water and sanitation. We argue that an accurate assessment of Target 10 should include ensuring access and affordability for the poor, treatment systems in place for wastewater and waste, and minimum water quality standards. Yet international organizations (IOs) and national leaderships in the MENA lack substantial incentives to adopt more accurate assessments for safe water and sanitation. From the standpoint

1. The target specifies: 'halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation' (UN, 2009: 45).
2. While the JMP relies upon the UN's geographical classification of North Africa and Western Asia, we have chosen to use the more widely accepted geographical construct of the Middle East and North Africa, which allows us to take into account the tremendous economic diversity of the region that spans the Maghreb to the Gulf States.
3. Indeed, as others have found in the study of regime effectiveness, perfect compliance with a goal does not necessarily mean that the problem will be solved (Young, 1994).

of IOs, more accurately gauging access, quality and affordability of water and sanitation may reduce the 'measurability' and 'standardization' of the MDG targets, premised upon generating comparable data across time and space. Similarly, the exclusionary nature of many MENA regimes means that political leaderships have had few incentives to reveal the poor state of their water quality or adopt more accurate assessments. Domestic leaderships find general and vague indicators politically useful, as a focus on these obfuscate their very real deficiencies in providing access to safe water and sanitation.

The article is organized as follows. The next section highlights the impact of poor water quality and unsafe sanitation on human health, economic productivity and ecosystem services in the MENA. The following section presents the JMP findings regarding progress towards delivering potable water and sanitation in the MENA. We then re-evaluate the region's progress in light of empirical material documenting lack of access, affordability, water quality and effective wastewater and waste treatment systems. Lastly, we highlight some of the national and international incentives contributing to the JMP's inability to capture the poor quality of water and sanitation services in the region.

WATER, HEALTH AND DEVELOPMENT IN THE MENA

The failure to provide people with safe drinking water and basic sanitation services is estimated to contribute to the deaths of approximately 3.5 million people annually from waterborne diseases (Prüss-Üstün et al., 2008).[4] Consumption of or contact with contaminated water contributes to waterborne diseases, water-washed diseases and water-based diseases, all of which produce diarrhoea responsible for 60 per cent of infant mortality throughout the world (Montgomery and Elimelech, 2007). The UN has compiled rough estimates of global mortality from waterborne diseases and poor water quality to highlight the importance of safe water and sanitation. In 2003, UNDP suggested that the number of children who had died from diarrhoea during the 1990s was greater than the total number of people who had died during armed conflict since World War II (UNDP, 2003). The United Nations Environment Programme (UNEP) and UN Habitat updated these estimates in 2010, concluding that more people die from poor water quality than from war or other forms of violence (Corcoran et al., 2010). UN agencies have also increasingly highlighted how inadequate sanitation has contributed to the pollution of the world's finite freshwater supplies and resulted in the destruction of fragile ecosystems (UNICEF, 2008). Simply put, these reports underscore the fact that increasing access to basic sanitation services and safe water supplies is the most critical component in reducing

4. See also: http://water.org/learn-about-the-water-crisis/facts/

infant and child mortality, and underpins policies to reduce poverty and improve environmental outcomes (Swedish Research Council, 2009).

Locating accurate data on the human health impacts of poor water quality for most countries in the MENA region is difficult because of under-reporting and states' lack of interest in providing this information. In fact, a WHO report tracking cholera outbreaks throughout the world from 2007 to 2009 had data available for only one nation in MENA, Iraq.[5] Nevertheless, we can draw on the existing literature for rough estimates. In the MENA (excluding the Gulf countries, Israel and Libya) the World Bank estimated that diarrhoea from drinking contaminated water caused 22 deaths per 100,000 in 2002 (World Bank, 2007: 108).[6] Children and women in the MENA suffer the most from water-related disease, and 75 per cent of the burden is felt in rural areas (ibid.). Annually, diarrhoea contributes to the deaths of 6,000 children under the age of five in Morocco (ibid.: 109). In the case of Jordan, diarrhoeal disease from drinking contaminated water or unwashed food is a significant public health risk for children and adults (Nimri, 2003). For the Gaza Strip, the WHO estimated that 26 per cent of all diseases are connected to poor water quality (World Bank, 2009).

Waterborne diseases have negative long-term effects on families. Children surviving diarrhoea are likely to be malnourished and anaemic, which can threaten their future physical health as well as economic productivity. The rehydration and survival of children affected by waterborne illnesses depends upon the procurement of clean water (*The Economist*, 2010). Given children's weakened immune systems from repeated episodes of diarrhoea, they are likely to be vulnerable to other diseases and epidemics (Marino, 2007). Repeated episodes of diarrhoea can also leave children cognitively impaired and their future plagued by poverty.

These diseases affect family income not only through the decrease in economic productivity of the sick family member, but also through the increasing cost of official and unofficial healthcare (Gleick, 2002). Lack of access to safe water can also reduce family income through the time that women and girls spend collecting water for their families rather than in school or in paid employment (World Bank, 2003). Indirectly, the lack of sanitation hinders girls' advancement in relation to boys because, in the absence of toilets, girls will often stay home rather than go to school (US Department of State, 2009).

Water-related diseases have a direct negative impact on national economies. In the MENA, water pollution is estimated to cost between 0.5 per cent and 2.5 per cent of GDP annually, with Iran, Morocco, Jordan, the Gaza Strip and Lebanon among the most severely affected countries (World Bank, 2007, 2009). National development programmes

5. See: http://www.who.int/gho/epidemic_diseases/cholera/en/index.html
6. In Latin America and the Caribbean region, which had similar income and service levels, the number was only 6 deaths per 100,000 (World Bank, 2007: 108).

are also compromised by poor water quality. In Egypt, the government invested heavily for twenty-five years in a programme to increase child survival, focusing on the provision of preventative health measures, such as vaccinations and potable water. The reductions in child mortality rates were 'spectacular', yet the rate of improvement has slowed dramatically. Some Egyptian experts argued that this is because children's living conditions, particularly with regard to sanitation, have not improved commensurately with health services and provision of potable water (United Nations Development Programme and Institute for National Planning, 2004).

Providing potable water and safe sanitation systems is thus a relatively inexpensive, effective means to improve public health (Montgomery and Elimelech, 2007). A one-dollar investment in water and sanitation is estimated to have an eight-dollar economic rate of return (Swedish Research Council, 2009). This high rate of return derives from the fact that safe water and sanitation underpin achieving MDGs related to poverty, health, schooling and gender equality (Shordt et al., 2004).

Providing potable water and basic sanitation services is particularly essential for the MENA given its limited freshwater supplies. Containing 5 per cent of the world's population, the MENA possesses less than 1 per cent of the world's available freshwater (Al-Jayyousi, 2004; World Bank, 2007). High population growth rates, contamination of existing supplies and climate change are interacting to aggravate MENA's freshwater crisis (Sowers et al., 2011). Projected population growth rates for 2025 mean that per capita water availability is expected to decline in the range of 30 per cent to 70 per cent over the next few decades (ibid.: 605).

Without exception, the MENA states have over-exploited their renewable and non-renewable sources of surface and groundwater, usually to support irrigated agriculture (IFAD, 2009).[7] Anthropogenic influences compound naturally occurring forms of water contamination in the MENA. Salinity has affected numerous basins in Israel, West Bank and Gaza, Jordan, Lebanon, Syria and Egypt, causing the closure of thousands of wells in the region (Marie and Vengosh, 2001; Vengosh and Rosenthal, 1994; Vengosh et al., 2005). Climate change scenarios, furthermore, predict that the MENA's freshwater crisis will get worse in the near future (IPCC, 2007; UNDP-PEQA, 2009). These models suggest a significant decrease in the overall freshwater supplies throughout the MENA (Evans, 2009). Projected impacts of sea-level rise from climate change will also accelerate processes of salinization in the freshwater layers of coastal aquifers. As the quantity of freshwater decreases further, governments within the MENA are likely to confront severe challenges in meeting current and future drink-

7. In Jordan, the safe yield of aquifers is estimated at 275 million cubic metres per year (mcm/yr.), but the current extraction rate is 520 mcm/yr., which has resulted in depletion and salinization of major aquifers (Bajjali and Al-Hadidi, 2005).

ing water and sanitation needs. Governments will attempt to increase water supplies through various measures, including importing 'virtual water' in food imports, as they have done in the MENA for decades (Allan, 1997, 2001). Even so, rapidly expanding cities like Amman are forced to tap non-sustainable sources of water such as low-saline fossil groundwater from the Disi aquifer to meet growing demand (Vengosh et al., 2009).

Population growth combined with increased living standards and expanded access to water increases not only *demand* for water — contributing to scarcity — but also generates increased flows — or *supply* — of wastewater that, without proper treatment, degrades water quality significantly. Thus, deteriorating water quality in the MENA stems in part from increased provision of potable water without commensurate investment in infrastructures to treat and redistribute water. Success in expanding potable water coverage in Egypt, for instance, has increased municipal flows into the drainage networks and contributed to rising groundwater tables (UNDP and INP, 2004). In turn, rising water tables have leached contaminants from shallow pit latrines, agricultural chemicals, landfills and solid waste sites. In a vicious circle, water pollution now threatens the very groundwater supplies used extensively for potable water consumption (ibid.).

MEASURING PROGRESS: JOINT MONITORING PROGRAMME METHODS

To assess states' progress towards providing sanitation and potable water, the JMP relies on two principal indicators. These are the 'proportion of population using an improved drinking-water source' and the 'proportion of population using an improved sanitation facility' (UNICEF and WHO, 2010: 34). To measure improved access to water resources, surveys ask households which technology they use to access water. 'Improved' sources include piped household water, public standpipes/taps, boreholes, protected wells, protected springs and rainwater collection. These indicators were selected based on the assumption that 'improved drinking water technologies are more likely to provide safe drinking water than those characterized as unimproved' (UNICEF and WHO, 2006b: 4). Drinking water supply is considered unimproved if it comes from unprotected wells or springs, tanker truck or small cart, or is drawn from surface water; bottled water is also considered 'unimproved' (UNICEF and WHO, 2008). Measurement of access to improved sanitation involves a similar question about whether households have access to public piped sewers, septic tanks, flush, pit, or ventilated latrines and composting toilets (UNICEF and WHO, 2006a). Unimproved access to sanitation facilities includes a pit latrine without slab, use of a bucket, hanging toilet, open defecation and flushing whereby excreta exit to the street, yard or open sewage (UNICEF and WHO, 2008).

The JMP relies on household survey data and assessment questionnaires.[8] Household survey data are gathered from Demographic Health Surveys, UNICEF's Multiple Indicator Cluster Surveys, World Health Surveys, and national demographic censuses. Using household survey data to assess coverage is a significant improvement from relying on inaccurate and often inflated official estimates of coverage (UNICEF and WHO, 2006b). In addition to survey data, assessment questionnaires are sent to country representatives of the WHO, who complete them with assistance from UNICEF staff and national agencies (Schordt et al., 2004: 28). Yet, the indicators used to measure states' progress towards achieving Target 10 have some shortcomings (Anand, 2006; Dar and Khan, 2011).

In 2004, the JMP added new questions to the household surveys in an attempt to improve assessment of water quality. The first question sought to identify the main source of drinking water for the household which, as mentioned previously, is considered a proxy indicator for whether drinking water is safe (UNICEF and WHO, 2006a: 6). Households were also asked whether they treat their water and if the response was affirmative, they were asked about the treatment method.[9] The JMP acknowledged that even with the addition of these questions, the survey does not adequately capture the quality of drinking water (ibid.).

To begin to address this problem, the JMP initiated the Rapid Assessments of Drinking-Water Quality (RADWQ) in six countries, including Jordan (Properzi, 2010).[10] In contrast to the household surveys, the RADWQ relies upon cluster sampling. Field teams in Jordan, for example, collected samples in 2004/2005 from approximately 1600 drinking water supply sites in 67 clusters (ibid.).[11] These tests were much more comprehensive than the household surveys as municipal water samples were collected and tested after treatment and upon reaching the household. However, the JMP maintains that these alternative measures for accurately gauging water quality are too complex to be routinely employed throughout the world and are prohibitively expensive (UNICEF and WHO, 2010: 31).

Since 2000, the JMP has focused on the type of sanitation facility available to individuals and households. Facilities are classified as 'improved' if they can separate human excreta from human contact, which can minimize the spread of diseases (UNICEF and WHO, 2010). However, we argue that the indicators selected to classify facilities as safe are inaccurate because many MENA states are not treating their wastewater and waste in an effective manner.

8. As of 2010, the JMP has collected 729 nationally representative household surveys.
9. The options available to the households include boiling the water, adding bleach/chlorine, using a water filter, solar disinfection, letting it stand and settle, or other methods.
10. The other countries were China, Ethiopia, Nicaragua, Nigeria and Tajikistan.
11. Tests were conducted for thermotolerant coliforms, pH, turbidity, faecal streptococci, appearance, conductivity, free/total chlorine, arsenic, nitrate, fluoride and iron, along with additional samples from households at 10 per cent of the sites.

Drinking Water and Sanitation Coverage in the MENA

In their last two annual reports, the JMP concluded that many states in the MENA are on track to meeting their water and sanitation target. Aggregate data from the JMP comparing the MENA to other developing regions appear to support this conclusion. The JMP reported that in 2008, drinking water coverage in sub-Saharan Africa was 60 per cent, in South Asia 87 per cent, but in the MENA drinking water coverage was between 90 per cent and 92 per cent. During the same period, 31 per cent of people in sub-Saharan Africa and 36 per cent in South Asia had access to sanitation, while the coverage in the MENA was reported as between 85 per cent and 89 per cent (UNICEF and WHO, 2008, 2010). Similar conclusions were also reported in the 2009 *Arab Human Development Report*, which found that coverage of water needs increased from 83 per cent in 1990 to 85 per cent in 2004, at a time when the total population increased from 180.1 million to 231.8 million (UNDP, 2009).

During the 1990s, many of the region's governments undertook a rapid expansion in the distribution of water supplies and sanitation services. As shown in the Appendix, the JMP reported that Egypt, Jordan, Tunisia and Turkey had drinking water coverage above 90 per cent in 2008. Algeria, Egypt, Jordan, Syria and Turkey were reported to have sanitation coverage at 90 per cent or higher. Yet, other MENA countries have not followed suit. Iraq, Djibouti and Yemen, in particular, have the most inadequate potable water and sanitation coverage: Yemen's 19 per cent rural sanitation coverage was one of the region's lowest rates.

The MENA region exhibits a persistent urban–rural divide in drinking water and sanitation coverage, as shown in Appendices I and II. Algeria, Djibouti, Iraq, Jordan, Morocco, Oman, Palestine, Syria, Tunisia and Yemen all illustrate this divide for drinking water. For instance, Morocco's urban areas have 98 per cent coverage, while the rural areas have 60 per cent drinking water coverage. Oman's urban areas have 92 per cent drinking water coverage, while the rural areas have 77 per cent coverage. In 1998, the urban–rural divide in sanitation coverage was largest in Algeria, Djibouti, Morocco, Palestine, Tunisia, Turkey and Yemen. Yemen had perhaps the largest gap in coverage with urban sanitation coverage of 94 per cent and rural coverage of 33 per cent. In contrast, Libya, Jordan, Syria and the UAE showed almost no difference in urban versus rural sanitation coverage.

Even according to JMP assessments, not all the MENA states have consistently expanded coverage over time. Egypt, Morocco, Oman, Tunisia and Turkey have succeeded in improving their population's access to water, while coverage in Algeria, Djibouti, Palestine and Yemen declined between 1990 and 2008. These figures most likely reflect the weakening capacity of state institutions to provide basic services under conditions of civil conflict (e.g., Algeria and Yemen) or war and closure (Palestine). As for sanitation coverage, Egypt, Morocco, Syria, Tunisia, Turkey and Yemen achieved

increased coverage, while Djibouti experienced a decline. Sanitation coverage in Israel, Kuwait, Libya, Oman, Palestine, Qatar and the UAE remained unchanged, while the picture was mixed in Algeria, Jordan and Iraq.

According to the JMP, as of 2006, 30 million people remained without access to safe drinking water in the MENA and 69 million people without adequate sanitation services (World Bank, 2007: 40). Moreover, even if all the MENA states achieve the MDG goals using the JMP's inadequate assessment methods, 14 million people in the region would remain without access to safe water and 40 million without basic sanitation (World Bank, 2007: 41).

Informal Areas and Deprived Populations

Identifying variations in access to water supply and sanitation can reveal highly concentrated pockets of deprivation. These areas do not always fit the formal designations of urban and rural areas that have become central to the JMP assessments. In much of the MENA, official designations of rural and urban areas are often highly inaccurate and do not reflect increasing population densities in both areas. In the Nile Delta and Nile Valley, for instance, there has been rapid growth in and around towns, villages and hamlets even as these remain classified as rural areas. Figures for 'rural' sanitation coverage thus apply to village agglomerations that often contain 10,000 people. These urbanizing agglomerations introduce significant contamination into irrigation and drainage networks as sanitation coverage is almost entirely lacking (World Bank, 2008). Faced with scarce resources, the government explicitly prioritized formally designated urban areas rather than rapidly growing villages, hamlets and secondary cities (UNDP and INP, 2004).

Conceptualizing urbanization in terms of population densities rather than formal administrative boundaries that are often hopelessly outdated leads to more accurate mapping of urban areas. In Egypt, such methods suggest that between 45 and 60 per cent of the urban population lives in 'informal' areas that are not legally recognized by the state (World Bank, 2008: 1). In Greater Cairo, whose estimated 20 million inhabitants make it the largest urban agglomeration in the MENA, residents of informal areas account for 65 per cent of the total urban population (Kipper and Fischer, 2009). In Egypt's second largest city, Alexandria, participatory assessments of the city identified thirty 'informal' settlements housing almost 40 per cent of the city's population (Euweida and Husar, 2008). These assessments, based on surveys among residents, reported that seven out of twenty of the surveyed informal areas lacked water supply and ten (50 per cent) had no access to a sanitation and wastewater network (ibid.).

The correlation between increasing population densities in 'informal' areas, whether rural or urban, and lack of access to drinking water and

sanitation, is not unique to Egypt. Informal or unplanned areas constitute much of the urban expansion observed in places such as Lebanon and Jordan (UN-Habitat, 2008; World Bank, 2010). It is estimated that a third to a half of the urban population in the developing world lives in 'informal' densely populated settlements, where many lack regular access to tap water and secure sanitation services (Shordt et al., 2004).

Increasingly, donors and states bundle water and sanitation services into plans for upgrading informal areas ('slums' in the language of MDG Target 15). In Egypt, plans were drawn up in the early 1990s to upgrade a total of 1,201 informal areas by extending water and sanitation services. As of 2008, approximately 30 per cent of these areas had been upgraded and another 50 per cent were in progress (Sayed, 2009: 110).

In addition to densely populated settlements in rural and urban areas, refugee and nomadic populations constitute another particularly underserved group. Nowhere is this as blatant as with the Palestinian refugee population. While the United Nations Relief and Works Agency insists that 100 per cent of all refugee camp shelters are connected to a public water supply network and 82 per cent are connected to public sewerage,[12] this masks the fact that the Palestinian refugee population cannot develop their water sector independently (Palestinian National MDG Steering Committee, 2005). Furthermore, while an impressive percentage of the Palestinian population is connected to a network household water delivery system — 84 per cent of Palestinian households in the West Bank and 98 per cent of the households in the Gaza Strip are connected to a network system (World Bank, 2009) — the combination of poor maintenance and conflict has meant that these networks are plagued by leakages, theft, intermittent supply and contamination (UNDP-PEQA, 2009; World Bank, 2009). Compounding this are the endemic effects of the occupation that have reduced the quantity and quality of available water (Palestinian National MDG Steering Committee, 2005; UNDP-PEQA, 2009). One estimate suggests that 91 per cent of the water delivered to households in Gaza from municipal wells is unsuitable for human consumption due to high levels of nitrate and chloride (Palestinian National MDG Steering Committee, 2005).

Refugee and nomadic populations are vulnerable even within states reporting 100 per cent water coverage. In Israel, where water resources are public property and the government recognizes that every person has a right to receive water for domestic needs, the infrequent recognition of Bedouin land claims has meant that approximately 60,000 Bedouins are not connected to the national water network, precisely because the Israeli government does not recognize their villages (Keinan, 2005: 4, 26).[13] The result is that these

12. See: www.unrwa.org/userfiles/2010101275635.pdf
13. Recognition is not the only problem. The Bedouin village of Darijat in the Negev was recognized in 2004, but even then it took five years to connect the village to the water network (Yagna, 2009).

villages fall outside of the numbers that feed into the MDGs. Many Bedouin communities also live in 'shanty towns' on the outskirts of Beer Sheeva and other cities in the Negev, where they not only lack access to safe water and sanitation, but also face the threat of demolition, as was the case in the 'unrecognized' village of al-Arakib (Khoury and Yagna, 2010).

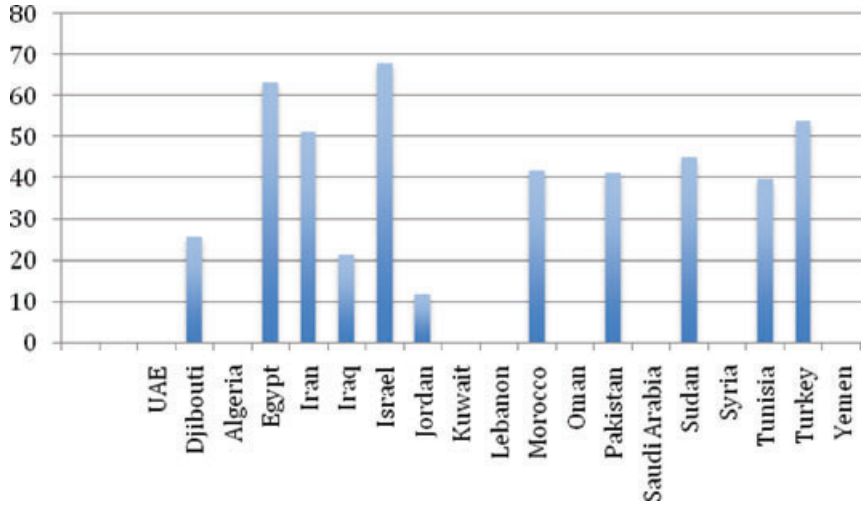
THE SITUATION ON THE GROUND: WATER QUALITY AND SANITATION IN THE MENA

In contrast to JMP's assessments of safe water and sanitation, a variety of data sources in the MENA paint a more accurate, if grim, portrait of access to safe water and basic sanitation. These sources include participatory assessments, reports from other UN agencies, donor projects, domestic ministries and agencies and academic research. While the information provided in these reports can be contradictory and incomplete, and is often not directly comparable to the JMP figures, the general trends are much less sanguine than the JMP coverage rates suggest.

Problems with water quality are increasingly documented in many of the MENA states. The 2008 Environmental Performance Index for the MENA region reveals some of these water quality problems. The index combines data from five commonly sampled parameters — dissolved oxygen, electrical conductivity, pH, total phosphorus and total nitrogen — to create composite national indices to indicate water quality problems including eutrophication, nutrient pollution, acidification and salinization (YCELP and CIESIN, 2008). As Figure 1 reveals, none of the MENA states achieve a score of more than 70, where 100 is classified as meeting international standards for water quality. This water quality index was not calculated for the oil-rich states in the Gulf, Syria, Yemen, Algeria and Lebanon, indicating either a lack of effective monitoring systems or a lack of data submission. Israel, Egypt and Turkey have the highest index scores, while Jordan, Djibouti and Iraq have the lowest.

Few states in the region have publicly known and acceptable standards of water quality for their drinking water compared with internationally recognized recommendations set by the WHO. Saudi Arabia, Yemen, Qatar, Libya and the UAE lack publicly accessible drinking water standards or they have yet to establish standards. For those states with set standards, most are within WHO recommendations or slightly above them. As Bruch et al. (2007: 604) found: 'A number of countries — including Algeria, Egypt, Jordan, Morocco and Syria — have set drinking water quality standards that are modelled after those of the WHO and amended to suit each country's local conditions'. Some countries, such as Yemen and Tunisia, issued standards that do not comply with WHO guidelines. Even in Israel, known for its high coverage rates for safe water and sanitation, the acceptable limit for chloride and nitrate contents are 600 and 70 mg/l respectively, well above the

Figure 1. Composite 2008 Water Quality Index for the MENA
(100 = meets water quality goals; 0 = no index calculated)



Source: Calculated from YCELP and CIESIN (2008).

WHO drinking water guidelines of 250 and 50 mg/l (State of Israel Ministry of Health, 2000).

According to the JMP, Lebanon has 100 per cent coverage for 'improved' drinking water in both rural and urban areas. A 2005 survey, however, found that only 56.1 per cent of Lebanese use the public network for drinking water, while 31.5 per cent rely on bottled water (considered unimproved by JMP) and 8.3 per cent rely on private, unregulated sources, including wells (Council for Development and Reconstruction, 2005). Other sources highlight much higher use of wells but do not generally indicate whether wells are protected or unprotected. An estimated 45,000 artesian wells, for example, were dug throughout the country to cope with the destruction of infrastructure from Lebanon's civil war (Darwish, 2004: 117), with one report estimating that these provided around 40 per cent of all water consumption in the country in the early 2000s (Makdisi, 2007: 378). In Lebanon, one of the unintended consequences from the digging of artesian wells has been further water contamination through seawater intrusion (Darwish, 2004).

Furthermore, in peripheral, rural areas and even in densely populated 'suburbs' of major cities, public water supply networks are either lacking altogether or provide only intermittent supply. In Beirut, an estimated 20 per cent of dwellings are not connected (Makdisi, 2007: 378). For those households connected to public systems, water supply is highly variable. The 2008 Lebanon Report for the MDGs noted that in summer, 80 per cent suffer delivery failure, while almost half of households surveyed reported

failed service in winter (Samad, 2009: 63). Outages can last from a few hours a week to a few hours a day. Residents who can afford to rely on bottled water do so not only because of supply disruptions, but also because an estimated 60–70 per cent of both natural and piped water contains chemical or biological contaminants, according to UNICEF (ibid.: 379).

While the JMP considers piped household water as an improvement in water coverage, it fails to differentiate between 'full' coverage and 'partial' coverage, that is, household water supplies available only a few hours a week. Whereas some countries have continuous tap water supplies, Lebanon, Palestine and Jordan have selected intermittent distribution systems, which allow states in arid regions to ration water supplies (Wardam, 2004; World Bank, 2009). The choice of municipal water distribution system thus directly affects the drinking water quality available to households.

Intermittent distribution systems for potable water contribute to the contamination of post-treated household water (Abu-Shams and Rabadi, 2003). By leaving the distribution system unpressurized for long periods, pipes become contaminated by the re-growth of bacteria and infiltration. Once pipes are back in use, treated water becomes polluted as it travels to households, resulting in contaminated tap water. Damaged, rusted or worn-out pipes in the distribution system increase water pollution and heighten the risk of waterborne diseases (Abu-Shams and Rabadi, 2003). Intermittent distribution systems also require households to store water supplies for periods ranging from a few days to one week. A common system in MENA is rooftop tanks. Unfortunately, the quality of drinking water deteriorates due to microbial re-growth and pathogens in tanks, especially during the hot summer months (Hashwa and Tokajian, 2004).

Thus the availability of piped water does not necessarily translate into safe drinking water, as water may become contaminated before it reaches the tap (UN-Habitat, 2008). In fact, the JMP's RADWQ analysis revealed that Jordan is in compliance with WHO guidelines when the public utility water is examined at the reservoir, but it fails to meet WHO guidelines once household water is analysed. As it reaches the tap, Jordanian household water is contaminated with nitrates, iron and high conductivity (Properzi, 2010).

The problem with focusing on 'built' infrastructure to assess safe water and sanitation is equally problematic in Iran. When Iran's National Water and Wastewater Engineering Company assessed the percentage of the rural population that receives safe water services, its findings (58 per cent) were in sharp contrast to that of the JMP (83 per cent), as in some instances the water supply had dried up or the water quality had deteriorated to the point that it could no longer be treated (World Bank, 2007: 41–2).

Increasing pollution threatens the sustainability of drinking water provision throughout much of the MENA. In 1997, Egypt reported that public water supply systems covered 73 per cent of the population, while 24 per cent had partial coverage and 3 per cent had no coverage (Ministry of Water

Resources and Irrigation, 2005). Most of Egypt's public water supplies are drawn from surface water, which supplied 83 per cent of the 'raw' water used for drinking in 2005 (ibid.). The country tripled its drinking water treatment capacity over the past two decades through the construction of new treatment plants, and many more are planned (ibid.: 4–11). However, increasing contamination of surface water threatens the effectiveness and longevity of these investments. Intake pipes of water treatment plants are often in irrigation canals that are increasingly polluted, forcing shut-downs and relocations of intake pipes.

The findings of a 2008 Gallup survey on perceptions of water quality around the world hint at the dimensions of the water quality crisis in the MENA. Within the MENA region, the median percentage of satisfaction with water quality was 55 per cent, ranging from a low of 35 per cent in Lebanon to a high of 79 per cent in the UAE.[14] Only the respondents from sub-Saharan Africa were less satisfied, with a median percentage of 48 per cent. By contrast, in South Asia, Latin America and Northern Europe, the median percentages of satisfaction with water quality were 74 per cent, 72 per cent and 94 per cent respectively (Gallup Poll, 2008).

Affordability of Drinking Water

After years of fully subsidizing water services, states in the MENA are beginning to move to a pricing system for municipal users, which has resulted in various successes and problems. In 1999, Jordan began to impose a metering and pricing system on household water consumption, which was based on an increased block tariff structure (Wardam, 2004). Although this pricing system is designed to secure a minimum amount of water for the poor, in fact this group tends to be most vulnerable because it pays the same for a similar amount of water from municipal supplies as the rich families in urban areas. Moreover, the poor in rural areas pay more than the rural rich. If considering quality, rich families tend to consume the largest amount of water, and they are able to secure higher quality water by purchasing bottled water (Iskandarani, 2002).

Unconnected Palestinian households in the West Bank tend to pay the highest prices for water that is often of poor quality: connected households pay about 2.6 New Israeli Shekels (NIS) per cubic metre of water, while unconnected residents can pay up to 10 NIS for the same quantity (World Bank, 2009: 18). Unconnected households rely mostly on purchasing water at relatively high prices from private tankers or collecting rainwater (ibid.). Water tankers often carry water contaminated with high levels of faecal

14. It is not surprising that Lebanon's population was the least satisfied, as this survey took place after the 2006 Israel–Hezbollah conflict in which large amounts of infrastructure were destroyed.

coliforms (ibid.: 23). Moreover, the price charged by water tankers increases in response to the challenges in getting water to households that arise from Israeli restrictions on movements. Under normal circumstances, households paid four to five times the municipal rate for water, but when restrictions on movements are imposed it can result in a 60 per cent to 300 per cent increase (costing up to 20 NIS per cubic metre) in the price of water (World Bank, 2009). Consequently, poor unconnected households expend approximately half of their income to access water that is often of poor quality.

Even in countries such as Lebanon that are viewed as water-rich, water is often available only at a cost that is prohibitive for low-income populations. Because segments of the population do not trust the quality of municipal drinking water, many have turned to more expensive, private suppliers of drinking water that are not licensed and not regulated, ultimately increasing the exposure to unsafe water (Darwish, 2004).

Quality and Accessibility of Sanitation Services

Within the MENA, the design and operation of wastewater treatment facilities contribute to the region's deteriorating water quality and increase the spread of waterbourne diseases. Moreover, existing forms of 'improved' wastewater disposal in rural and informal urban areas contribute to water pollution and contamination, which threatens human health. Septic tanks, for instance, contribute to rapidly deteriorating quality of groundwater supplies because they are not properly maintained. Cesspits and sewers in the MENA often leach contaminants into shallow aquifers. In Egypt in 2004, 48.9 per cent of rural areas with some kind of drainage system relied on septic systems, while another 25 per cent relied on *bayara* (vaults). However, only 6.9 per cent and 8.2 per cent of urban inhabitants, respectively, utilized such systems (UNDP and INP, 2004). Both septic tanks and vaults tend to be disposed of directly into drainage canals or areas where they leach into shallow aquifers (ibid.). Even where public and private agents are contracted to provide sanitation services, they often opt to dispose the contents of septic tanks directly into water bodies to avoid disposal fees and travel times. Thus, for water quality to be addressed, disposal of collected wastewater at the communal level is a critical problem.

In rural areas in Jordan the majority of the population lacks any connection to a public sewage system and must find alternative means to dispose of their waste, which has included dumping it into open fields and contributing to the contamination of freshwater (IDRC, 2006). In Egypt, the environmental agency reports that by the end of 2010, sanitation coverage at the village level will have reached only 11 per cent (Egyptian Environmental Affairs Agency, 2009: 132). Official reports estimate that some 5,000 shallow basins are in use for the collection of rural domestic wastewater, which is then discharged directly into agricultural drains (ibid.: 130). In Lebanon, the JMP reports 100

per cent sanitation for urban areas and 87 per cent for rural areas. However, while Lebanon's Ministry of Social Affairs and UNDP found that 99 per cent of Beirut households were provided with sewer connections, a majority of households in poor, rural areas in fact relied upon septic tanks or open sewers (Makdisi, 2007: 378). The situation was not much better in schools; a survey by Lebanon's Ministry of Education found that at least 50 per cent of 1,300 public schools did not meet minimal sanitation standards defined by the Ministry (Samad, 2009: 64).

Although there is great variation within the MENA in wastewater treatment capacity, in several states these facilities have been overloaded and/or inadequately maintained. Their influents and effluents tend to be unmonitored or poorly monitored.[15] In addition, the design of some sanitation systems has been inappropriate for arid regions, producing increased contamination of surface and groundwater supplies. Jordan, for instance, has nineteen wastewater treatment plants that rely on technologies unable to treat the country's highly concentrated wastewater. The hot, arid climate and low per capita water consumption in both urban and rural areas mean that wastewater influent has high concentrations of organic matter (Al-Kharabsheh, 1999). Under these conditions, anaerobic, facilitative and maturation ponds proved incapable of adequate treatment (Japan International Cooperation Agency, 2001).

Assessing the quality of effluent from wastewater treatment plants in Jordan is complicated as some facilities lack monitoring devices, while monitoring systems at others are broken or unused. Moreover, government data vary according to the source — whether it is from the Ministry of Water or Ministry of Health — and this information differs from scientific assessments by scholars (Japan International Cooperation Agency, 2001). Independent tests by scientists reveal that effluents from Jordan's largest wastewater treatment plant contain high levels of nutrients leading to eutrophication of the treated effluent and contamination of groundwater in Wadi Dhuleil, Zerqa River and the King Talal Dam (Al-Kharabsheh, 1999). Effluent with BOD5 (biochemical oxygen demand), which is twice as high as Jordanian and WHO standards allow, reaches the King Talal Dam, where it is mixed with effluents from three other wastewater treatment facilities and freshwater, to irrigate farmland in the Jordan Valley. On several occasions, the Jordanian government stopped pumping irrigation water from the King Talal Dam because of high salinity and the presence of toxic substances (Japan International Cooperation Agency, 2001).

In Egypt, few wastewater treatment plants perform to design specifications, with significant regional variations. While Greater Cairo, Suez Canal cities, Aswan and Luxor have wastewater facilities performing near design capacities, wastewater plants in many secondary cities of the Nile Delta and

15. Israel is an exception; it has been at the forefront of treating wastewater and re-using it for agriculture (Tal, 2006).

Upper Egypt perform at rates significantly lower than specified in design capacity. Treatment plants in the Delta cities of Monoufia and Gharbiyya operate at 60 per cent and 62 per cent of design capacity, respectively, but in the middle and upper Egyptian cities of Qena, Sohag and Assiut, treatment plants performed at 11 per cent, 2 per cent and 23 per cent respectively (calculated from Egyptian Environmental Affairs Agency, 2009: 131).

Of the seven wastewater treatment plants available to the Palestinians, three are located in the Gaza Strip. These three facilities are overloaded and two operate intermittently. Although about 70 per cent of the Palestinians in Gaza are connected to a sewage network — wastewater treatment plant, cesspits or boreholes — these facilities fail to protect the populace from untreated effluents. Instead, 70 to 80 per cent of the produced wastewater is discharged into the environment untreated, contributing to the spread of waterborne diseases (Alfarra and Lubad, 2004). West Bank Palestinians fare much worse when it comes to connection to a sewage system, with only 31 per cent of the households connected to a network. Of the four towns in the West Bank with sewage treatment facilities, all have poor quality effluents that contribute to environmental contamination (World Bank, 2009).

Disposal of solid waste is another factor contributing to deteriorating water quality in the MENA. Accumulations of solid waste are one of the most serious environmental problems in the region, contributing to air pollution through nightly burning in many urban areas. Run-off and leaching of solid wastes into shallow aquifers and drainage networks is a significant source of water contamination. In Egypt, municipal solid waste accumulates in drainage and sometimes irrigation canals in informal and peri-urban areas, directly impacting surface water quality. As with other factors affecting water quality, solid waste treatment and collection varies significantly across the region. Tunisia, as a whole, reports that 83 per cent of household waste is processed, while the cities of Casablanca and Damascus report 10 per cent and 3 per cent, respectively (Tolba and Saab, 2008).

THE FAILURE OF EXISTING SYSTEMS OF ASSESSMENT

Although the JMP has acknowledged the inadequacy of the household surveys to measure improved water and sanitation, it has failed to incorporate alternative metrics and assessment techniques, claiming that the available methods are prohibitively expensive. What is causing this systematic failure to move beyond existing systems of assessment? We argue that inadequate assessments persist because IOs and domestic leaderships face few incentives to significantly improve these assessments even in the face of their documented inadequacy.

IOs, especially within the UN system, help spread a homogenized understanding of development, conveyed through sets of harmonized, simplified

accounting schemes that can be generalized across a variety of national contexts. As prior analyses of IOs have underscored (Barnett and Finnemore, 1999, 2004), practices of harmonization and replication are politically important, because as IOs disseminate these frameworks and assessment methods, they can shift how states conceptualize and measure development initiatives. The original intention of the MDGs, according to one participant in the process, was 'to help align national priorities with the MDG agenda so as to foster human well-being' (Vandemoortele, 2011: 7). Rather than fostering discussion of how inequalities in services flow from asymmetries in political power, however, UN-produced MDG assessments are highly 'technocratic in tone and content' (Finnemore, 2007: 1).

The result is data collection systems that emphasize simplified legibility and apolitical analyses, producing numerical targets disconnected from notions of local power relations and contexts (Vandemoortele, 2009). As Ferguson (1990) argued more generally about the development industry, the MDGs themselves have been subsumed into a 'donor-centric view of development' that encourages replicating 'best practices' and one-size solutions (Vandemoortele, 2011). In other words, the diffusion of these standardized parameters ends up shaping the broader policy and research agenda of what is touted as 'development' and 'progress' (Saith, 2006). Local and contextual factors that determine whether coverage is meaningful (Is water potable? How is sewage disposed of? Are sanitation networks maintained?) may drop out entirely. The result is assessment techniques that fail to capture the original MDG objectives to improve potable water and sanitation services.

Since 1977, the UN has repeatedly called attention to the need for safe access to drinking water and sanitation. At the 1977 UN's World Water Conference in Mar del Plata Argentina, the International Drinking Water Supply and Sanitation Decade 1981–1990 was declared. In 2000, the UN's MDG Goal 7 and Target 10 were embraced. The WHO declared the period between 2005 and 2015 to be the Water for Life Decade, while the UN General Assembly declared 2008 the International Year of Sanitation. Most recently, in December 2010, the UN General Assembly established a new effort for Sustainable Sanitation for the period between 2011 and 2015 with the hope that investments in community participation and the mobilization of financial and technological resources will allow the UN to meet the MDG goal for improved sanitation by 2015. These cumulative efforts have arguably raised awareness among political leaderships in the MENA about the developmental costs of poor sanitation and potable water services. This has been particularly important given the prevalence of authoritarian regimes in which vulnerable populations are often politically marginalized.

However, the JMP's focus on quantifying infrastructure provisions rather than measuring water quality and safe sanitation means that governments receive no credit in the MDG accounting system for undertaking more substantive reforms in the water and sanitation sector. Consequently, the

diffusion of a universal definition of what constitutes improved access to safe water and sanitation has reinforced and magnified pre-existing incentives among domestic leaderships to hide their deficiencies. Moreover, the JMP's inflated and overly optimistic estimates have inadvertently provided governments with perverse incentives, to prioritize reporting of aggregate coverage rates rather than investing in more adequate metrics to gauge quality, accessibility and affordability of services. Regimes have strong incentives to overstate their provision of safe water and sanitation services, as claims to political legitimacy often invoke the state's role in extending access to water (see Jones, 2010 for the case of Saudi Arabia).

Overstating performance and obscuring inefficient and inadequate public services has long been a hallmark of governmental sectors in the MENA. This can extend to minimizing public health threats in water supplies. Jordan, for example, has embarked upon a large infrastructure project to deal with water shortages to the capital Amman that would pump fossil groundwater from the Disi aquifer. The discovery of naturally occurring radioactivity in the groundwater (Vengosh et al., 2009) led to a spate of articles in the Jordanian press in which Jordanian officials sought to discredit the researchers' methods and claim that the water posed no health threats (Murad, 2009).

The inadequacies in the MDG assessments may well be overtaken by rising domestic pressure by local populations in the MENA for improved water and sanitation. The uprisings and mass protests that rippled across the region in 2011 showed that the exclusionary nature of many states — both politically and economically — is now contested by large numbers of citizens. Exclusionary politics had long produced inadequate investments in basic services to large swathes of the population. Public demand for improvement may prompt state agencies to conduct more robust, accurate assessments of water quality and adequacy of sanitation. Already, the revolutionary upheavals in Tunisia and Egypt have opened new opportunities for underserved communities to make claims for basic public services such as potable water and sanitation, prompting transitional governments to promise additional resources (for Egypt, see El Gawad, 2011).

CONCLUSION

Access to safe water and sanitation is integral to meeting many of the MDGs. The JMP has repeatedly concluded that many of the MENA states are on track to meeting Target 10 of the MDG to halve the proportion of the population without access to safe drinking water or basic sanitation. However, as we have demonstrated through an empirical analysis of the region, the JMP's conclusions are misleading. If we consider actual rates of coverage, deteriorating water quality and increasingly costly services, it is clear that many people in the MENA lack access to safe drinking water

supplies. A large number of citizens also confront unsafe sanitation systems that threaten their health and local ecosystems. This is already evident from a single indicator used by the JMP to measure improved coverage — that access to tap water equated with access to safe drinking water. As we have shown, tap water is often contaminated by existing systems of treatment, distribution and storage; thus connection to a potable water system does not ensure safe drinking water. Similarly, supposedly 'improved' wastewater and solid waste treatment systems are contributing to the spread of diseases, contamination of scarce water supplies and pollution of the environment. Provision of safe sanitation and potable water is particularly lacking in densely populated 'informal' settlements in both rural and urban areas.

Several forces are interacting to perpetuate the inaccurate assessments of states' progress towards meeting Target 10. UN agencies and other IOs rely on data simplification and harmonization in order to draw comparable conclusions across a variety of countries. From the moment the MDGs were adopted, they were publicized as 'a blueprint agreed by all the world's countries and all the world's leading development institutions — a set of simple but powerful objectives that every man and woman in the street, from New York to Nairobi to New Delhi, can easily support and understand' (UN, 2005: 3). The need for harmonization, however, resulted in the selection of indices for improved water and sanitation that failed to measure the quality of these services accurately.

MENA political leaderships also have a vested interest in showing progress and demonstrating success in providing safe drinking water and sanitation systems. As a result, while domestic reports may accurately capture the water quality and sanitation problems, such analyses are often overlooked in national investment budgets and in MDG reports. To accurately capture states' progress towards meeting Target 10, the JMP must overcome existing constraints and incentives to select assessment techniques and indicators that accurately capture the safety of drinking water and sanitation systems. These techniques must consider access, water quality, affordability and environmental sustainability.

APPENDIX

Table A1. Percentage of Drinking Water Coverage

State	1990		2000		2008		Urban/Rural Discrepancy
	Urban %	Rural %	Urban %	Rural %	Urban %	Rural %	Yes/No
Algeria	100%	88%	93%	84%	85%	79%	Yes
Bahrain	100%	NA	100%	NA	100%	NA	NA
Djibouti	80%	69%	88%	61%	98%	52%	Yes
Egypt	96%	86%	99%	93%	100%	98%	Yes

(Continued)

Table A1. (*Continued*)

State	1990		2000		2008		Urban/Rural Discrepancy
	Urban %	Rural %	Urban %	Rural %	Urban %	Rural %	Yes/No
Iran	98%	83%	98%	83%	98%	NA	Yes
Iraq	97%	44%	95%	49%	91%	55%	Yes
Israel	100%	100%	100%	100%	100%	100%	No
Jordan	99%	91%	98%	91%	98%	91%	Yes
Kuwait	99%	99%	99%	99%	99%	99%	No
Lebanon	100%	100%	100%	100%	100%	100%	No
Libya	54%	55%	54%	55%	NA	NA	Yes
Morocco	94%	55%	96%	58%	98%	60%	Yes
Oman	84%	72%	87%	74%	92%	77%	Yes
Palestine	99%	90%	95%	89%	90%	88%	Yes
Qatar	100%	100%	100%	100%	100%	100%	No
Saudi Arabia	97%	63%	97%	NA	97%	NA	NA
Syria	96%	75%	95%	79%	94%	84%	Yes
Tunisia	95%	62%	98%	77%	99%	84%	Yes
Turkey	94%	73%	97%	85%	100%	96%	Yes
UAE	100%	100%	100%	100%	100%	100%	No
Yemen	NA	NA	82%	59%	72%	57%	Yes

Note: NA = not available.
Source: UNICEF and WHO (2008, 2010).

Table A2. Percentage of Sanitation Coverage

State	1995		2000		2008		Urban/Rural Discrepancy
	Urban %	Rural %	Urban %	Rural %	Urban %	Rural %	Yes/No
Algeria	99%	77%	99%	82%	98%	88%	Yes
Bahrain	100%	NA	100%	NA	100%	NA	NA
Djibouti	73%	45%	69%	30%	63%	10%	Yes
Egypt	91%	57%	95%	79%	97%	92%	Yes
Iran	86%	78%	86%	78%	NA	NA	Yes
Iraq	NA	NA	76%	54%	76%	66%	Yes
Israel	100%	100%	100%	100%	100%	100%	No
Jordan	98%	NA	98%	96%	98%	97%	Yes
Kuwait	100%	100%	100%	100%	100%	100%	No
Lebanon	100%	NA	100%	87%	100%	NA	Yes
Libya	97%	96%	97%	96%	97%	96%	Yes
Morocco	81%	27%	82%	43%	83%	52%	Yes
Oman	97%	61%	97%	61%	97%	NA	Yes
Palestine	84%	69%	84%	69%	84%	69%	Yes
Qatar	100%	100%	100%	100%	100%	100%	No
Saudi Arabia	100%	NA	100%	NA	100%	NA	NA
Syria	94%	72%	95%	82%	96%	95%	Yes
Tunisia	95%	44%	95%	57%	96%	64%	Yes
Turkey	96%	66%	96%	71%	97%	75%	Yes
UAE	98%	95%	98%	95%	98%	95%	Yes
Yemen	64%	6%	81%	21%	94%	33%	Yes

Note: NA = not available.
Source: UNICEF and WHO (2008, 2010).

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