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Ability and Willingness to Pay for Water and Sewage Services in Two Palestinian Cities

Results from a Household Survey in Nablus
and Gaza City

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Preface

This study was conducted in 1997 as a part of a wider Water Tariff Study to develop a Tariff Design Model – a generally applicable tool to determine concrete water supply and sewerage tariffs for municipal water departments and regional water utilities - for the Palestinian Territories. The partners to the wider project were Norconsult International A.S. (Oslo), Nordic Consulting Group (Oslo), Center for Engineering and Planning (Ramallah), and Fafo (Oslo). The Water Tariff Study, funded by the Norwegian Agency for Developing Aid (NORAD), came to a conclusion in June 1998, when the Final Report was submitted to the commissioner, the Palestinian Water Authority (PWA).

Although Fafo was responsible for the study of households' ability and willingness to pay (AWTP) for domestic water, we benefited a lot from discussions with our colleagues Tore Laugerud and Simon B. Watt (Norconsult), Tore Roy Semb (Nordic Consulting Group), and Rami S. Abdulhadi (Center for Engineering and Planning). Likewise, the AWTP study received valuable comments in the design phase from Ms. Fadia Daibes, Programme Coordinator at the Palestinian Water Authority, and from the project's Palestinian counterpart team, especially from Mr. Abdelkarim Asad and Dr. Yousef Nasser.

In the two areas of study we received invaluable assistance from the employees at the local water utilities. Thanks are due to Mr. Abdul Haleem Swaiseh, Chief Accountant, and Mr. Asem H. Arafat, Head of the Computer Section, at Nablus Municipality, and to Mr. Fayes Majdalawi, Director General, and Mr. Awad El-Zarqa, Head of the Computer Section, at the Billing Department of Gaza City Municipality. Without their support, as well as the support of their colleagues, we would not have been able to get an understanding of the local billing systems. We are thankful that the municipalities let us draw our sample from their subscription lists. And further, we would like to extend our thanks to the bill collectors who helped the interviewers to find the selected households in the field.

At Fafo, several persons have been involved in the ability and willingness to pay study. Many thanks go to Researcher Ole Fredrik Ugland and Research Director Jon Hanssen-Bauer for the planning of the project. Akram Atallah and Hani Al-Dada at Fafo's Jerusalem Office were responsible for the translation of the survey tools from English to Arabic and used their long experience and knowledge of the study areas to ensure high-quality field-work. Al-Dada was in addition in charge of data entry and data cleaning. We are grateful for their dedicated work. Ramallah-based sociologist Dr. Jamil Hilal supported the Fafo team in the design of the survey and gave essential input to the analysis of the data. Research Directors Jon Hanssen-Bauer and Jon Pedersen supervised the study. The latter also was the quality back-stopper of the team and provided supportive and creative feedback throughout the study. Thank you. Yet, it goes without saying that the author of this report takes full responsibility for the product.

Åge Arild Tiltne
Oslo, November 1998

Summary

The Ability and Willingness to Pay (AWTP) Survey conducted in the cities of Gaza and Nablus had two objectives: (1) Profile domestic water consumption. (2) Assess consumers' AWTP for water and sewerage services. We report on four different populations: households residing inside and outside the refugee camps of Nablus (322 and 136 interviews) and households living in the refugee camp and outside the refugee camp of Gaza City (370 and 181 interviews).

The survey data indicate that the average Gaza City household consumes considerably more water than the average household in Nablus, amongst others due to higher stability of water supply, much cheaper water and larger household size. Also, there is a notable difference in consumption between the camp and non-camp population in Gaza City in disfavour of the camp population. This most probably reflects the weaker purchasing power of the camp residents. However, the biggest problem in Gaza City is water quality, not quantity.

The average household in the four areas spends from 1.1 to 2.9 percent of their income on water, which may indicate a potential for increased tariffs. However, when confronted with a scenario for improved services, there is not much willingness to pay more than today. Respondents in Nablus seem content with the current situation, while households in Gaza City look willing to pay somewhat more per cubic meter than they do today. This result has to be put in a picture where the living conditions in the Palestinian Territories have been deteriorating steadily for the last couple of years, and where the trend is towards a continued worsening of the situation for most people.

About twenty percent of the households, which are not currently connected to an underground sewerage network, do not want to pay to get connected or they do not want the service because they cannot afford it. Seventy households want to pay on average about 600 NIS to get connected.

Approximately 50 percent of all interviewed households do not want to pay a regular bill for the sewerage service, while the average maximum willingness to pay stands at around 5 NIS a month. The result is similar for all four areas.

There is a tendency, albeit not very strong, that wealthier households in all four populations under study declare their willingness to pay more for the services presented in the hypothetical willingness to pay questions than the poorer households. This contrasts the analysis of data on water consumption and income, which shows a significant statistical correlation between the two only for Nablus.

To conclude, the survey results point to the existence of considerable differences between various geographical regions in the Palestinian Territories, as well as between various population groups in each locality. This is demonstrated in such fields as water consumption and expenditure, income and affordability.

The AWTP survey data could be interpreted as a support for a coming increase in the water tariff, provided that the interests of the poorest segments of the Palestinian population are taken care of. Clearly, the levels of any future domestic water tariff will have to take into account the developments of the national economy.

Abbreviations:

AWTP	Ability and Willingness to Pay
CVM	Contingent Valuation Method
NIS	New Israeli Sheqalim, Israeli Shekel
PCBS	Palestinian Central Bureau of Statistics
PWA	Palestinian Water Authority
UNRWA	United Nations Relief and Works Agency for Palestinian Refugees in the Near East
UNSCO	United Nations Office of the Special Coordinator in the Occupied Territories
WTP	Willingness to Pay

1 Introduction

This study looks at the consumption of water for domestic purposes in two areas of the Palestinian Territories. The two areas are Gaza city, the largest community in the coastal Gaza Strip, and the city of Nablus in the inland West Bank.¹ We report on four different populations: households residing inside and outside the refugee camps of Nablus, and those living inside and outside the refugee camp of Gaza city.

The analysis is mainly based on quantitative data from a so-called *Ability and Willingness to Pay survey* conducted in the fall of 1997. The two principal objectives of the Ability and Willingness to Pay (AWTP) survey were (i) to profile domestic water consumption, and (ii) to assess the consumers' ability and willingness to pay for water. In addition, since sewerage services is meant to be an integrated part of a future Palestinian tariff system, the survey also aimed at finding out how much customers are willing to pay for such services.

The report is organised in six main parts. As a background for the subsequent data analysis, we picture the socio-economic conditions under which the people of the Palestinian Territories find themselves in chapter 2. The next chapter describes the sampled households in terms of their size and economic standing. Chapter 4 answers the first of our main objectives by looking into the characteristics of water consumption among the households of the four study areas. We describe supply conditions, such as the different sources of domestic water, the stability of supply and the water quality.

Chapter 6 deals with the willingness to pay for water, while chapter 7 looks into the willingness to pay for sewerage services. We use the *Contingent Valuation Method* (CVM) to establish information about people's maximum willingness to pay (WTP). Briefly stated, the CVM invites a respondent into a hypothetical decision-making situation in order to find out how much money he or she is willing to pay for the good or service (Rogerson 1996). This method is presented in chapter 5. We also attempt to identify factors that determine the respondents' declared willingness to pay (or not to pay) for the two services. For example, we discuss the relationship between, on the one hand, people's ability to pay (income) and, on the other hand, their willingness to pay.

The report concludes with a brief summary. Many details supporting the arguments in the text are found in a number of tables in appendix 1. Appendix 2 contains methodological comments, which treat such topics as the sample, the questionnaire, the Contingent Valuation Method and data quality.

¹ Although Nablus also is the name of a district, Nablus will hereafter refer to the city only.

2 The Socio-Economic Situation in the Palestinian Territories

A number of studies assert that the Palestinian economy has weakened considerably over the last few years, affecting negatively the standard of living for most, if not all, Palestinians in the West Bank and Gaza Strip. According to the Office of the United Nations Special Coordinator in the Occupied Territories (UNSCO) the real per capita GNP declined by 36.2 percent between 1992 and 1996 (UNSCO 1997). There are several explanations for this trend.

The Palestinian Territories has seen a dramatic drop in the remittances from Palestinian workers in Israel and other countries. Such remittances constituted a substantial 25 percent of the Palestinian Territories' GDP in 1992 declining to 8 percent three years later (Pedersen and Hooper (eds.) 1998). This development highlights the vulnerability of the Palestinian economy to political instability in the region.

The most important factor in the economic well being of Palestinian households is access to employment. While more than 95 percent of the labour force was employed in 1981, this was reduced to less than 90 percent in 1988. During the fourth quarter of 1995, almost 20 percent of the work force was unemployed, with unemployment continuing to increase in 1996, and, by mid-1997, standing at around one third of the labour force. (Pedersen and Hooper (eds.) 1998.)

As a response to the developments in the labour market, wage labour gradually gets a declining role in economy of the Palestinian households, while self-employment in the informal sector becomes more important. In the current situation with high population growth and reduced access to Israeli and Arab Gulf labour markets and the resulting high unemployment, local wages are pushed down. (Pedersen and Hooper (eds.) 1998.) According to UNSCO (1997) "the purchasing power of average monthly incomes of WBGS [the West Bank and Gaza Strip] workers declined by 9.4 percent as between 1996 and 1997."

The combined effect of less work opportunities and lower paid jobs is worsened living conditions. A recent study indicates that there has been a substantial deterioration of living standards over the last years. Based on expenditure data from the Palestinian Central Bureau of Statistics (PCBS), it was estimated that in 1995 about 10 percent of the West Bank population lived in poverty. The poverty rate for the Gaza Strip was 20 percent for the same year, even when a 23 percent lower poverty line was used to correct for the lower cost of living in Gaza. The incidence of poverty was higher among refugee camp residents than for urban and rural areas (Shaban 1997). UNSCO (1997) states that the "continuous declines in the real household expenditures during 1996 and 1997 ... have probably increased the incidence and severity of poverty since late 1995".

The portion of the population receiving social support is an indicator of poverty. In a 1996 survey of approximately 1,500 households in the Palestinian territories 24 percent

declared that without some sort of formal or informal social assistance they would not be able to cover basic household needs (Hilal and El-Malki 1997, MAS 1997).

3 Socio-Economic Profile of the Selected Households

The Palestinian Central Bureau of Statistics estimated the population of Nablus (without its camps) and Gaza city (without its camp) to be 102,500 and 282,900 respectively in 1996. This makes Gaza the largest city and Nablus the second largest city in the Palestinian territories. The total refugee camp population of the two areas was 18,200 and 70,800 (PCBS 1996).

Sample Size

The sample was drawn from the subscription lists of the water utilities of the Gaza city and Nablus municipalities using a linear systematic sampling technique. We interviewed 1009 out of 1259 sampled households in the period from 25 October to 8 November 1997. This equals 80 percent of the sampled households. Only 12 households, or about 1 percent, refused to participate in the survey. The main reasons for the unsuccessful interview attempts are: (a) Only commerce at the given address (from 1.1 percent to 21.1 percent of the households in the four areas). (b) Non-existent dwellings or empty or vacant dwellings due to house repair and construction works or other reasons (from 6.6 percent to 14.3 percent).

The number of households interviewed in the four study areas are listed below:

- Nablus: 322 households.
- Nablus, refugee camps: 136 households from Balata, New Askar, Old Askar, and Ein Beit al-Ma.
- Gaza city, outside camp: 370 households.
- Gaza city, refugee camp: 181 households from Ashati', also called the Beach Camp (the only refugee camp served by Gaza city municipality).²

Household Size and Density

Although systematically lower than the average figures from the Demographic Survey of the Palestinian Central Bureau of Statistics (PCBS 1997), relative to each other the AWTP survey figures comply with the general pattern found in the Demographic Survey: Refugee camp households are larger than the households outside the camps, and Gaza Strip households are bigger than the households in the West Bank.

According to the AWTP survey, again following PCBS statistics, the two Gaza populations under study have a considerably higher household density than the two Nablus

² See appendix 2, section 3 for some more details about the sample.

populations. The figures are 2.2 persons per room compared to 1.7 persons per room for the households outside the camps and 2.9 persons per room opposed to 1.9 persons per room for the refugee camp households.³

Economic Status

Level of Income

In order to establish cash income, we asked about the households' total earnings from 23 different income sources for the latest 12 months.⁴

Table 1 Average Total Yearly and Monthly Income the Last 12 Months (October 1996 - September 1997) for Households in Nablus and Gaza City and Their Camps (in NIS)

	Gaza city camp	Nablus camps	Gaza city	Nablus
Average total income last year	12,186	22,282	28,458	32,708
Average monthly income	1,016	1,857	2,372	2,726

The survey reveals a significant disparity between the two cities in the average yearly household income. An even higher disparity in the average yearly household income exists between the two cities' camps. Nablus had a 15 percent higher average household income than Gaza city. Nablus' camp residents have an average yearly household income that is 83 percent higher than the camp of Gaza city (table 1). This is in line with PCBS data, which show that the average income in the West Bank is higher than the average income in the Gaza Strip and that town dwellers have higher incomes than individuals living in camps and villages. Household income disparities between the two cities are noticeably less than disparities between the camps of the two cities. This is significant, as camps constitute a larger percentage of the population in the Gaza Strip than in the West Bank. Only about 8 percent of the West Bank population live in camps compared to 38 percent in the Gaza Strip.⁵

Sources of Income

For both cities around two-thirds of the households reported income from wages and salaries the last year. From 10 to 27 percent of the sampled households have one or more self-employed persons. Remittances contribute to the income of 3 to 7 percent of the households.

More households in both Nablus and its camps (13 percent for both) had members who worked in Israel (during September 1997) than in both Gaza city and its camp (7 and 8 percent respectively). The rates for employment in Israel are closely linked to the political situation in the areas and more specifically to the development of the peace process. Israeli-imposed border closures and other restrictions as responses to setbacks in the peace

³ Appendix 1, table 1 contains more details on the characteristics of the sampled households.

⁴ See appendix 2, section 6 on how we asked to collect information on income.

⁵ Data from the PCBS *Demographic Survey*; calculations by Fafo.

negotiations immediately impinge on the household economy of many families. In the West Bank the percent of the labour force employed in Israel and Israeli settlements fluctuated between 11.4 percent and 20.7 percent in the period from September 1995 to September 1997 and stood at 18.6 percent in the summer of 1997. In the Gaza Strip the figures for the same period varied from 3.6 percent to 13.7 percent, and stood at 7.1 percent in the summer of 1997.⁶

These fluctuations and regional disparities are relevant to any new water tariff system as they indicate the existence of a sizeable percentage of households that have a precarious economic situation. The group of vulnerable households is significantly larger in the Gaza Strip than in the West Bank and larger in camps than in towns.

The AWTP survey data reflect some of the differences between the two cities and their camps. Nearly a quarter (23 percent) of the Gaza city camp households depends on financial transfer from the Palestinian National Authority, UNRWA, Zakhat funds and charitable organisations for their livelihood. In the camps of Nablus the percentage is much lower (9 percent) but it still indicates a noticeable percentage of households living at subsistence level. In both cities (excluding their camps) the percent of household depending on public, international (UNRWA) and charitable transfers is fairly small (3 percent in Nablus and 4 percent in Gaza city).⁷ These figures are in accord with data from the Palestinian Central Bureau of Statistics.

⁶ PCBS, *Labor Force Survey (July-September 1997)*, press conference on the Labor Force Survey results, 2 November 1997, tables.

⁷ Appendix 1, table 4 has details on the income sources of the sampled households.

4 Water Consumption and Expenditure

Supply Conditions

Water Sources and Water Supply

In the four areas under study, all households had water from the local water network as their main source (since the sample was based on the municipalities' water subscription lists). But this does not imply that all the selected households get the network water piped into the residence. While nearly all the households in Nablus (97 percent) and its camps (99 percent) have the main source of water piped into their dwelling, the situation is different in Gaza city (80 percent) and its camp (91 percent).

For Nablus and its camps the main source of water piped into residence is used for drinking and cooking among most households. This is not so for Gaza city and its camp. In Gaza city, while the majority of the households use piped water for cooking, 15 percent use other sources than piped water for drinking. In the Gaza city refugee camp 12 percent do the same.⁸ The more affluent families rely on piped water as their main source of drinking water to a lesser degree than do the underprivileged.

Most households in both cities and their camps use one or more water storage tanks. A slightly higher percentage of high-income households use storage tanks than the lower-income households in all four locations.

The use of an electric pump to get the water to the tank or tanks on the roof is much more prevalent in Gaza city and its camp than in Nablus and its camps⁹, which reflects the lower water pressure in Gaza city.

Stability of Supply

There are wide variations in the stability of water supply. The Beach Camp of Gaza city shows the most stable water supply with 60 percent of the households claiming more than twelve hours of supply daily in summer and 77 percent in winter. In Gaza city less than one-half of the households (48 percent) have such supply in summer and 64 percent in winter. In Nablus camps the figure is only 11 percent in summer and 10 percent in winter. In Nablus, excluding the camps, 22 percent of the households report to have more than twelve hours of daily supply during the summer season, while 32 percent report the same for the wintertime.¹⁰ This suggests that an improvement in the stability of the water

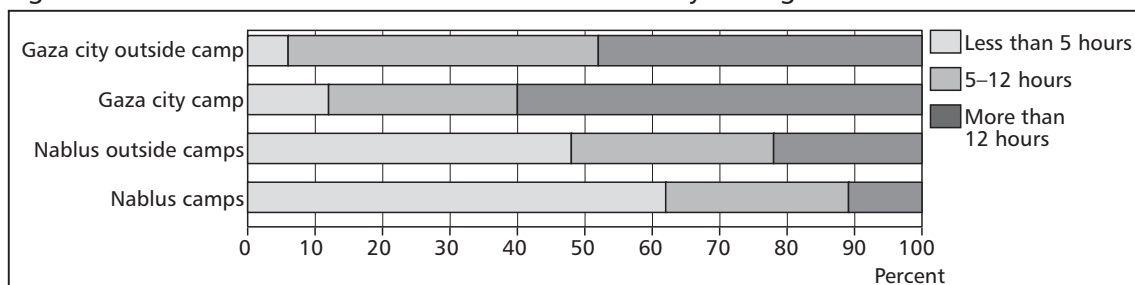
⁸ Appendix 1, table 5 contains accurate information about people's most important sources of water.

⁹ Appendix 1, table 7.

¹⁰ Appendix 1, table 7 has much data on various aspects of the water supply conditions of the sampled households.

supply be of importance to a sizeable proportion of households, especially in Nablus and its camps.¹¹

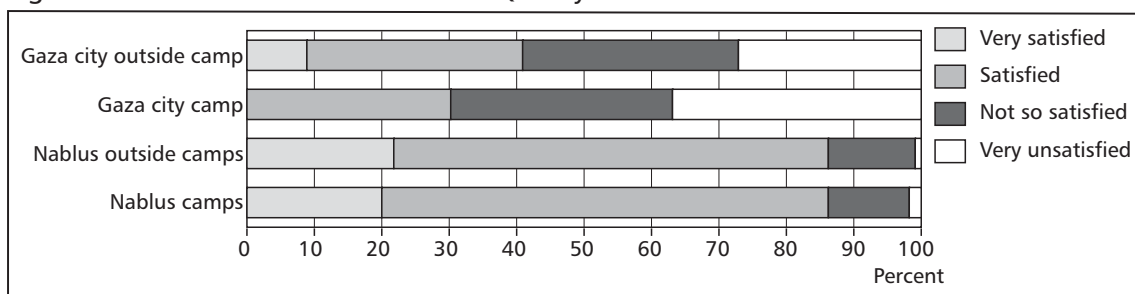
Figure 1 Number of Hours With Network Water Per Day During Summer



Water Quality

The majority of the households in Nablus and its camps (87 percent in both locations) report that they are either very satisfied or satisfied with the quality of the network water, compared to only 41 percent and 30 percent in Gaza city and the Gaza city camp. More than one-half of the respondents in Gaza city and more than two thirds in its camp state that they are dissatisfied with the quality of the network water compared to only 14 percent in Nablus and its camp.¹² Corresponding results were obtained with respect to satisfaction with the quality of drinking water.¹³

Figure 2 Households' Satisfaction With Quality of Water From Main Source



A small number of households (from 3 to 10 percent) use a filter device for drinking water. A higher number of high-income households use a filter than low-income households.¹⁴

People's concern with the quality of drinking water is confirmed by the fact that 17 percent of the households in Gaza city and 11 percent in its camp said that they consumed

¹¹ According to a 1996 report, about 75 percent of the population in Nablus *district* receive piped water supply. However, the supply is irregular and the network, it is claimed, suffers from frequent dry periods which sometimes, especially during summer, last for several days or even months (Applied Research Institute, Jerusalem 1996).

¹² An illustration of the bad quality of the water in Gaza is the fact that the salinity of most groundwater, the source of piped water in the area, exceeds up to five times the maximum norm indicated by the World Health Organization. This is caused by an overuse and the resulting seawater intrusion and up-coning of deeper brackish water. High nitrate contents in the water due to agricultural drainage and leakage from sanitation facilities are other problems (World Bank 1996).

¹³ Appendix 1, table 6.

¹⁴ Appendix 1, table 7.

bottled water the week preceding the interview. Hardly any household reported such consumption in Nablus and its camps.¹⁵

Use of Water Outside the House

Some 20 percent of all households in Nablus use piped water for the additional purpose of irrigating their gardens, compared to 16 percent of all households in Gaza city, 6 percent of the households the Gaza camp, and 4 percent of all households in Nablus camps. About ten percent of all households (more in Nablus than in Gaza city) use piped water for the additional purpose of washing their cars.¹⁶

Self-reported Water Consumption and Expenditure

Comparison between the four study areas

The AWTP survey shows variation in the households' self-reported consumption of network water in the two months prior to the time of the survey (i.e. consumption in the months of August and September 1997). The average monthly consumption of piped water for the camps of Nablus during this period was found to be 9.1m³ and for the camp of Gaza city 12.9m³. Nablus households outside the camps reported the lowest average consumption of water (6.8m³), which is less than a quarter of the average Gaza city consumption (29.0m³).

Table 2 Self-Reported Average Monthly Consumption of Network Water, Average Monthly Expenditure on Network Water, and Average Monthly Total Water Expenditure, August and September 1997

	Nablus camps	Nablus	Gaza city camp	Gaza city
Water consumption (m ³)	9.1	6.8	12.9	29.0
Expenditure on network water (in NIS)	37.2	30.4	22.3	26.4
Total water expenditure (in NIS)	38.1	31	29.3	32.3

The higher consumption reported in Gaza city than in Nablus despite of a higher average income level in Nablus may be explained by several factors. Nablus' higher rate of piped water inside the dwelling is presumably less important than the fact that Gaza city has more hours of water supply per day than Nablus. Differences in the average household size across the four locations could also account for some of the variation. (For example, the average household size for Gaza city is 7.3 versus 5.8 for Nablus, excluding the camps.) In addition, but here we are guessing, illegal connections may be more widespread in Gaza city than in Nablus.

As can be seen from table 2, for Gaza city, self-reported expenditure does not match self-reported consumption. While water consumption outside the camp in Gaza city is more

¹⁵ Appendix 1, table 8. In Beach Camp, 7 out of 17 households consuming bottled water belong to the lowest income-group, whereas 4 and 6 out of 17 households belong to the medium and highest income groups respectively. Outside the camp of Gaza city 12 out of 45 households that use bottled water form part of the low-income category, 27 out of 45 households using bottled water have medium income, while only 6 out of 45 users of bottled water have high income.

¹⁶ Appendix 1, table 7.

than twice as high as inside the camp, the expenditure is less than 20 percent higher. This might suggest that the self-reported consumption outside the camp of Gaza city is too high. We can think of two possible explanations for the reported high consumption-rate outside of Gaza city's Beach Camp. First, it is likely that the accuracy of consumption estimates decreases somewhat in cases where several households share one meter, while expenditure data remain more reliable. Outside the camp of Gaza city, 65 percent of the interviewed households share the meter with one or more households or with a shop. Inside the camp this holds true for 45 percent. The difference of 20 percentage points' might add to the inaccuracy of the outside-camp estimates.

Another point is the many broken meters found in Gaza city. The municipality has admitted that wrecked meters are a considerable problem, and one study has claimed that as many as seven in ten domestic water-meters are out of order (Palestinian Water Authority 1996). Households with broken meters of course never receive bills with actual consumption figures, but are charged according to the assessments of municipality employees. Some households with operative meters are charged according to the best judgement of the municipality employees too, because frequently they do not trust the meters. In addition, sometimes customers are simply charged the same fee as last month without a reading of the meter, and the bill, therefore, would not mirror actual consumption. It could be that broken meters is a bigger problem outside than inside of the refugee camp and that, therefore, the estimates are more often wrong outside the camp. This explanation is thinkable, yet quite speculative, as we have no evidence to support it.

The implication of the above for the AWTP survey is that the reliability of the self-reported consumption-data for the two Gaza populations thus might be lower than for the two populations in Nablus, where destroyed meters are fixed or replaced immediately, at the cost of the consumer.¹⁷ The argument is that households, which rarely or never get bills with actual consumption figures, but are charged according to the assessments of municipality employees, might have a considerably distorted basis for making their estimates.

The average expenditure on network water in the two surveyed West Bank populations is higher than in the population served by the municipality of Gaza city. This is due to a much stiffer price on water in Nablus than in Gaza city, as would be clear from the box below:

Gaza city

Basic fee: 3 NIS per month; 1-10m³ at 0.30 NIS per m³; plus 11-30m³ at 0.50 NIS per m³; plus 31m³ or more at 0.90 NIS per m³.

Nablus

Basic fee: 3 NIS per month, covering consumption up to 5m³; plus 6-10m³ at 3.75 NIS per m³; plus 11m³ or more at 5 NIS per m³.

¹⁷ Information from Nablus municipality.

However, when we include the more frequent consumption of expensive bottled water as well as other sources for Gaza city and its camp and calculate the total expenditure on water, the difference between the two cities disappears.

Besides, the actual (but indirect) cost of water is higher for households using an electric pump to get the water to the water tank on the roof, than for those households that manage without it, as an additional cost is added to the electric bill. Gaza city and its camp are hardest hit since they rely on such pumps to a much greater extent than Nablus.

If we trust the expenditure data more than the data on water consumption it could be argued that the consumption of the Gaza camp should be higher. Hence, while we believe the figures for Nablus to be fairly accurate, our best estimate of domestic water consumption for Gaza city's Beach Camp is probably closer to 15m³ and for Gaza outside the camp nearer to 20m³.

As can be expected, total water expenditure constituted a higher percentage of the average monthly income in camps than in the cities. According to our data, it formed 1.1 percent and 1.5 percent of the average monthly income in Nablus and Gaza city respectively and 2.1 percent and 2.9 percent in the camps of Nablus and the Beach Camp. For comparison, the Palestinian Central Bureau of Statistics has estimated the water expenditure to total expenditure ratio for the Palestinian Territories to be 0.90 for the refugee camps, 0.94 for the cities, and 1.13 for the villages. For the better-off households the water expenditure to total expenditure ratio is 0.79, for the middle category 0.99, and for the worse off 1.02.¹⁸

The average consumer is debt-ridden to a noticeable extent. The average accumulated debt resulting from unpaid water and electricity bills among the sampled households is as follows: Gaza city 1,428 NIS; Gaza camp 1,138 NIS; Nablus 489 NIS; Nablus camps 696 NIS.¹⁹ The ratio of outstanding bills to yearly income for the four areas tells us something about people's ability to pay. The ratios are as follows: Gaza camp: 0.09; Gaza city outside camp: 0.05; Nablus camp: 0.03; and Nablus outside camps: 0.02. Although debts usually do not lead to water cuts they do, at least in the case of Gaza, lead to electricity cuts when the debt reaches a certain level (reported to be 1,000 NIS).²⁰

Comparisons within each study area

Above we have discussed the variation in water consumption *between* the four areas of study. Let us now briefly turn to the consumption data for each of the four areas.

¹⁸ Register-data from the two municipalities. The calculations were kindly done on request. Data from the Household Expenditure and Consumption Survey, October 1995 – September 1996.

¹⁹ It is worth mentioning that most of the debt is related to electricity, not water. According to information obtained from the Billing Department at the Gaza city municipality, only 6 percent of the outstanding revenue stem from delayed payment of water bills (figures as of late September 1997).

²⁰ Information obtained from the Billing Department at the Gaza city municipality. If this rule is routinely implemented, it would imply that at the time of the interview roughly one third (35 percent) of the households outside of Gaza city's refugee camp and more than one quarter (27 percent) of the households in what constitutes Beach Camp were without network electricity. This is the amount of households with a debt higher than 1,000 NIS. For comparison, in the camps of Nablus 20 percent of the households owed more than 1,000 NIS to the local billing department, while only 13 percent of the households outside of the camps were in the same position. These facts probably both reflect the better economic standing of the population of Nablus and indicate a somewhat stricter attitude from the Nablus municipality towards their customers compared to Gaza city.

Analysis of the relationship between water consumption and income, and water consumption and household size gives different results for the two study areas of Gaza compared to the two areas of Nablus. In the West Bank town we find an expected increase in the households' use of water for domestic purposes with increased household size and increased household income.²¹ 26 percent of the low-income refugee camp households of Nablus consumed 10m³ or more a month, whereas 39 percent of the high-income households did the same. Outside the camps the percentages for the lower and upper income groups using more than 10m³ were 11 and 23 percent.

In the refugee camps of Nablus, the use of domestic water reached to more than 10m³ per month for 23 percent of the households with five members or less. More than double the percentage (58 percent) of households with nine members or more used that much water. Among the non-camp households only about one tenth (9 percent) of the households with fewer than six members consumed above 10m³ of water, while nearly one-half (48 percent) of the households with nine members or more consumed over 10m³.

The same trends are not observed for the two areas of study in Gaza. As a matter of fact we cannot find any (or at most an extremely weak) association between the income and household size variables on the one side, and domestic water consumption on the other.²² Why is that? Regrettably, we do not manage to come up with a full answer to this question. But clearly, at least some explanatory power must be attributed to the comparatively low water prices. Furthermore, there is reason to believe that the current billing strategy pursued by the Gaza city municipality, whereby customers, as the discussion above indicates, only to a limited extent are charged according to their actual consumption, does not restrain water use.

²¹ Appendix 1, tables 10a and 10b.

²² Appendix 1, tables 10c and 10d.

5 The Contingent Valuation Method

The survey methodology used to establish information about people's maximum willingness to pay for water and sewerage services in this survey is called the *Contingent Valuation Method* (CVM). It was first developed in the early 1960s to price environmental public goods such as clean recreational areas and national parks to preserve wildlife. Later the CVM spread to such fields as water and sanitation, and the health sector. Our choice of methodology stems from the belief that the CVM is an adequate technique for our purpose. Such a view is supported by conclusions from other studies, for example one from India: «Well-conducted contingent valuation studies can provide reliable and valuable information on behavioural responses to well-defined and well-understood goods such as household water supply» (Griffin et al 1995).

The CVM survey tool exists in a myriad of variants or different versions. Yet it is possible to make a distinction between two main types of willingness to pay contingent valuation studies: (1) Continuous methods: open-ended questions, where respondents are asked to state their maximum willingness to pay for the good being valued. (2) Discrete methods: the dichotomous choice format, where respondents determine whether their WTP is larger or smaller than a set money value. A dichotomous choice question is often followed by an open question to allow the researcher to check for consistency (Ready, Buzby and Hu 1996). We opted for a version of the second type.

Within the discrete method of contingent valuation there exist several different ways to ascertain people's willingness to pay. One book dedicated to the discussion of the strengths and weakness of the CVM mentions four questioning strategies: the bidding game; the payment card; the take-it-or-leave-it approach; and take-it-or-leave-it with follow up (Mitchell and Carson 1989). A fifth strategy is called the bidding-tree technique, and is an attempt to combine bidding games and payment cards (Kriström 1995).

We chose the bidding game question format, which is also called the referendum format, the oldest and most widely used method. The bidding game technique imitates an auction, where the respondent is offered to pay a specific bid which is raised or lowered in an iterative manner until the maximum willingness to pay is reached. The auction format is one of the strengths of the procedure, because it is straightforward and likely to be familiar to the respondents.

A crucial point in the scenario offered is an increase in the level of provision of the good or service. In fact, improvement of services is such a significant part of a willingness to pay survey and the Contingent Valuation Method that textbooks and articles in scholarly journals on the topic define the method by this characteristic.

6 Willingness to Pay for Improved Water Services

Service Scenario

A fundamental issue in water supply policy is predicting the response of consumers to a service to which they have not previously had access or characteristics of that service such as improved reliability and increased prices. Such information was collected through the AWTP survey by presenting a realistic scenario to the respondents and asking them how much they would be willing to pay for the service. As mentioned above, we did not ask for a price directly, but used the so-called bidding game whereby prices are offered increasingly or decreasingly (depending on the answer given) until a “negotiated” price have been settled.

The following scenario was presented²³:

Imagine that your dwelling is connected to a national Palestinian water system. Also imagine that the water is available every day for most of the day, that the flow in the taps is always good, and that the water is safe/clean/healthy/potable.

Such improved water services imply increased costs, which will have to be covered. Those who use more water will have to pay more.

Variation in Demand for Improved Services

The average household stated that it wants to pay about 3 NIS per m³, with the average bid being somewhat higher in Nablus than in Gaza city. In Gaza’s Beach Camp the average declared maximum willingness to pay is 2.9 NIS, while outside the camp Gazans want to pay at most 2.6 NIS per cubic meter. In Nablus the average highest willingness to pay for improved water services is 3.1 NIS and 3.5 NIS for residents inside and outside the refugee camps respectively. Hence, apart from the low bid for Gaza city, excluding the camp, the bids seem to reflect the income levels of the study areas.

That Nablus is willing to pay a somewhat higher price for the water than Gaza city reflects the better economic standing of people there compared to those in Gaza city. However, while Gazans, compared to what they are paying to today, clearly are willing to pay more for a rise in the quality of the water service provided, this seems not to be the case for the inhabitants of Nablus.

If we were to apply the stated price on today’s consumption, the average Nablus household, both inside and outside the camps, would end up paying less for the network water than they do today. This might suggest that people feel they have reached a limit to how much they want to pay for water, and that the benefit from the improved services offered

²³ A more detailed description of the scenario offered to our respondents is given in appendix 2.

in the bidding game is only marginal contrasted with the current situation. While the data show that many households in Nablus face unsatisfying water stability, as measured by the number of hours of tap water per day, nearly all households have a water tank and therefore most likely are able to buffer the unstable delivery.

A similar exercise applied on Gaza city indicates that people both inside and outside the camp are willing to pay considerably more than today. For the camp the figure is 37.4 NIS monthly against the current total average of 29.3 NIS, up nearly 30 percent. The households outside of the camp seem ready to more than double their expenditure.²⁴ Now, caution is needed here as there are no survey data to indicate that the Gaza households would not adjust to the hypothetical circumstances given in the bidding game and their own bids by decreasing the consumption.

Within each of the four populations there is a trend, albeit not very strong, for higher-income households to bid more than lower-income households. Variation across income levels is most notable for the lowest and highest bids. This tendency is seen from table 3.

Table 3 WTP for Improved Water Services. Bids (in NIS) According to Households' Income Level (Low=L, Medium=M, and High=H). Percent of Households

	Gaza city			Gaza camp			Nablus city			Nablus camps		
	L	M	H	L	M	H	L	M	H	L	M	H
No bid (0)	54	30	27	33	36	15	15	9	9	18	12	9
Low bid (1-1.5 NIS)	14	18	22	18	20	23	7	7	7	17	10	3
Middle bid (2-4 NIS)	20	38	36	36	36	35	69	71	64	61	62	64
High bid (8-16 NIS)	11	14	16	13	8	26	9	12	20	5	16	24
	99	100	101	100	100	99	100	99	100	101	100	100

If we compare the average bid for five income groups, we detect a similar pattern (figure 3, next page). There are considerably higher bids in the highest income group compared to the lowest income group in every study area.²⁵

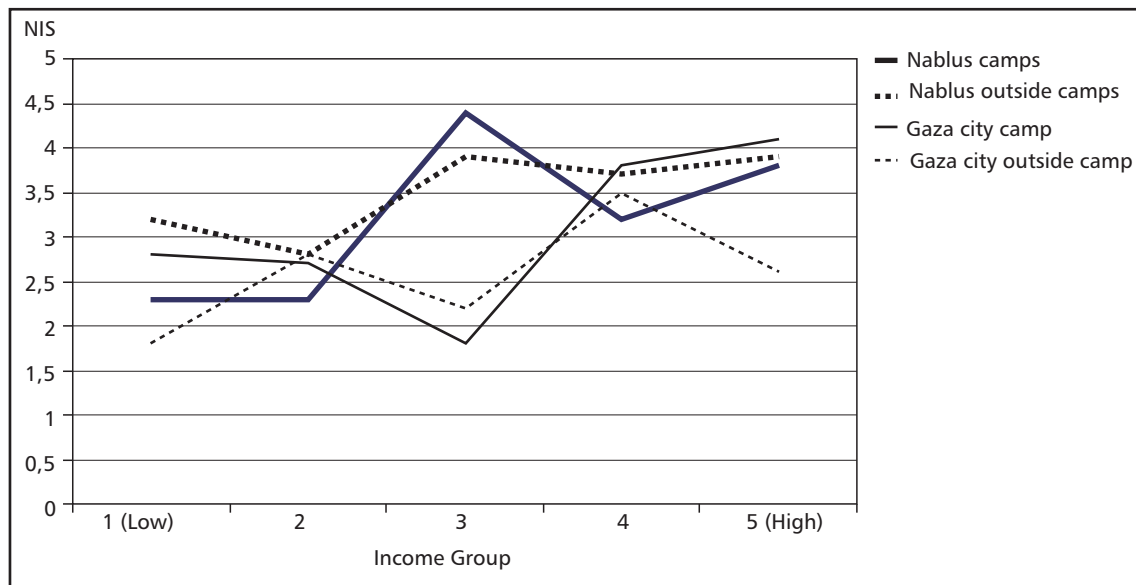
In our data, household size and consumption levels do not appear to have any significant effect on the maximum willingness to pay. To illustrate, the bids are decreasing for increased consumption for two of the four areas of study (Nablus city and the Beach Camp of Gaza), while there is no clear trend in the data for the two other areas.²⁶

²⁴ A 1995 study using the so-called Rapid Rural Appraisal technique, including both individual and group interviews, of three areas in the Gaza Strip, among them the Beach Camp, concluded that "women in all areas expressed a willingness to pay [more] for better water supply, both in terms of quantity and quality" (Abu Sway 1995). Yet another study has indicated that the willingness to pay for water among people living in the Gaza Strip would increase if the quality and quantity of water would improve (non-random sample of 400 households, Aqtash 1997).

²⁵ Appendix 1, table 11.

²⁶ Appendix 1, table 11.

Figure 3 Willingness to Pay for Water. Average Maximum Bid Per Cubic Meter by 5 Income Groups in the Fours Study Areas



7 Willingness to pay to for Sewage Services

All households were asked to participate in one or two bidding games to assert how much people were willing to pay for improved sewage services. The households without connection to a public underground sewerage system were asked about how much they were ready to pay to get connected. In addition, all households were asked about the maximum monthly fee they were willing to pay for the sewage services.

Connection Fees

We can present data only for the cities of Nablus and Gaza, excluding the camps, as only in these two areas is there a sufficient number of households for which the question about connection fee is relevant. In Gaza city one fifth of the 46 households do not want to pay anything to get connected, while the average connection fee for all is 579 NIS. In Nablus 17 percent of the 24 households do not want to get connected to a sewerage network, or they want it for free, while on average the households would accept a connection charge of 604 NIS.

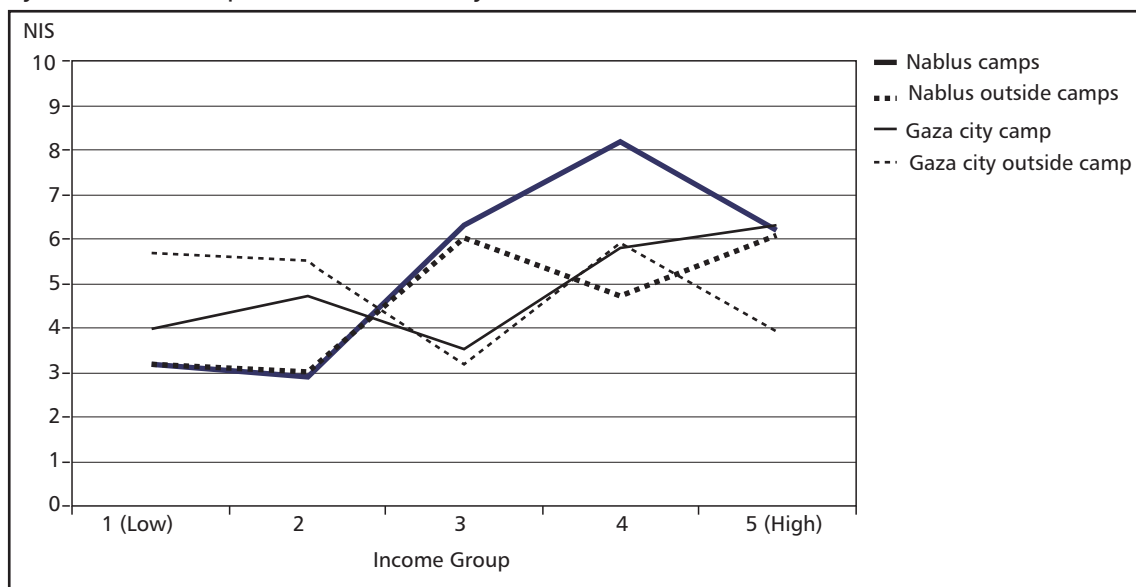
Monthly Sewage Fees

The sewage fee bidding game resulted in little variation across the four study areas. Roughly one-half of all households do not want to pay any regular fee for the use of a sewage system, while the average maximum willingness to pay is approximately 5 NIS a month. Currently there exists no sewage charge in Nablus, apart from the connection cost, yet the households there accept to pay a regular fee for the service. In Gaza city, where the current monthly price is 6 NIS per floor of the house or apartment plus 15 percent of the water rate, the average respondent wants to cut his monthly payment.

For three of the study areas the wealthier households tend to declare themselves willing to pay a higher fee than the less advantageous households. In fact, the upper 20 percent are willing to pay nearly twice as much as the lower 20 percent. The exception to this trend is Gaza city, outside the camp, where no clear pattern emerges (figure 4).²⁷

²⁷ Detailed results of the two sewerage-fee bidding games are found in appendix 1, table 12.

Figure 4 Willingness to Pay for Sewage Services. Average Maximum Monthly Sewage Fee Bid by 5 Income Groups in the Four Study Areas



Why are 50 percent of the households not willing to pay anything for sewerage services? Firstly, the households of Nablus may hold the opinion that the old practice of free sewerage service should continue. Although clearly stated in the bills, one should not overlook the possibility that some of the respondents in Gaza city believe that sewerage service is currently free of charge. In that case, the argument just presented for Nablus is also valid for Gaza city. Secondly, some might believe that suffice the price they pay for water. Other respondents might think that the sewerage fee should be integrated in the water fee and hence refuse to pay extra. Finally, some households are so poor that they do not want to pay anything, whatever the quality of that service.

8 Conclusion

Water Consumption

On average Gaza city households consume more water than households in Nablus. Explanatory factors are:

- Stability of water supply. Although the widespread existence of water tanks in Nablus might absorb some of the problems arising from the short number of hours with network water, the increased availability of water in Gaza leads to higher consumption.
- Cheaper water. Notwithstanding the higher level of income and better living conditions in Nablus, the comparably much higher price of water in Nablus leads to water saving practices.
- Bigger households. Larger families in Gaza city increase its average household consumption.
- Inadequate billing system. The current billing strategy, whereby many customers are not charged according to their actual consumption, induce high consumption.

We believe that the water consumption for the two Nablus populations stands at more or less the same level.

There seems to play a big role for a household's water consumption whether it is dwelling inside or outside of the Gaza city Beach Camp area. Since the level of provision is as good inside as outside the camp, the comparatively lower water consumption inside must be explained mainly by the economic factor. Although water from the Gaza city municipality is cheap in comparison with the water offered by the municipality of Nablus, water expenditure as a proportion of household income is highest in the Beach Camp. The refugee camp households in Gaza city are also the most indebted ones.

Still, rather than quantity and price, water quality is the biggest issue for the population of Gaza city.

Affordability and Willingness to Pay for Water

Although contested, water studies often claim that households in most areas of the world could and should be able to spend up to five percent of their total income on water (Rogerson 1996). If this five-percent rule-of-the-thumb holds true, one would think that it would be possible to double or triple the prices in Gaza city and Nablus and, judged from the PCBS expenditure statistics, increase average water tariffs even more at the national level.

Yet, there is reason to be cautious. The arrow that indicates the Palestinian's income and welfare is pointing downwards. Analysts are sceptical about the economic development

for the Palestinian Territories, at least in the short run. Lack of investment in the private sector and a high unemployment rate is likely to be important features of the picture so long as there is little or no progress in the peace process. The demographic development, characterised by a high although slowly reduced growth, contributes negatively to the overall situation (Pedersen and Hooper (eds.) 1998).

This fear of times becoming even worse may have affected the respondents' answers to the willingness-to-pay questions, at least in Nablus. It seems like most people in Nablus are relatively content with the current situation. The fact that only about half the households get tap water more than five hours a day did not result in a willingness to pay more for the water than they already do. The two Gaza populations, on the other hand, seem prepared to pay more for the water, for the most part due to its low quality.

For all areas, there appears to be some willingness to pay higher rates among the highest income groups compared to the lowest. Thus it could be argued that there is a potential for progressive tariffs.

Stiff prices and low consumption in Nablus compared to low prices with higher consumption in Gaza city could be interpreted as an argument for price policy having a water saving effect in the Palestinian Territories.

Affordability and Willingness to Pay for Sewerage Services

About twenty percent of the households, which are not currently connected to an underground sewerage network, do not want to pay to get connected or they do not want the service because they cannot afford it. Seventy households want to pay on average about 600 NIS to get connected.

Approximately 50 percent of all interviewed households do not want to pay a regular bill for the sewerage service, while the average willingness to pay stands at around 5 NIS a month. The result is similar for all four areas. Again, as for water, the well-to-do are prepared to pay somewhat more for the service than the less fortunate.

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Appendix 1 Tables

Table 1: Household Size and Density

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Household size	6.1	5.8	7.5	7.3
Persons per room	1.9	1.7	2.9	2.2

Table 2: Some Housing Characteristics (Percent of Households)

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Independent kitchen	95	98	90	97
Shower or bath	84	81	90	96
Flush toilet	36	62	46	79
Connected to underground sewage network	98	93	96	88

Table 3: Household Income (in NIS)

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Average yearly household income	22 282	32 708	12 186	28 458
Average monthly household income	1 857	2 726	1 016	2 372
Average yearly income by 5 income groups				
1 (low)	1 434 (n=26)	5 210 (n=58)	986 (n=27)	2 837 (n=76)
2	8 886 (n=31)	13 651 (n=66)	3 371 (n=36)	9 170 (n=68)
3	13 779 (n=20)	20 148 (n=67)	7 258 (n=37)	13 895 (n=89)
4	20 311 (n=28)	30 304 (n=58)	12 336 (n=35)	23 594 (n=59)
5 (high)	44 710 (n=26)	62 162 (n=59)	27 145 (n=31)	63 704 (n=64)

1\$=3.15 NIS, September 1997

Table 4: Income Sources Last 12 Months (Percent of Households)

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Wages/salaries	80	68	69	69
Self-employment	22	27	10	17
Home production for sale	3	1	0	0
Government Poor Relief Fund	1	0	11	4
Transfer from charitable organisation	0	0	1	0
Zakhat *)	4	2	0	0
Transfer from UNRWA	4	1	11	0
Remittances from relatives (inside or outside Palestine)	5	7	3	6
Monetary gifts	37	40	10	7
Rent of land or buildings	2	8	0	6
Interest profits from deposits, bonds, monetary papers or loans etc.	0	2	0	5
Retirement pension and social security	7	4	2	2
Profit from sale of durable goods	0	1	3	1
Household member worked in Israel last month	13	13	8	7

•) *Zakhat* is a religious tax paid to a Muslim religious leader, who then allocates money or goods to the needy. The zakhat is one of the five pillars of Islam.

Table 5: Sources of Water (Percent of Households)

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Main source of water				
Main source of water piped into residence	99	97	91	80
Main source of water piped into building	1	3	9	20
Total	100	100	100	100
Main source of drinking water				
Piped into residence	99	97	79	54
Piped into building	1	2	4	21
Public tap	0	1	5	9
Other source	0	0	12	15
Total	100	101	100	99
Main source of water for cooking				
Piped into residence	98	97	90	73
Piped into building	1	2	6	22
Public tap	1	1	2	3
Other source	0	0	2	2
Total	100	100	100	100

Table 6: Satisfaction With Quality of Water (Percent of Households)

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Water from main water resource				
Very satisfied	20	22	0	9
Satisfied	67	65	30	32
Not so satisfied	12	13	33	32
Very unsatisfied	2	1	37	27
Total	101	101	100	100
Water from main source of drinking water				
Very satisfied	18	20	6	8
Satisfied	68	66	25	44
Not so satisfied	12	13	30	26
Very unsatisfied	2	1	39	22
Total	100	100	100	100

Table 7: Water Supply Characteristics (Percent of Households)

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
One household to the meter	50	66	55	35
Share the meter with other household, and which prefer a separate meter	59	59	42	26
Share the meter with a shop or the like	26	12	9	14
One or more water storage tank	97	97	76	90
Use electric pump to get water to tank on the roof	5	7	22	53
Use filter device on drinking water	5	7	3	10
Garden/ hakura	9	29	6	17
Use piped water to irrigate garden/ hakura (basis for presentation (n) is households with a garden)	44 (n=11)	70 (n=91)	100 (n=10)	95 (n=61)
Normally wash car at home (out of those who own a car or truck)	35	28	46	56
Solar water heater	72	73	78	83
Number of hours per day with network water in winter				
Less than 5 hours	60	38	9	3
5-12 hours	30	30	14	33
More than 12 hours	10	32	77	64
Number of hours per day with network water in summer				
Less than 5 hours	62	48	12	6
5-12 hours	27	30	28	46
More than 12 hours	11	22	60	48
Irregularity of water supply				
Almost never problems	80	83	61	33
Problems from time to time	18	15	33	29
Weekly problems	1	2	2	22
Daily problems	1	0	4	16

Table 8: Self-Reported Water Consumption

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Average consumption of network water (m ³) September 1997	9.1	6.8	12.9	29.0
Average total water consumption (m ³) September 1997	9.2	6.8	12.3*	28.3*
Percent of households in six consumption groups (September 1997)				
Total water consumption below 5m ³	28	44	39	11
Total water consumption 5-10m ³	37	39	16	7
Total water consumption 10-14m ³	17	8	16	6
Total water consumption 15-19m ³	12	7	10	13
Total water consumption 20-29m ³	5	3	8	27
Total water consumption 30m ³ or more	2	0	12	36
Total	101	101	101	100
Do you consider your total consumption to be a suitable quantity of water? (Percent of Households)				
Suitable quantity	61	69	83	84
Too little	15	14	16	15
Too much	24	17	1	1
Total	100	100	100	100
Reported sources(Percent of Households)				
Network water (last two months)	99	99	95	97
Vendor/tanker truck (last month)	0	0	0	1
Bottled water (last week)	1	1	11	17
Other sources (last month)	0	1	25	24

*It may seem odd that the total consumption of water for Gaza city and its camp is lower than the consumption of network water, but this result is due to a slightly different number of cases for the two calculations.

Table 9: Average Self-Reported Water Expenditure (in NIS) by Source, September 1997

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camps
Network water	37.2	30.4	22.3	26.4
Vendor/tanker truck	0	0.2	0	0
Bottled water	1	0.4	3.7	5.3
Other sources	0	0	3.3	0.5
All sources	38.1	31	29.3	32.3

1\$ = 3.15 NIS

Table 10a: Total Water Use Last Month by Yearly Household Income and Household Size – Nablus Refugee Camps

Household Income				
	Low income: 10,000 NIS or less	Medium income: 10,001-18,000 NIS	High income: 18,001 NIS or more	Total
Less than 5 m ³	43	18	20	27
5-9 m ³	31	42	40	38
10-14 m ³	12	18	24	18
15-19 m ³	9	13	13	12
20-29 m ³	5	8	1	5
30 m ³ or more	0	0	1	1
Total	100	100	100	100
n	45	42	48	135

Household Size				
	1-5 members	6-8 members	9 members or more	Total
Less than 5 m ³	40	17	1	27
5-9 m ³	36	47	32	39
10-14 m ³	5	27	34	18
15-19 m ³	10	7	22	12
20-29 m ³	8	0	2	5
30 m ³ or more	0	0	0	1
Total	100	100	100	100
n	67	39	30	137

Table 10b: Total Water Use Last Month by Yearly Household Income and Household Size – Nablus Outside Refugee Camps

Household Income				
	Low income: 15,000 NIS or less	Medium income: 15,001-30,000 NIS	High income: 30,001 NIS or more	Total
Less than 5 m ³	48	44	37	43
5-9 m ³	40	38	40	39
10-14 m ³	5	8	8	7
15-19 m ³	3	6	13	7
20-29 m ³	2	3	2	3
30 m ³ or more	1	0	0	0
Total	100	100	100	100
n	103	119	86	308

Household Size				
	1-5 members	6-8 members	9 members or more	Total
Less than 5 m ³	56	40	17	45
5-9 m ³	36	43	34	38
10-14 m ³	4	7	21	7
15-19 m ³	2	7	24	7
20-29 m ³	2	2	3	2
30 m ³ or more	1	0	0	0
Total	100	100	100	100
n	160	110	47	317

Table 10c: Total Water Use Last Month by Yearly Household Income and Household Size – Gaza City Refugee Camp

Household Income				
	Low income: 3,600 NIS or less	Medium income: 3,601-10,800 NIS	High income: 10,801 NIS or more	Total
Less than 5 m ³	45	28	41	38
5-9 m ³	13	24	13	16
10-14 m ³	18	13	14	15
15-19 m ³	13	12	6	10
20-29 m ³	3	6	14	8
30 m ³ or more	8	16	11	12
Total	100	100	100	100
n	52	49	51	151
Household Size				
	1-5 members	6-8 members	9 members or more	Total
Less than 5 m ³	40	37	40	39
5-9 m ³	7	19	20	16
10-14 m ³	23	18	8	15
15-19 m ³	15	10	6	10
20-29 m ³	2	9	11	8
30 m ³ or more	13	7	15	12
Total	100	100	100	100
n	44	49	62	155

Table 10d: Total Water Use Last Month by Yearly Household Income and Household Size – Gaza City Outside Refugee Camp

Household Income				
	Low income: 10,000 NIS or less	Medium income: 10,001-20,000 NIS	High income: 20,001 NIS or more	Total
Less than 5 m ³	13	8	10	11
5-9 m ³	6	7	6	7
10-14 m ³	6	7	5	6
15-19 m ³	14	7	17	13
20-29 m ³	31	27	25	28
30 m ³ or more	29	44	36	36
Total	100	100	100	100
n	100	101	83	285
Household Size				
	1-5 members	6-8 members	9 members or more	Total
Less than 5 m ³	11	12	9	10
5-9 m ³	7	6	9	7
10-14 m ³	6	7	5	6
15-19 m ³	7	18	15	13
20-29 m ³	29	26	26	27
30 m ³ or more	41	31	36	36
Total	100	100	100	100
n	99	94	100	293

Table 11: Willingness to Pay for Water. Result of Water Fee Bidding Game

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camp
The various bids, NIS per m³ (Percent of households)				
0	13	11	29	37
1 or 1.5 NIS	10	7	20	17
2 NIS	39	31	24	20
4 NIS	23	38	11	12
8 NIS	13	10	8	8
12 or 16 NIS	2	3	8	6
Total	100	100	100	100
Average highest bid, NIS per m ³	3.1	3.5	2.9	2.6
Average bids (NIS Per m³) According to five income levels *				
Level 1 (low)	2.3	3.2	2.8	1.8
Level 2	2.3	2.8	2.7	2.8
Level 3	4.4	3.9	1.8	2.2
Level 4	3.2	3.7	3.8	3.5
Level 5 (high)	3.8	3.9	4.1	2.6
Average bids (In NIS Per m³) According to three consumption levels				
0-4m ³	3.2	2.5	3.3	2.1
5-9m ³	2.6	2.4	3.1	3.2
10m ³ or more	3.5	2.1	2.5	2.8

* The four study areas are divided into five approximately equally large groups. Therefore each income level is not equivalent across the areas.

Table 12: Willingness to Pay for Sewage Services. Result of Two Sewerage Fee Bidding Games (in NIS)

	Nablus camps	Nablus outside camps	Gaza city camp	Gaza city outside camp
SEWERAGE CONNECTION FEE BIDDING GAME. Sufficient number of cases only in two study areas				
Average highest bid	604 (n=24)		579 (n=46)	
Sewerage fee bidding game				
The various bids, NIS per month (Percent of households)				
0 NIS	50	45	47	55
2 or 3 NIS	8	15	15	9
6 or 9 NIS	20	25	26	18
12 NIS	12	10	5	13
24 or 48 NIS	10	5	7	6
Total	100	100	100	101
Monthly sewerage fee, average highest bid	5.5	4.6	4.7	4.7
Average bids according to five income levels*				
Level 1 (low)	3.2	3.2	4.0	5.7
Level 2	2.9	3.0	4.7	5.5
Level 3	6.3	6.0	3.5	3.2
Level 4	8.2	4.7	5.8	5.9
Level 5 (high)	6.2	6.1	6.3	3.9

* The four study areas are divided into five approximately equally large groups. Therefore each income level is not equivalent across the areas

Appendix 2 Methodological Comments

1 Introduction

In the design of a water tariff structure one is in need of as much and as detailed information as possible about the users, that is the demand-side of the service to be provided. To collect information about domestic consumers we conducted a so-called Ability and Willingness to Pay (AWTP) survey in two selected areas, Gaza city and Nablus. We chose to include refugee camp dwellers in both study places. Hence, we report on four different populations: households residing both inside and outside of the refugee camps of Nablus City, and households living inside and outside of the camp in Gaza city.

As stated in the report, the two main objectives of the AWTP survey were (i) to profile domestic water consumption, and (ii) to assess the consumers' ability and willingness to pay for water. In addition, since sewerage services is meant to be an integrated part of the future tariff system, the survey aimed at finding out how much customers are willing to pay for such services.

Below we make an attempt to present briefly some central aspects of the AWTP survey. The first two sections are used to delineate the content of the questionnaire and describe the sample. Thereafter, we discuss some aspects related to the collection of data on water consumption as well as expenditure. Next, we go through the approach to the gathering of information about willingness to pay for future services, that is, our application of the Contingent Valuation Method (CVM). Finally, we outline how we asked about household income.

2 The Questionnaire

The questionnaire was developed in English by Fafo with some in-put from the project team of the wider Water Tariff Study, Palestinian academicians and the Palestinian Water Authority (PWA). The Arabic version was reviewed several times and went through a small-scale field test or pilot survey. The pilot revealed some weaknesses that were improved before the actual survey fieldwork, which took place from 25 October to 8 November 1997.

The carefully designed questionnaire contains several parts with varying themes or survey modules. These topics appeared in the following order: administrative form; housing; sources of domestic water; consumption of water; expenditure on water; bidding games about water use, connection to sewerage network and use of sewerage system; demography; education; labor force, and economy.

3 The Sample

The sample was drawn from the subscription lists of the water utilities of the Gaza city and Nablus municipalities using a linear systematic sampling technique. We interviewed 1009

out of 1259 sampled households, which equals 80 percent. Only 12 households refused to participate in the survey. Respondents were heads of households or their spouses. The main reasons for the unsuccessful interview attempts are: (a) Only commerce at the given address (from 1.1 percent to 21.1 percent of the sampled households in the four areas). (b) Non-existent dwellings or empty or vacant dwellings due to house repair and construction works or other reasons (from 6.6 percent to 14.3 percent of the sampled households).

Table: Interview Status

	Gaza city - refugee camp ¹	Gaza city - outside camp	Nablus - refugee camps ²	Nablus - outside camps	Total
Interview completed	181	370	136	322	1009
Status not determined/ no usable inform.	2	0	0	2	4
Dwelling unit does not exist/ vacant/ under construction	12	53	11	34	110
Not eligible/ no contact	3	6	4	11	24
No private household, only commerce	2	25	5	68	100
Refusal	0	12	0	0	12
Sampled households	200	466	156	437	1259

¹ Ashati', also called Beach Camp (the only refugee camp served by Gaza city municipality.

² Balata, New Askar, Old Askar, and Ein Beit al-Ma.

4 Consumption and Expenditure

First we posed several questions concerning sources of domestic water for drinking as well as other use, stability of supply, satisfaction with supply, and storage facilities. Next we asked about the household's total use of water from the network (last two months), a vendor/ tanker truck (last month), bottled water (last week) and other sources (last month). We specified sources to increase accuracy of reporting. Also, the interviewers asked to see the water bills, if available, to increase reliability of estimates. A majority of the surveyed households were able to base their reporting on the bills, which specify amount of water consumed and sum charged, as well as the sewerage charge, the electricity charge and other taxes.

However, the data collectors took great care not to ask for the exact amount on the bill, in order to avoid excluding possible, but not very likely, illegal network connections from the calculations of the respondents. The survey did not include a specific question about illegal network connections for two reasons: (1) According to information from local sources, either a dwelling unit is hooked up to the network, and as a result is charged, or it is not, and might then be connected illegally. Since the sampling frames were the municipality subscription lists, most likely few, if any, households with illegal connections were interviewed. Besides, compared to other districts of the Gaza Strip, such as for instance the Khan Younis area, Gaza city is thought to have fewer problems with illegal connections.

(2) It was not considered wise to ask about illegal connections, because it could jeopardise the entire interview situation and reflect negatively on the two municipalities and PWA.

Also, accepting the consumption-figure specified on the bills without checking it out further with the respondent was thought to be unwise for a second reason, namely that it might not represent the household's actual (legal) consumption. This issue is particularly relevant for the Gaza AWTP survey and is related to the many broken meters found in Gaza city. As stated in the report, the municipality has admitted that wrecked meters constitute a considerable problem, and one study has claimed that as many as 70 percent of domestic water-meters do not work. Households with broken meters of course never receive bills with actual consumption figures, but are charged according to the assessments of municipality employees. Some households with operative meters are charged according to the best judgement of the municipality employees too, because they do not always trust the meters. In addition, sometimes customers are simply charged the same fee as last month without a reading of the meter, and the bill, therefore, would not mirror actual consumption. The two latter practices hold true for both municipalities, but are presumably more widespread in Gaza city than in Nablus.

The implication of the above for the survey is that the reliability of the self-reported consumption-data for the two Gaza populations might be lower than for the two populations in Nablus, where destroyed meters are fixed or replaced immediately, at the cost of the consumer. In an early phase of the project we had hoped to check self-estimated consumption figures against record-data from the municipalities. However, the idea had to be given up for several reasons: (a) We would not be able to make the comparison in cases where two or more households share the meter or where the household shares the meter with a shop or some other commercial establishment (50 percent of the cases). (b) As already mentioned, not all data from the municipalities are record-data in the sense that they are based on meter reading and hence reflect real consumption, or the data are flawed due to erroneous meters. (c) A check of the record data revealed considerable unsystematic fluctuations in the quantity of water recorded per household per month over the last 12 months. Thus, the reliability of the record data was found not to be satisfactory and high enough to improve the quality of the information from the households themselves. Record data's weaknesses for research purposes are more serious for Gaza city than for Nablus.

Following the question about consumption, the interviewers queried about the households' expenditure on water, according to the same four types or sources of water mentioned above and, of course, using the same reference periods. Again, the interviewer asked for the bill. In this case, the figures on the bills naturally correspond to the amount of money actually paid for network water, and hence helped a lot in improving the data quality. In general we consider the expenditure data to be more reliable than the consumption data. In addition to the reason just given, this is because recalling the exact figure of a recently paid bill is presumably much easier than calculating the correct amount of water consumed, especially when the respondent has no trustworthy bill to help him.

Finally, we asked about expenditure on sewerage last month. For the households of Nablus this amounted to zero, as they are not charged anything (except for the connection fee), while the monthly rate in Gaza city is 6 NIS per floor of the house or apartment plus 15 percent of the water rate.

When estimating expenditure, the respondent could choose between stating them in Jordanian Dinars (JD), which is widely used in the West Bank, or Israeli Shekel (NIS).

5 Willingness to Pay

Service scenarios offered

As explained in the report, to establish the respondents' maximum willingness to pay for the future good, we brought them into a hypothetical situation. We asked them to value or price a future, yet not too distant, water delivery system. It should be stressed that in a contingent valuation approach, a hypothetical good does not equal a vaguely defined good. On the contrary, much research has underscored the importance of a plausible, *realistic scenario* and a *carefully described good* in the questionnaire in order to get reliable results (Carson and Mitchell 1995). The following description has been put forth as a guideline for good contingent valuation scenarios:

[It] must be informative; clearly understood; realistic by relying upon established patterns of behavior and legal institutions; have uniform application to all respondents; and, hopefully, leave the respondent with a feeling that the situation and his responses are not only credible but important (Rowe and Chestnut 1982, cited in Mitchell and Carson 1989).

We sought to comply with as many of these characteristics as possible. The exact look of the future system or program is not known at the moment, but will be designed through coming scientific and political debates. Yet, the Palestinian Water Authority had indicated some features of it, such as high regularity and stability of delivery; healthy, drinking-water standard; and progressive pricing to allow for subsidising across geographical areas and socio-economic groups.²⁸ These elements were integrated into the scenario offered to the respondents:

Imagine that your dwelling is connected to a national Palestinian water system. Also imagine that the water is available every day for most of the day, that the flow in the taps is always good, and that the water is safe/clean/healthy/potable.

Such improved water services imply increased costs, which will have to be covered. Those who use more water will have to pay more.

We attempted to increase the likelihood of getting honest answers and «true» values by introducing the willingness to pay section of the questionnaire with the following statement:

Now I would like to ask you some questions about how much your household would be willing to pay for improved water services. I will describe the nature of the improved services and then ask you whether you would like to have the service at a suggested price. During this procedure, you shall have to think about the advantages and disadvantages of subscribing to the improved service and to consider how much the service is valued to you and your household.

²⁸ From discussions with the Palestinian Water Authority (PWA). Some "Elements of the National Water Policy" is also available in official documents (PWA 1997).

In addition, we attached a special statement after the offered scenario:

In the so-called bidding game that is about to start, we would like you to indicate your willingness to pay for the improved services within the total income of your household and your budget limit. We would like to inform you that it is in your best interest to indicate your true/real willingness to pay. Only by so doing can you help the Palestinian Water Authority to develop a fair national water tariff system.

You should be aware that every household has different needs and economic standing. There exist no «right» answer. Please respond to the questions on the basis of your own needs and financial situation.

After the water fee questions, the respondents were taken through one or two more rounds of questioning, depending on whether the households were already connected to a sewerage network or not. The introduction read as follows:

I will next take you through two more bidding games.

Imagine that your dwelling is connected to the national Palestinian water system already mentioned. Suppose that in addition to having this improved water service, your dwelling would be connected to a public, well-functioning underground sewerage network.

The first bidding game deals with connection fees, the second will be about the regular, monthly payment charged for the sewerage service.

The bidding games

As explained in the report, there are several different ways to ascertain people's willingness to pay within the discrete method of contingent valuation. We chose the bidding game question format, which imitates an auction, where the respondent is offered to pay a specific bid which is raised or lowered in an iterative manner until the maximum willingness to pay is reached.

An example of the exact auction format used is shown below:

Water fee bidding game – high starting point:

- (I) If the price you are charged for water were NIS 8 per m³, would you like to purchase this service?
- Yes (II)
- No/DK/Not sure (IV)
- (II) If the price you are charged for water were NIS 16 per m³, would you like to purchase this service?
- Yes Stop; enter bid below
- No/ DK/Not sure (III)

(III) If the price you are charged for water were NIS 12 per m³, would you like to purchase this service?

Yes Stop; enter bid below

No/ DK/Not sure Stop; enter NIS 8 below

(IV) If the price you are charged for water were NIS 4 per m³, would you like to purchase this service?

Yes Stop; enter bid below

No/ DK/Not sure (V)

(V) If the price you are charged for water were NIS 2 per m³, would you like to purchase this service?

Yes Stop; enter bid below

No/ DK/Not sure (VI)

(VI) If the price you are charged for water were NIS 1 per m³, would you like to purchase this service?

Yes Stop; enter bid below

No/DK/Not sure Stop; enter 0 below

HIGHEST BID ACCEPTED: NIS |__|__|__|

What exactly is the maximum price per m³ you would be willing to pay for this improved water service? NIS |__|__|__|

(The answer "Do not want improved service" was given a separate code.)

Quality of data

Well-experienced users of the CVM have claimed that in most situations it would be impossible to carry out a WTP survey in which the interviewer raised or lowered the commodity price like we did, because individuals would not know how much water they normally consume in terms of a standardised unit (Whittington, Lauria and Mu 1991). We avoided this pitfall by establishing the household's water consumption and expenditure as well as (in the case of Gaza city) the expenditure on sewerage prior to the bidding game, thus helping the interviewee to anchor his or her response to the WTP questions.

A criticism raised against the bidding game formula is the starting price effect or starting point bias that goes with it (Cummings et al 1986, Mitchell and Carson 1989, Hausman (ed.) 1993). Starting point bias occurs when the respondent's stated WTP is influenced by a value introduced by the scenario or the bidding game itself. Confronted with a money

figure in a situation where the respondent is uncertain about the value of the good, he or she may regard the proposed amount as conveying an approximate value of the good's true value and anchor the WTP amount on the proposed amount. Such a propensity is likely to be exacerbated by yea-saying, the tendency to agree with the interviewer's statement regardless of own true view.

We sought to reduce the problem related to the starting point bias through three strategies: (1) The good was as carefully described as possible, so that it should be easy to validate. (2) Giving some households a high starting point and some a low starting point in the bidding games. The distribution of the starting points on the sampled households was done through a random procedure. (3) Setting the starting points with a view to existent rates in the surveyed communities.

Our survey results reveal a significant difference in the stated WTP when comparing households with high versus low starting points, and thus confirm the existence of a starting point bias (see table below). However, if we assume that the low starting point tend to underestimate real values as much as the high starting point tend to overestimate them, we would argue that the mean values found for the four total populations are meaningful and approximate "true" values.

Table: Average Highest Bid (NIS per m³) for Water and Sewerage Services According to Starting Point (High vs. Low) for the Four Populations

	Gaza city - refugee camp	Gaza city - outside camp	Nablus - refugee camps	Nablus - outside camps
Water - high starting point	3.97 (n=87)	3.55 (n=193)	3.86 (n=67)	3.95 (n=159)
Water - low starting point	2.0 (n=94)	1.61 (n=177)	2.35 (n=70)	3.01 (n=162)
Sewerage - high starting point	6.92 (n=88)	7.67 (n=193)	9.62 (n=64)	6.30 (n=146)
Sewerage - low starting point	2.52 (n=94)	5.64 (n=177)	6.21 (n=69)	5.18 (n=153)

Furthermore, when we compare the results of the bidding games with the findings from the open-ended follow-up question about how much the respondent wants to pay for the provided service (see bidding game format above), we find only minor deviations. The proportion of mean highest bid accepted to mean maximum price given as a response to the open question varied from .87 to .97 for network water, from .94 to 1.04 for monthly sewerage fee, and from .97 to 1.16 for sewerage connection. We believe that this result supports the reliability of the average maximum WTP figures we uncovered in the bidding games.

Surprisingly, many interviews resulted with no willingness to pay whatsoever, that is a zero bid (see table below). For the bidding game on the cost of network water, one might have thought that part of the explanation was to be found in the structure of the bidding game itself, since the lowest offer given was 1 NIS per m³. However, not a single respondent used the chance given in the follow-up question to state for instance 0.5 NIS per m³. An insignificant number of the respondents who answered zero NIS in the bidding game, stated that they did not know how much to pay or that they did not want improved services in the follow-up question. Therefore we interpret a zero to indicate that the respondent

either can not afford the service rendered or he holds the view that the service should be provided without charge.

Table: Percent of Households Bidding 0 (NIS) for Water and Sewerage Services According to Starting Point (High vs. Low) for the Four Populations

	Gaza city - refugee camp	Gaza city - outside camp	Nablus - refugee camps	Nablus - outside camps
Water - high starting point	28.3 (n=87)	32.5 (n=193)	11.7 (n=67)	6.7 (n=159)
Water - low starting point	30.2 (n=94)	42.2 (n=177)	9.9 (n=70)	18.5 (n=162)
Sewerage - high starting point	44.6 (n=88)	47.8 (n=193)	42.8 (n=64)	44.2 (n=146)
Sewerage - low starting point	52.7 (n=94)	52.6 (n=177)	34.4 (n=69)	40.2 (n=153)

6 Income data

Since classifying the respondents into income groups is of such importance to the survey, it warrants some comments on how it was done. Basically, we have analysed the four surveyed populations separately. For each population or study area we grouped the households into three or five approximately equally large groups. Hence, the economic standing of the lowest third or lowest quintile in Gaza city's Beach Camp is not the same as the economic standing of the lowest third or lowest quintile in the refugee camps of Nablus.

Getting reliable information about cash income is perhaps the most difficult task in a survey. People may be reluctant to answer questions about their financial status for a variety of reasons. In order not to jeopardise the entire interview, we put this most sensitive topic at the end of the questionnaire. Also, we sought to convince the respondents of the need for good income data for our purpose, that of developing a national water tariff, and underlined the confidentiality involved in our research. This was done both as we presented the study just after entering the dwelling and later when the questions about income were about to start.

Here is an extract from the first presentation of the study, made by the data collectors as they entered the dwelling:

I would like to ask you some questions regarding your household's socio-economic characteristics and practices of water use. The information you provide us is very important and valuable to the study and the formulation of the future national water policy. All of your answers, including your names, will be strictly confidential. The information will only be utilised to reach an appropriate water tariff structure and to develop a sound water strategy for the nation.

Before the questions about the household's economic standing started, the confidentiality of the data was underscored once more:

The final part of the interview will deal with the economic situation of the household. It is of crucial importance that you give us real figures. We will remind you that your anonymity is taken care of and that the information given to us will NOT be made available to the water utility, the tax department or any other government agency.

We collected income data according to 23 different sources of income. These income sources are specified below in the income question extracted from the questionnaire:

We will now show you a list of different possible sources of CASH income. For each of these sources we would like you to specify the <i>total</i> amount of income for the household in the <u>past 12 months</u>. In answering, please think carefully about the activities of each household member over the past 12 months. Show Que Card and read sources slowly one by one. Offer pen and paper for calculations.	(Jordan Dinars) JD	1	
	(Israeli Shekel) NIS	2	
	Wages or salaries	a	
	Income from self-employment	b	
	Income from home production for sale	c	
	Rent of land or buildings	d	
	Interest profits from deposits, bonds, monetary papers or loans and mortgages	e	
	Profits from shares and portions and cooperation	f	
	Other property income	g	
	Retirement pension or social security	h	
	Compensation from insurance	i	
	(Cash) monetary gifts (in such occasions as wedding and birth)	j	
	Zakhat	k	
	Government Poor Relief Fund	l	
	Other government transfer payments	m	
	Educational (grants and) scholarships	n	
	Transfers from charitable organisations	o	
	Transfers from UNRWA	p	
	Transfers from other organisations	q	
	Remittances from relatives (in or outside Pal.)	r	
	Other transfer income	s	
	End of services payment	t	
	Profit from sale of land or buildings	u	
	Profit from sale of durable goods	v	
	Other source of income	w	
	NA	x	

Ability and Willingness to Pay for Water and Sewage Services in Two Palestinian Cities



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