

**Socio-Economic Variations in Water
Consumption, Household Management
Strategies and Satisfactions in Greater
Amman, Jordan: the Results of a
Quantitative Household Survey**

**Khadija Darmame
and
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Water and Development and the Specific Case of Amman, Jordan

Access to adequate supplies of water is a universal component and indicator of human development in all territories and plays a fundamental role in resolving some of the manifold problems associated with poverty, disadvantage and exclusion. Thus, the second *World Water Development Report* (UNESCO, 2006) emphasizes that human development is inextricably linked with issues of water availability and management, in terms of proximity, quantity and quality. In order to increase globally the number of households connected to both water and sanitation networks, several programmes and initiatives related to the water sector have been launched since the 1970s. However, despite these, according to the World Health Organisation and UNICEF, almost one sixth of the world population of 6.1 billion still lacks access to improved water supplies and two-fifths do not have access to adequate sanitation (WHO/UNICEF, 2000). The United Nations proclaimed the ten year period from 2005 to 2015 as the International Decade for Action in respect of *Water for Life*. At much the same time, the United Nations (2000) announced the *Millennium Development Goals* (MDGs), which include clear targets for water and sanitation (Rigg, 2008; Potter *et al* 2008). One of the principal targets of the MDGs is to reduce by half the proportion of people without sustainable access to safe drinking water by 2015 (UNDEP, 2004).

It is noticeable that the principal objective of all these imperatives has been to improve the quantitative dimension, while the supply of water, like all urban services, has an equally important qualitative dimension that affects the daily lives of households. Thus, several recent studies have affirmed that having a connection to the network is not always synonymous with adequate access to water, in terms of quantity, quality and regularity. Good examples of this principle have been reported by Chikher (1995) in the context of Algiers, Allain-El Mansouri (1996) in Rabat-Sale, Zerah (1999) in Delhi, and Darmame (2004) in Amman. These studies illustrate the impact that an intermittent supply of domestic water can have on households and the costs that are involved in strategies to cope with such problems. The lack of continuous supply, whether under public or private management, often serves to exacerbate socio-spatial inequalities in access to water. Thus, although the poor may be well-connected vis a vis the network, the quality of supply may be irregular and unpredictable (See Zerah, 1998, Graham and Marvin, 2001, Jaglin, 2001, Mitlin, 2008; Darmame and Potter, 2008).

Over the last two decades, Jordan has suffered from a chronic water crisis as manifest by a deficit in the balance between the demand for water and available water resources and financial investment in the water sector. However, despite such difficulties, Jordan has achieved one of the objectives of the MDGs. As recorded in the *Household Expenditure and Income Survey of 2006* (Hashemite Kingdom of Jordan, 2007) some 98 per cent of households in the country are connected to the public supply network, and thereby, the universalisation of water access has effectively been achieved for both the poor and rich alike (Darmame, 2006). However, like many developing countries, the efficacy of water supply is affected by several dysfunctions. One of these dysfunctions is the intermittent basis of the supply of water, following a weekly rationing programme, which serves to constrain the day-to-day lives of individuals and households (see Iskandarani, 1999, Darmame, 2004, Potter, Darmame and Nortcliff, 2007).

Thus, one of the distinctive characteristics of the water supply system in Greater Amman is that it has been based on a system of rationing since 1987, with households receiving water once a week for various durations. This reflects the fact that Jordan is one of the ten most water-scarce nations on Earth and has long suffered from a structural crisis in the water sector. In 1999 the water supply system of the capital was privatized. The privatized company LEMA oversaw the reduction in ‘unaccounted for’ or ‘lost’ water, the upgrading of the network as well as making improvements in billing and debt collection. In January 2007, the water supply system of Greater Amman was effectively “deprivatized“ and placed in the hands of a local company *Meyahona* (‘*Our Water*’), which is owned by the Water Authority of Jordan, although its remit has remained avowedly commercial. Water, both for domestic and commercial purposes, is metered and charged for in Jordan, although there is a marked subsidy to the poor (Figure 1). For example, domestic water is charged at just two or three Jordanian Dinars (JD) for quarterly levels of consumption less than 20 cubic metres. In the *Water Strategy for Jordan*, produced in 1997 (Ministry of Water and Irrigation, 2007), the Jordanian Government stated its first priority as meeting the basic water needs of the urban populace, an intention that was confirmed in the *National Water Master Plan* produced in 2004 (GTZ, 2004). Indeed, over recent years there has been talk of possibly moving to a comprehensive system of continuous supply, and as an experimental run up to this, in the winter of 2006 continuous supply was introduced to 15.8 per cent of customers.

Given the realities of water rationing, water charging, privatization and deprivatization, and the possibility of establishing continuous supply, how do different groups of urban consumers in Greater Amman manage and use water on a daily basis and what do their attitudes and perceptions reveal about the likely impacts of future developments in the water sector?

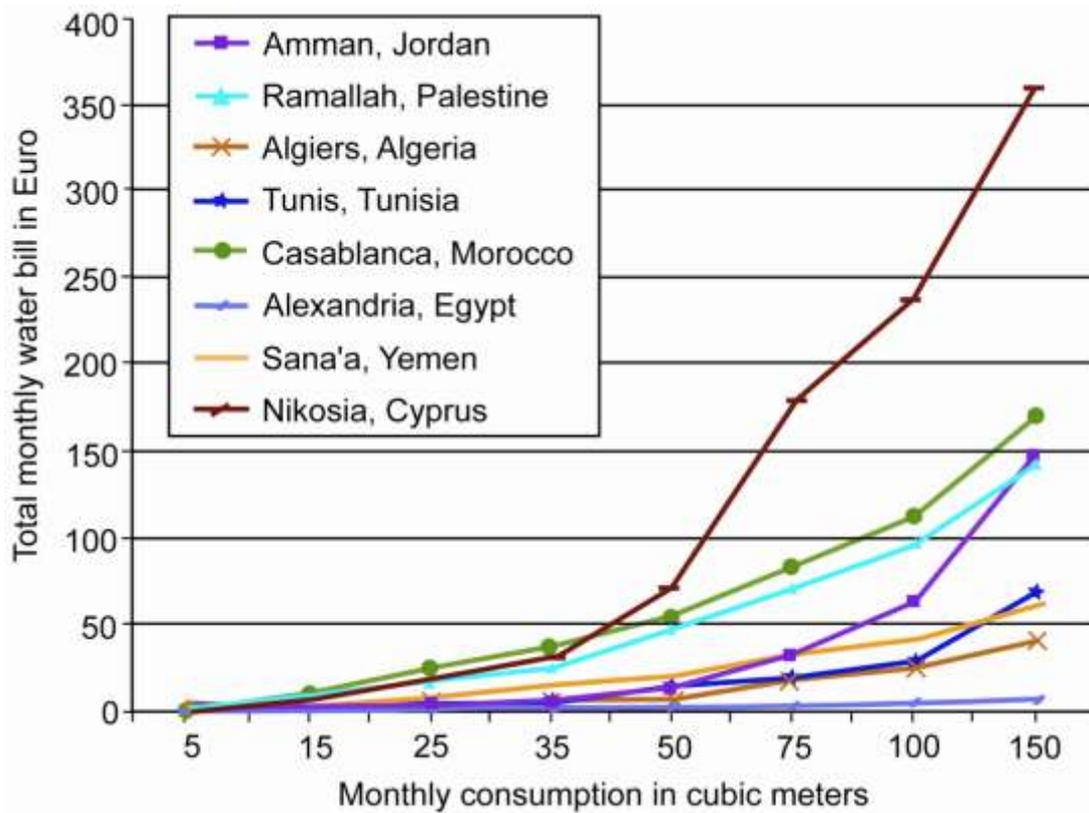


Figure 1 – Water charges in Amman, Jordan and a selection of other cities in the MENA region

Household Water Surveys: Research Design

As part of the Development Studies sub-component of the *Water, Life and Civilisation* project funded by the Leverhulme Trust at the University of Reading, contemporary social variations in household demand for, management of, and satisfactions with, the water supply system in Greater Amman are being examined (Potter and Darmame, 2007). Specifically, the aim is to provide detailed empirical evidence concerning the contemporary storage and use of water, the strategies that are used by households to manage water under conditions of water stress and rationing, and the general degree of satisfaction with contemporary water supply conditions and related issues. Amman is markedly divided socio-economically (see Potter, Barham and Darmame, 2007; Darmame and Potter, 2008), so how do different social and

income groups within the city use water and, specifically how do they react to rationing, the daily management of water and the prospects of continuous supply? At the societal level, of course, through time, the control and use of water has been closely related to social power and forms of societal organisation (see Potter and Lloyd-Evans, 1998).

The study design was based on examining potential social equity dimensions in the use of water within the city, and accordingly, housing areas were selected in both low- and high-income areas of Greater Amman. Amman can broadly be divided into relatively high-income western and northwestern tracts (see Potter et al 2007 and 2009) and its relatively low-income eastern portions, as shown in Figure 2. Twenty-five households were selected in low-income eastern Amman. The specific households were selected from existing contacts and snowball sampling was employed thereafter. The interviews were carried out in five residential sub-areas of eastern Amman. These were: (i) Wihdat, the second largest Palestinian camp in Jordan; (ii) Wadi Haddada, an area of informal settlement; (iii) Al-Nasser, a Palestinian settlement area; (iv) Nazal and (v) Quisma, both popular housing areas within the city. The location of these five study areas in the central eastern and southeastern areas of the city is clearly shown in Figure 2.

Similarly, twenty-five households were interviewed in seven areas of high-income western Amman and these districts are also shown in Figure 2. The areas from which respondent households were drawn were: (i) Abdoun, one of the wealthiest areas of the city consisting of luxury houses; (ii) Swifieh, an area served by an up-market commercial district; (iii) Deir Ghbar, an area of luxury villas and houses; (iv) Jabal Amman, one of the earliest high-status residential zones; (v) Jbeha, close to the University of Jordan (for all residential locations see Figure 2).

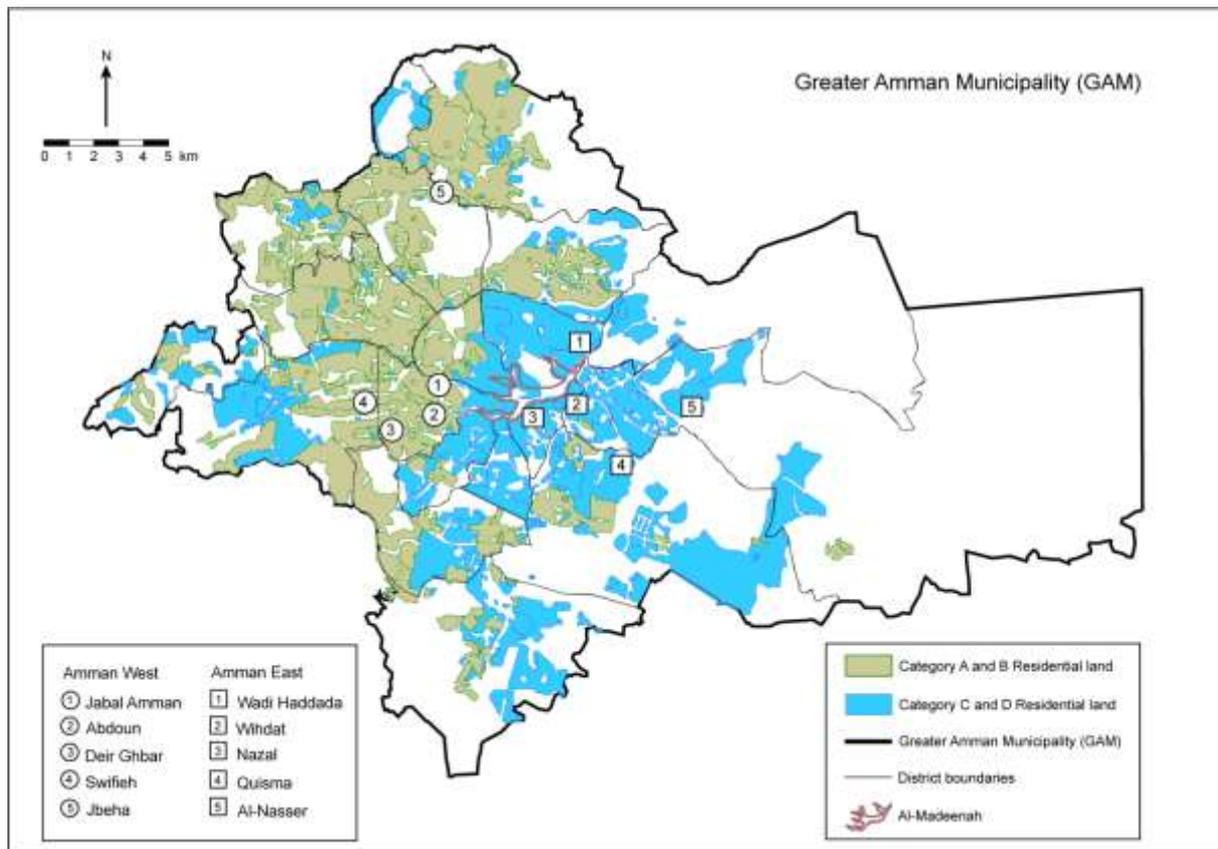


Figure 2 – The social areas of Greater Amman and the residential areas sampled for the households interviewed

In the case of both the high- and low-income residential areas, structured interviews, collating quantitative data were conducted using a printed *proforma*. Specifically, issues such as access to the public water supply, the means and extent of household water storage, the daily use of water and the management strategies employed, along with wider perceptions, attitudes and satisfactions were investigated. In this paper, an overview of the preliminary findings of these quantitative household water surveys is reported.

The Socio-Economic and Demographic Characteristics of the Low- and High-Income Respondent Households

The main difference between the low- and high-income households surveyed in Amman was naturally in their respective average income levels. As shown in Table 1, the high-income households interviewed recorded an average monthly income of JD 1932, as opposed to JD 235 for the low-income households. This eight-fold disparity in household income levels reflects the degree of social polarity which characterizes contemporary Amman (see Potter *et al*, 2009). In this regard, the distribution of households by income is particularly instructive,

with 100 per cent of low-income households earning less than JD 500 per month and 64 per cent of high-income households earning in excess of JD 1001 per month (Table 2).

Table 1: Socio-demographic profile of the respondent households

Socio-demographic variable	High-income households	Low-income households	Entire sample
Average age (years)	49	43	45
Female (%)	32	40	36
Male (%)	68	60	64
Married (%)	84	84	84
Employed (%)	72	48	60
Unemployed (%)	4	24	14
Retired (%)	16	16	16
Average income (monthly net JD)	1932	235	1029

Table 2: Distribution of respondent households by income group

Income range (net monthly income JD)	Percentage of households by category:		
	High-income households	Low-income households	Entire sample
≥ 500	4	100	52
501-1000	32	0	16
≥ 1001	64	0	32

Looking at the broad occupational categories of the heads of households included in the survey, the principal feature is the noticeably higher level of self-employment among the high-income households, amounting to 44 per cent, as opposed to 28 per cent for the low-income households (Table 3). As shown in Table 1, at the time of the survey, unemployment stood at 4 per cent for the high-income households, but was recorded as 24 per cent in the low-income households.

In wider demographic terms, the sample households showed broad similarity. Both income groups consisted of relatively youthful households, with the average age of those interviewed being in their 40s (Table 1). Identical levels of marriage (84 per cent) and retirement (16 per cent) were recorded in respect of both income-groups. For the sample as a whole, a preponderance of males were interviewed, although as shown in Table 1, this proportion was marginally higher in the case of the respondents from high-income households, standing at 68 per cent. Families tend to be large in Jordan, and this is evident for the sample households, with an average family size of 5.82 persons for the respondent households, with a somewhat higher figure of 6.44 pertaining to the low-income households (see Table 4).

Table 3: Occupational categories of the heads of households included in the sample

Sector	Percentage of household heads:		
	High-income households	Low-income households	Entire sample
Government	24	16	20
Private	24	28	26
Self employed	44	28	36
Military/Police	0	4	2
Farmer	8	0	4

A re-examination of the wider socio-economic data for the respondent households, shows distinct differences between the two samples. In terms of average house size, this is 345 square metres for the high-income households interviewed and 82 square metres for the low-income households (Table 3). This disparity becomes even more evident if the frequency distribution of households by size of dwelling is examined in detail, as shown in Table 5. Thus, while 76 per cent of low-income households live in houses comprising 100 square metres or less, some 20 per cent of high-income households live in houses with 401 or more square metres of living space. With respect to levels of owner-occupation of housing, this is significantly higher at 92 per cent for the high-income households than for the low-income households at 68 per cent (Table 4). Once again, the social polarity of everyday life in Amman is clearly mirrored by these data.

Table 4: Residential profiles of the respondent households

Residential variable	Households by category:		
	High-income households	Low-income households	Entire sample
Owner-occupiers (percentage)	92	68	80
Average house size (sq m)	345	82	213
Size of family	5.2	6.44	5.82
Sharing with other occupants (percentage)	8	20	14

Table 5: Distribution of respondent households by size of dwelling

Size of dwelling (m ²)	Percentage of households by category:		
	High-income households	Low-income households	Entire sample
≤ 100	0	76	38
101- 200	48	24	36
201- 300	20	0	10
301- 400	12	0	6
≥ 401	20	0	10

Table 6: Household water supply from the public network

Water supply characteristic	Percentage of households:		
	High-income households	Low-income households	Entire sample
Connected to the supply network	100	96	98
Sharing a water meter	12	56	34
With their own private cistern	40	8	24
Using a pump	40	28	34
Using a filter	20	16	18

Household Access to the Public Water Supply

As already noted, Jordan is characterised by high-levels of access to the water supply network. This was confirmed for the sample households with an overall level of 98 per cent connection pertaining to the entire sample (Table 6). The survey data also showed how similar the high- and low-income households are with regard to their connection to the public water network, standing at 100 per cent and 96 per cent of households respectively, thereby attesting to the effective ubiquity of mains water in the Greater Amman urban area, regardless of income level and geographical area of residence within the city.

However, as water is provided only once a week for various durations, the supply of water in a temporal sense depends on the ability of households to store water in roof-top tanks and underground cisterns, something that involves substantial costs in terms of the necessary infrastructure. Some 56 per cent of the low-income households surveyed shared a water meter, reflecting the fact that several families or two generations of the same family were sharing both the supply and storage of mains water (Table 6). Such sharing was much lower at only 12 per cent in the case of the high-income families and stood at 34 per cent for the entire sample of households.

In order to augment storage capacity and to increase water availability, households develop strategies for water use on a daily basis. For example, households store water in near ubiquitous roof-top tanks (Figure 3) with a capacity of 2 cubic metres. In addition, households can invest in the construction of underground water cisterns as well as using a water pump to aid supply when the water pressure is low. To improve the quality of the water piped into the house for use, consumers may install and use a filter. As each of these responses potentially involve infrastructural, installation and operating costs, it seems highly likely that their use may closely match, and thereby amplify, existing social inequalities. Thus, as shown in Table 6, while some 40 per cent of the high-income households had their own private cistern, this was much lower at 8 per cent for the sample of low-income households. Pumps were actively used by 40 per cent of the well-off consumer households and 28 per cent of those who were low-income. Using a filter stands at less than one-fifth of the entire sample, but is slightly higher for the high-income householders at 20 per cent, as opposed to 16 per cent of low-income families (see Table 6).



Figure 3 – Typical roof-top storage tanks on a property in the north-western suburbs of Amman

One of the most pronounced contrasts shown in our survey was in the total water storage capacity that characterised the two social-income groups surveyed. The average maximum storage capacity of the entire sample of households surveyed was 9.72 cubic metres (Table 7). However, when the high-income households were compared directly with the low-income households, the difference was revealed to be over five-fold. The high-income households had an average water storage capacity of 16.24 cubic metres, while for the low-income consumers storage amounted to 3.12 cubic metres. The extent to which household water storage capacity is skewed is shown if the more detailed frequency distribution of households by storage capacity is considered, as shown in Table 8. This shows, for example, that while 60 per cent of high-income households have seven cubic metres of storage or more, 72 per cent of low-income households have four cubic metres or less. This socio-economic contrast in water storage is amply exemplified by the graphics shown in Figure 4.

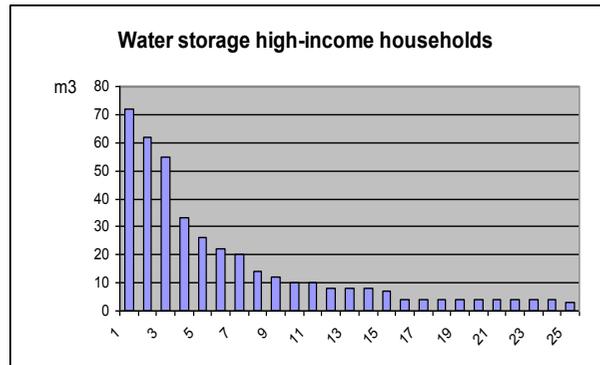
Table 7: Average household water storage capacity by income group

Income group	Average storage (m ³)
High income	16.24
Low income	3.12
Entire sample	9.72

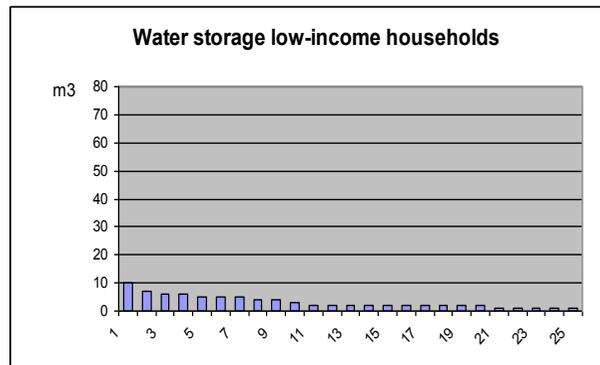
Table 8: Respondent households by water storage capacity

Capacity (m ³)	Percentage of households:		
	High-income households	Low-income households	Entire sample
1	-	20	10
2	-	40	20
3	4	4	4
4	36	8	22
5	-	12	6
6	-	8	4
7	4	4	4
8	12	-	6
9	-	-	-
≥10	44	4	24

The inequality of water storage in Amman



Wealthy households are able to store large volumes of water in tanks



In poorer areas, water is stored in plastic barrels and jerrycans

Figure 4 – Income-related variations in water storage capacity among the interview respondents

Water Use by Households and Household Water Management Strategies

This research also confirmed that, although not quite so unequal and socially polarised, levels of water consumption and household expenditure on water also closely reflect socio-economic and income variations in Amman. On average, the high-income households we interviewed consumed 70.24 cubic metres of water per quarter, while the low-income households consumed around half this total at 32.68 cubic metres (Table 9). Reflecting the payment subsidy given at relatively low-levels of water supply, this two-fold difference in consumption was paralleled by low-income consumers paying, on average, 3.76 times less for their water per quarter. Thus, the average water bill of the high-income households was 55.80 JD per quarter, against 14.84 JD for the low-income households (Table 9). However, it is important to note that the low-income households are devoting a higher proportion of their income to the purchase of water: an 8-fold disparity in income versus under 4 times for water.

The ability of wealthier households to access water with greater ease was, of course, shown by their greater propensity to buy water directly from water tankers, standing at 24 per cent of high-income households who regularly buy water in this way, as opposed to only 4 per cent of poorer households. In purchasing water from tankers, on average, 20 JD was spent during the summer months by the wealthier households, as opposed to 17 JD by the lower income households. Differential access to water resources was also shown by the fact that 44 per cent of high-income households stated that they regularly purchased bottled water, spending on average 10.45 JD per week, against 20 per cent for low-income households at an average cost of 8.2 JD per week.

Respondent households were also asked about how they paid their water bills. Table 10 shows that the majority of consumers (52 per cent) paid their bills at the post office; but as expected, this was noticeably higher at 62 per cent in the case of the low-income households, whilst accounting for 40 per cent of high-income consumers. The question revealed that just under a third all households made their payments directly at the offices of the Water Authority of Jordan, and this proportion was identical for the two income groups. The main difference exhibited in Table 10 is the fact that over a quarter of high-income households pay their water bill via their bank accounts, a process that is not possible for the consumers from low-income households (Table 10), who do not hold bank accounts.

Table 9: Household water consumption and cost levels

Aspect of consumption	High-income households	Low-income households	Entire sample
Average consumption m ³ /quarter	70.24	32.68	51.46
Average water bill per quarter (JD)	55.80	14.84	36
Percentage of households buying bottled water	44.00	20.00	32.00
Average spent on bottled water (JD per week)	10.45	8.2	9.75
Percentage of households buying water from private water tankers	24.00	4	14.00
Average spent on water from tankers (JD per summer period)	20	17	19.57

Table 10: Method of payment of water bill

Method	High-income households	Low-income households	Entire sample
Post Office	40	64	52
Bank	28	0	14
WAJ office	32	32	32
Other	0	4	2

The rationing of water has both financial and time-costs for consumers. In order to cope with rationing, households have developed clear water management strategies. Some 74 per cent of households stated that they adopt specific strategies in order to carry out the household tasks at hand on what is commonly referred to as “the day of water“, whereby they organise bathing, housework, laundry, cleaning and gardening in a specific way or at a specific time (Table 11). As might be expected, the proportion stating that they organize tasks specifically on the day water is received was higher among the low-income households, standing at 84 per cent, as opposed to 64 per cent for high-income households.

Further questioning about how water is used within the household demonstrated all too clearly that water quality is a major issue. Thus, just less than a third of households, specifically 32 per cent, stated they used networked water for drinking purposes (Table 11).

The proportion using mains for drinking purposes was as low as 12 per cent for the high-income households, but extended to over half (52 per cent) in the case of the low-income households. All respondent households mentioned past incidents related to cases of water pollution and ill-health. Similarly, nearly all low-income consumers (96 per cent) reported that they use networked water for cooking purposes; this figure is lower for the entire sample at 86 per cent as a result of the fact that a lower proportion, 76 per cent, of high-income consumers report that they use mains water for such purposes. All households interviewed, regardless of income level, reported that they used network water for the purposes of doing the laundry, bathing and cleaning.

Table 11: Details of the use of networked water by households

Aspects of water use	Percentage of households:		
	High-income households	Low-income households	Entire sample
Special organisation of tasks on the day of water supply	64	84	74
Using networked water for drinking	12	52	32
Using networked water for cooking	76	96	86
Using networked water for laundry	100	100	100
Using networked water for bathing	100	100	100
Using networked water for cleaning	100	100	100
Using networked water for gardening	40	0	20

Table 12: Gendered aspects of the management of water within households

Aspect of water use	High-income households	Low-income households	Entire sample
Managing the daily use of water	68% women	84% women	76% women
Responsible for paying bills and maintaining equipment	88% men	64% men	76% men
Children's awareness of the need to conserve water	24% women	36% women	30% women
	40% men	48% men	44% men
	8% both	12% both	10% both
	28% nobody	4% nobody	16% nobody

When asked about the use of networked water for gardening, a clear socio-economic divide re-emerged, with 40 per cent of high-income households stating that they did so, but none of the low-income households (Table 11).

The household surveys showed that “the day of water“ required the specific management of all household tasks in a limited time, including personal hygiene. In this respect, it was apparent that gender was a salient issue. When asked, revealingly, 84 per cent of low-income households reported that women take overall responsibility for the day-to-day management and control of the use of water within the home (Table 12). The involvement of women in the daily use of water was shown to be somewhat lower in the case of the high-income households, but remained as high as 68 per cent of households. On the other hand, when it came to issues such as paying water bills and the maintenance of water-related equipment, the household surveys showed that the responsibility was primarily vested with men. Once again there was some variation by income group, with men’s primary involvement with maintenance and bill paying being recorded as noticeably higher in the case of the high-income families interviewed (88 per cent), than it was in the case of the low-income households (64 per cent), as shown in Table 12.

In conditions of water scarcity, the education of children – and indeed, all members of the family – in the careful use and conservation of water is vital. Prior to the household surveys it was conjectured that women might be expected to be more involved in the instruction of children as to how to use water wisely and to conserve supplies on a daily basis. However, somewhat to our surprise, it was reported that men were generally more involved than women in such instructional activities (Table 12). For the entire sample of households, of those whose primary role it was to oversee such education and monitoring within the home, 44 per cent were men, as opposed to 30 per cent females. In 10 per cent of households it was reported that the task was shared between men and women; and as Table 12 also shows, in the case of 16 per cent of households, it was reported that nobody undertook the instruction of family members in the use of domestic water (Table 12).

In fact, the proportion of men reported as being responsible for such day-to-day guidance in the domestic use of water was higher, standing at 48 per cent, for the low-income households, For the high-income households the proportion was 40 per cent. Perhaps the most striking feature of Table 12 is the fact that in well over a quarter of the high-income households in the sample (28 per cent), it was reported that nobody was concerned with ensuring that children

are aware of the need to conserve water, presumably as a reflection of the fact that they could easily pay their bills and use water without worrying too much about the conservation of supplies (Table 12).

Finally, in respect of the day-to-day realities of water use, personal observations indicate that few urban residents within Greater Amman harvest and make use of rainwater from roof tops and other surfaces, unlike in some rural areas where rain harvesting has been practiced over the years. In order to substantiate this and to check for any variations, householders were specifically asked whether they were involved in such practices. The results, shown in Table 13, indicate that none of the high-income households reported the collection and use of rainwater. Indeed, it was only a very small proportion of the low-income households in the sample, some 8 per cent, that reported that they collected rainwater, with an equal number using this for drinking and for non-drinking purposes. Four per cent reported that they treated such water by means of boiling before use.

Table 13: The use made of collected rainwater by households

Use made of collected rainwater	Percentage of households:		
	High-income households	Low-income households	Entire sample
Collect rainwater	0	8	4
Use rainwater for drinking	0	4	2
Use rainwater for non-drinking purposes	0	4	2
Treat water before use	0	4	2

Satisfactions and Attitudes in relation to Water Issues

Initially in this respect, the interviews sought to investigate how aware consumers were of pricing in the water sector and the details as to exactly how their bills are derived. The findings indicate that just over a third of all households appear to be fully aware of the intricacies that are involved in the water tariff system (Table 14). Significantly, the results show clearly that such awareness varies markedly by socio-economic group, standing at 60 per cent for high-income households, but only 12 per cent in the case of low-income households (Table 14). The formula that relates water consumption to the overall charge

made per quarter is quite complex and it seems that the majority of consumers are not fully aware of the full intricacies involved.

Table 14: Awareness of selected water tariff issues

Awareness	Percentage of households:		
	High-income households	Low-income households	Entire sample
Aware of water tariff system	60	12	36
Aware of price increases over last ten years	96	92	94
Felt that price increases were acceptable	64	24	44

When asked, however, nearly all respondent households, some 94 per cent, stated that they were aware that prices had increased over the last ten year period. Socio-economic variations crept in again when the proportion of households who stated that they felt such price increases were warranted was estimated, with 64 per cent of high-income and only 24 per cent of low-income households stating that they felt such increases were justified (Table 14). Clearly, low-income consumers are naturally more price sensitive than their high-income counterparts. Nearly all respondent households attributed such price increases to the involvement of the private sector since 1999.

In order to examine how satisfied households felt with the water sector in overall terms, households were asked to employ a five point scale, ranging from 5 representing ‘total satisfaction’ to 1 denoting ‘not satisfied at all’. The frequency distribution of households by stated level of satisfaction is shown in Table 15, both for the entire sample and its low- and high-income constituent households. More low-income households (12 per cent) than high-income households stated that they were not at all satisfied, while more high-income households stated they were either moderately- or fairly-satisfied. However, as shown by Table 15, the distribution for low-income households is differentially skewed, with thirty-two households stating that they were well-satisfied, against sixteen high-income households. If these data are summarised by an overall points scoring system, as shown in Table 16, then despite these slightly variant distributions, little difference exists between the high- and low-income household groups in respect of their overall stated levels of satisfaction with the water

supply system of Amman. Thus, for the high-income households satisfaction was recorded at 2.84, and for low-income households, it was fractionally lower at 2.80, in both cases approximating to the level of being ‘fairly satisfied’.

Table 15: Variations in household satisfaction levels with the water sector as a whole

Level of satisfaction	Percentage of households:		
	High-income households	Low-income households	Entire sample
1 Not satisfied	0	12	6
2 Moderately satisfied	40	28	34
3 Fairly satisfied	40	28	34
4 Very satisfied	16	32	24
5 Highly satisfied	4	0	2

Table 16: Overall household satisfaction score with the water sector by income group

Income group	Average satisfaction score
High-income	2.84
Low-income	2.80
Entire sample	2.82

However, when the households were asked to assess their satisfactions with different aspects of the water supply system of Greater Amman, the outcome was highly revealing, as shown by Table 17. This is quite a complex table, and so here what seem to be the most salient aspects are highlighted. Looking at all households, an overwhelming majority, 92 per cent, stated that they were satisfied with the reliability of the water supply system of the city and 80 per cent stated their general satisfaction with the standard of maintenance of the network. Notably, despite the clear constraints that rationing places on their daily lives, satisfaction regarding the reliability of supply was expressed by 96 per cent of low-income consumers, although this was marginally lower at 88 per cent of the high-income householders. Similarly, some 52 per cent of all households stated they were satisfied with general

management standards in the water sector and this was identical for both income groups (Table 17).

The overall level of stated satisfaction was, however, shown to be somewhat lower in respect to the price paid for water, standing at 40 per cent for the entire sample of households (Table 17). As expected, more high-income households than low-income households stated that they were generally satisfied with the price of water, standing at 52 per cent as opposed to 28 per cent of surveyed households respectively.

Table 17: Satisfaction with different aspects of the water supply system

Aspect of water supply	Percentage of households:								
	High-income			Low-income			Entire sample		
	Satisfied	Not satisfied	Don't know	Satisfied	Not satisfied	Don't know	Satisfied	Not satisfied	Don't know
Price	52	48	0	28	72	0	40	60	0
Water quality	16	84	0	20	80	0	18	82	0
Reliability of supply	88	12	0	96	0	4	92	6	2
Standard of management	52	40	8	52	28	20	52	34	14
Standard of maintenance	84	12	4	76	8	16	80	10	10

The satisfaction data clearly demonstrate that by far and away the chief concern expressed by consumers relates to the *quality of the water*, with 82 per cent of all households stating that they were not satisfied with the existing quality of water supplied. It is noticeable that when disaggregated by socio-economic group, as shown in Table 17, levels of dissatisfaction do not vary much by socio-economic group, standing at 84 per cent in respect of the high-income households and 80 per cent of low-income households (Table 17). In short, in respect of the two issues with which the respondent households show general levels of dissatisfaction, while price is more salient to the relatively poor, water quality clearly represents the chief issue for all households irrespective of their income level. This general concern expressed about the quality of water seems to reflect the appearance and taste of the network supplied water, as well as fears about the impacts of water on health and general well-being.

A further question then asked the respondent households whether they felt that the water supply system of Greater Amman had improved or not in the period since 1999 when water was privatised under the control of LEMA, and the results are summarised in Table 18. Just over half the total sample of respondent households stated that they felt that the water system had improved (52 per cent). Interestingly the proportion expressing this positive evaluation was higher among the low-income households, standing at 60 per cent, as opposed to the high-income households, for which a figure of 44 per cent was recorded.

Table 18: Perceived improvement in the water supply system since privatisation in 1999

	Percentage of households:		
	High-income households	Low-income households	Entire sample
Perceived that water system has improved	44	60	52
Perceived that water system has not improved	56	40	48

Finally, an overall impression was derived as to just how important water supply issues are to households as part of their day-to-day lives, in relation to the other issues they face in their lives, and the results are listed in Table 19. Just over half of all households surveyed, some 54 per cent, reported that they regarded water as an issue of the utmost importance. This statistic also tends to suggest that while water supply issues are of considerable salience for the majority of consumers, many households have found ways and means to deal with the situation. Further, as might be anticipated, the data show that a slightly higher proportion of relatively low-income households (56 per cent) regard water supply issues as being of the utmost importance, with the corresponding figure being 52 per cent in the case of the high-income households surveyed.

Table 19: Priority accorded to water supply issues by households

	Percentage of households:		
	High-income households	Low-income households	Entire sample
Water seen as an issue of the utmost importance	52	56	54
Water seen as an issue of secondary importance	48	44	46

Conclusions

The household survey data derived among the two income-groups within Greater Amman clearly serve to show that although there are considerable socio-economic differences in the storage and day-to-day use of water, household systems for the management of water, and the satisfactions and attitudes of urban consumers in Greater Amman have, in overall terms, developed well-articulated strategies to guide their use of water in order to try to minimize the challenges of scarcity they face and the tasks that this imposes. Their responses to the quantitative household survey show that they are generally contented with the reliability of supply, the standard of maintenance and standards of overall management that characterise the urban water supply system of the city.

Quite simply, by means of carefully developed household water management strategies, they have accommodated to rationing and it is not the major problem they currently perceive as affecting their lives. This is not to say that such realities do not impact daily on their lives, far from it. This research shows that poorer households in particular are constrained to carry out their daily activities in highly prescribed ways due to the rationing of water, and that this burden falls disproportionately on the female members of households.

For obvious reasons, more low-income householders than high-income households are concerned about the overall quarterly cost that is involved in securing the water they use. But this survey shows clearly that it is the quality of water that is the major issue that concerns the vast majority of consumers, regardless of their income levels, socio-economic status or the area of the city in which they live. Consumers generally avoid drinking mains water and report low levels of satisfaction in respect of water quality in general. This is a major challenge facing the water supply system of Greater Amman in the coming years, some might argue far more so than the establishment of continuous water supplies within the city in the near future.

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