

Proposal of a continuous water supply system in urban Mexico

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Abstract

Mexico has enough natural occurring water to cover the demand of its population, nonetheless most cities suffer of deficient water services. The lack of hydric and economic resources is used regularly to justify this situation, but studies have proved that wrong. This work was aimed at eliciting WTP for a continuous water service in urban Mexico, and find out whether Mexican consumers would cover the costs of an improved service. Pachuca, a medium-sized city was selected as the site of study, thence a contingent valuation was conducted; results confirmed that users are prepared to pay for the costs of operation and maintenance of a continuous water supply.

[Word Count: 4,940]

Objective

The implementation of continuous water supply is essential for the sustainability of water services. Mexican utilities need incentives to overcome their wrong assumptions, both technical and socio-economical. The aim of this work is to contribute to shed light on these locally little explored issues.

Research Questions

Previous studies have shown that when a better level of water service is offered, people are willing to pay for the operation costs (World Bank 2010), and when amortized by the water authority, even the capital costs can be covered by the users (Griffin, Briscoe et al. 1995). Additionally, these studies show that when switching to continuous supply, users have used less water, and they are more willing to pay the bills on time (World Bank 2010), thus shattering the myths claiming that a continuous water supply requires more money and water to operate (Rouse 2013b).

Based on these findings, and the similarity between the location of previous studies and this work's, it was considered of great interest to conduct a study to elicit the willingness to pay for improved water services in urban Mexico; a country where intermittent service is still predominant, and water utilities justify these conditions alleging lack of hydric resources and low rate of paid for water with tariffs already very low (CONAGUA 2014b, INEGI 2009). Therefore the following research questions are posed:

Is the population of urban Mexico willing to pay enough to cover the costs of providing an improved, continuous water service?

Does their current level of service, household income or other factors influence their response?

The main reason to propose the first question is the research gap that exists in Mexico on willingness to pay for water services; as will be explained in the following chapter, only three studies based in Mexico were found to exist (Soto Montes de Oca, Bateman 2006, Vásquez, Mozumder et al. 2009,

González Dávila 2013), of which one was specialized on water service provision in general (Soto Montes de Oca, Bateman 2006), whereas the remaining two study drinking water safety (Vásquez, Mozumder et al. 2009, González Dávila 2013). Therefore, this work would represent the first willingness to pay study for improved water services in Mexico, outside of the Metropolitan Area of Mexico City. The second question is complementary to the first; seeks to understand the main factors affecting people's perception of water service, whether household income correlates with current conditions of service and, given that intermittent conditions of service have prevailed for many decades in Mexico (INEGI 2013), what is the impact of coping measures on the valuation of improved service.

Site of Research: Pachuca

The city of Pachuca was selected for being an average-sized city among the capital cities of the states of Mexico, for its simplicity in terms of political administration (despite being divided in seven municipalities, the city has only one water authority), and more importantly for having to deal with the challenges most big cities in Mexico have regarding water administration; low water tariffs that do not reflect the costs of water provision, low cost recovery, intermittent water distribution, deficient water quality in some areas and unsatisfied consumers (CAASIM 2014).



Figure 1. Geographic location of Pachuca.

The population of the greater metropolitan area of Pachuca was 512,196 in 2010; 77% of the city's population lives in the municipalities of Pachuca and

Mineral de la Reforma, with 5 other municipalities containing the remaining 23% of the population (CONAPO 2010).

Methodology

Very influential to this work was the study carried out by Soto Montes de Oca and Bateman (2006) in Mexico City; the socioeconomic conditions and the state of the infrastructure is very similar to that of Pachuca (CCA 2011), but at a much bigger scale, the objectives of Soto's research are very much aligned with this work's and thus some of the methods here described were based on her work. As for the works of González Dávila (2013) and Vazquez (2009), also undertaken in Mexico, their objectives were more related to specific aspects of water quality and thus not much could be learned from them. Another work of guidance for the present study was the WEDC's *Willingness-to-pay surveys* guidance notes (Wedgwood, Sansom 2003), which helped me learn the basics of the contingent valuation method and the overall structure of a willingness to pay study.

Current situation of water distribution in Pachuca

Additionally to the consultation of institutional information, three visits were made by previous appointment to the main offices of the water commission; interviews were conducted with the Hydraulic Operation Director and the Commercial Sub Director, they provided information on coverage, water balance, water quality, continuity, leakages, physical and economic efficiencies, tariff structures and methods of payment (Arteaga 2015, García 2015).

The Water and Sanitation of Inter-municipality Systems Commission (CAASIM) is a decentralised governmental institution and the authority responsible for water distribution in the city. It has a total of 184,122 connections, of which 164 are industrial, 780 are public, 11,764 commercial, and 171,414 are domestic connections (CAASIM 2014). Counting with 783 employees, it has an average productivity of 4.6 employees per 1,000 connections (CCA 2011). Besides the city of Pachuca, CAASIM serves 12

municipalities, but most the connections (85%) lie within the city, in the municipalities of Pachuca and Mineral de la Reforma (CAASIM 2014).

The Commission reports coverage of 99% for piped water and 95% in sanitation (CCA 2011). That is significantly higher than the national urban average of 95% for drinking water and 87% for sanitation (WHO/UNICEF 2014a). The utility produced 49.67 million cubic metres (Mm³) of water in 2014 (roughly 1.6 m³ per second). Most of the water consumed in the city comes from the ground; an almost insignificant 1.4% of the water comes from the surface, namely from El Cerezo and Jaramillo dams; 3.4% is extracted from abandoned mines, and the remaining 95.2% comes from the Cuautitlán-Pachuca aquifer, through 45 wells yielding roughly 1,500 litres of water per second (lps) (CAASIM 2014) (Figure 2).

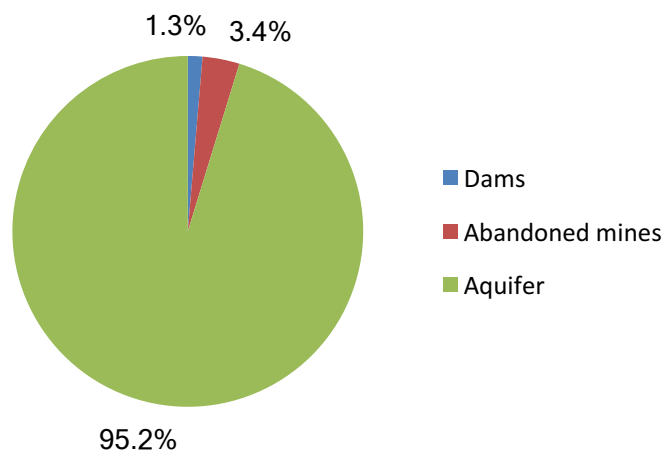


Figure 2. City of Pachuca's water sources. With information of (CAASIM 2014).

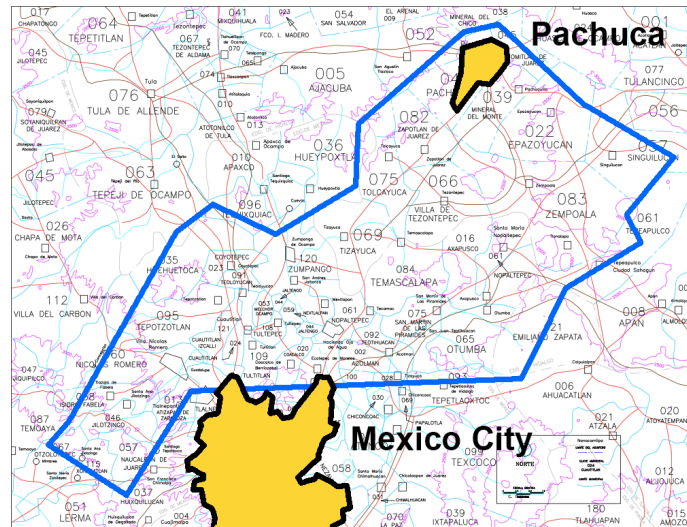


Figure 3. Location of the Cuautitlán-Pachuca Aquifer, provider of the 95% of the water distributed in Pachuca. Adapted from (INEGI 2005).

Despite producing 49.67 Mm³ of water per year, CAASIM reports that only 21.60 Mm³ were billed in 2014, which results in a very low physical efficiency of 42.9%; this is equivalent to a loss of 683 litres every second (CAASIM 2014).

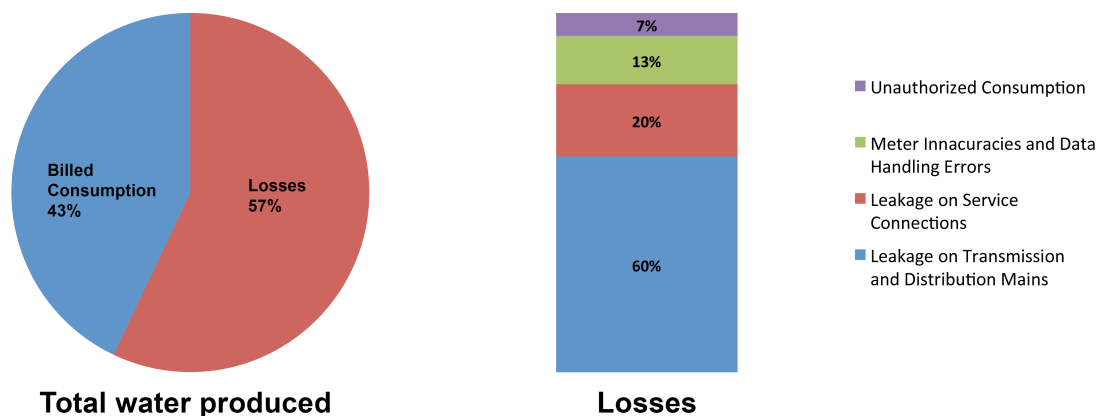


Figure 4. City of Pachuca's water balance. With information from (CAASIM 2014).

On the other hand, commercial efficiency (the proportion of the billed water that is actually paid for) was also low at a reported 52.4% by volume and a 56.8% in revenue; this means that users paying higher tariffs per cubic metre (either domestic, commercial or industrial) are more prone to pay for the service than more modest users (CAASIM 2014). As a result, the global efficiency of the utility, that is the amount of water that is paid for as a fraction of the total volume produced, is very low at 22.5% (Figure 4).

Continuity is also an issue for the CAASIM; reportedly only 42% of the neighbourhoods served by the utility receive the service continuously, 26% receive it every day but only a few hours per day, and the remaining 32% receive it from four times a week down to only twice a week (CAASIM 2014). According to the utility, the reason to not provide a continuous supply is the aforementioned lack of hydric resources, nonetheless the amount of physical losses suggests that this problem could be solved by reducing the amount of leakages in the system (CAASIM 2014). According to the Hydraulic Operation Director, José García, physical constraints are the only factors influencing which zones receive better or worse services; thus, zones with higher socioeconomic statuses do not necessarily receive better services (García 2015). Furthermore, there is correlation between intermittence in the service and occurrence of leakages; 60% of the neighbourhoods with high leakage rate receive the service intermittently; some of the neighbourhoods that receive the service continuously and yet present a relatively high rate of leakages are, according to the utility, connected directly to pumping stations and thus receive very high levels of water pressure (CAASIM 2014).

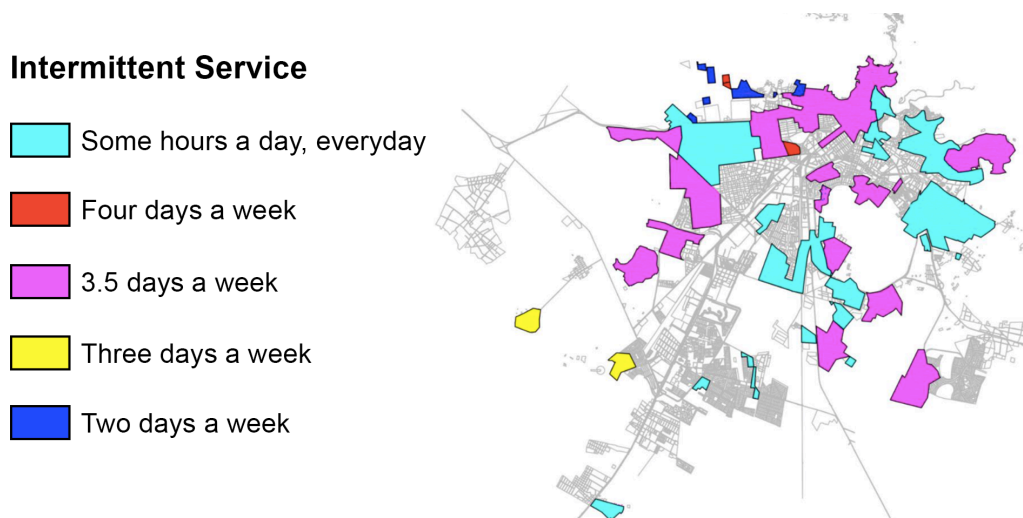


Figure 5. Areas of Pachuca with intermittent supply. Adapted from (CAASIM 2014).

Leakages not only bring the problem of lost volume, but also lead to detriments in water quality. In 2014, 370 reports of visibly deficient water quality were made, either reporting turbid water or bad smell. Given that practically the totality of the water produced is reportedly made potable and

disinfected, this bad quality reports confirm the damage that intermittent supply induces on water quality (CAASIM 2014).

Additionally, the CAASIM reports other anomalies in its operation; given the bureaucracy that involves obtaining a concession title and the political issues surrounding the matter, only 58% of the water abstraction counts with a national concession title. Meaning 42% of the sources (from the Cuautitlán-Pachuca aquifer mostly) are being exploited without the proper rights from CONAGUA (the national water authority) (CAASIM 2014). Adding up to the inefficiency in the operation due to the leaks in the distribution network, the electro-mechanical equipment is also deteriorated and operating with very low performance; according to the CAASIM, 60% of the pumping equipment at wells and reservoirs do not meet the national standards of efficiency, norm NOM-006-ENER-1995 (CAASIM 2014).

Water tariffs are set annually, at the beginning of the year, and are subject to national inflation throughout the year. The utility proposes a tariff that fairly represents their costs of reinvestment and operation, the state's ministry of finance then sets a tariff based on this proposal and the state's economic situation (Arteaga 2015). As of January 2015 the water is charged in a two-part block volumetric tariff scheme: from 0 to 8 cubic metres per month, the water utility charges a fixed \$58.2 pesos (3.6 USD), from 9 to 12 cubic metres, the water is billed by volume, at \$12.8 pesos per cubic metre (0.8 USD per m³), the tariff then increases to \$27.8 pesos (1.7 USD per m³) from 13 to 25 m³, \$36.6 pesos (2.2 USD per m³) from 26 to 50 m³, \$49.6 pesos (3 USD per m³) from 51 to 250 m³, and \$55.8 pesos (3.4 USD) for each cubic metre above 251 (Gobierno Estado de Hidalgo 2014) (Figure 6).

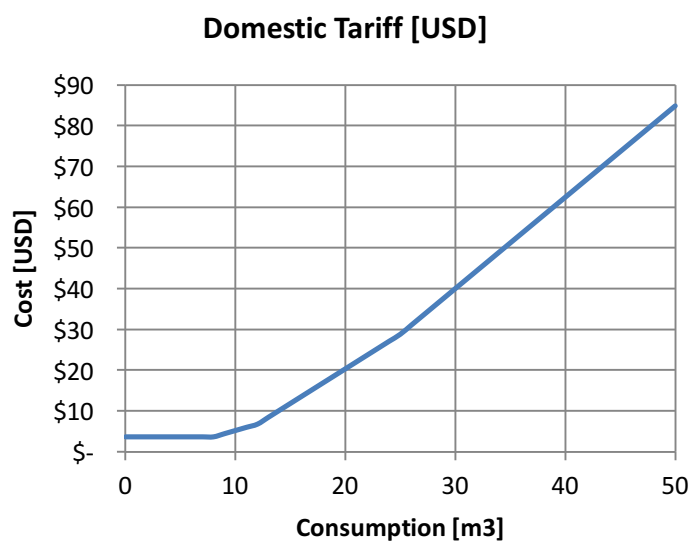


Figure 6. Cost of water in Pachuca. With information from (**Gobierno Estado de Hidalgo 2014**).

The commercial and industrial tariffs work in very similar ways but with higher prices, starting at \$92.8 pesos (5.7 USD) from 0 to 8 cubic metres for commercial use, and \$559.3 pesos (34.3 USD) from 0 to 20 cubic metres for industrial use Table 1.

Table 1. Water tariffs in Pachuca. Adapted from (**Gobierno Estado de Hidalgo 2014**).

Domestic Tariff		Commercial Tariff		Industrial Tariff	
Volume [m3]	Cost [USD]	Volume [m3]	Cost [USD]	Volume [m3]	Cost [USD]
0 to 8*	\$ 3.56	0 to 8*	\$ 5.68	0 to 20*	\$ 34.25
9 to 12	\$ 0.78	10	\$ 0.94	21 to 50	\$ 1.89
13 to 25	\$ 1.70	20	\$ 1.56	51 to 80	\$ 1.99
26 to 50	\$ 2.24	30	\$ 1.85	81 to 100	\$ 2.26
51 to 250	\$ 3.04	40	\$ 2.07	101 or more	\$ 2.47
251 or more	\$ 3.42	50	\$ 2.22		
		51 or more	\$ 2.26		

Additionally, since the CAASIM also provides the services of sanitation and treatment, they charge an additional 25% and 10% for these services, making it the highest charging nationwide; water tariffs in Pachuca are 65% higher than León's, 104% higher than Saltillo's, and 188% higher than Monterrey's, the three best performing utilities in the country (CCA 2011).

Low water efficiency could hardly be a cause of lack of options to pay for the service; the CAASIM has 7 own offices spread across the city for this matter,

and offers the option to pay in one of the 61 bank branches in the city or at Oxxos, a chain of convenience stores with more than 30 branches in the city, and almost 13,000 countrywide (FEMSA 2015, Ayuntamiento Pachuca 2012). Despite having numerous options to pay for the service, users are still more prone to use the CAASIM offices; 77.4% used them in 2014, whereas 13.8% of the bills were paid in Oxxos and 8.8% in bank branches (Arteaga 2015).

Regarding cost recovery, according to the CAASIM's Hydraulic Operation Director, the utility has financial autonomy, receiving no funding from the state's government for operation and maintenance (García 2015), yet financial aid is provided by the Federal administration. National programmes such as the Drinking Water, Sanitation and Treatment in Urban Zones Programme (APAZU), the Efficiency of Water Utilities Improvement Programme (PROME), the Water Rights Rebate Programme (PRODDER) and the Programme for the Modernisation of Water Utilities (PROMAGUA), have reported to finance projects in the state for 106.5 million pesos (6.3 million USD) in 2012 (CONAGUA 2014b, 2015a, 2015e, 2015d, 2015c). In the case of PROME, a programme aimed at improving the efficiency of water utilities, part of the funding came from a loan for 100 million USD from the World Bank (CONAGUA 2015e).

The cost of providing continuous water supply

To have a baseline to design the contingent valuation questionnaire, as for comparing users' willingness to pay with the costs of providing an improved continuous supply it was necessary to know what the operating and maintenance costs of such a system would be. As a reference to compare the results of this study, with costs of operation and management of a continuous supply, I used the costs and revenues made available by three of the best performing water utilities in Mexico: León, Saltillo and Monterrey. The amount of water per month used to do this calculation was 20 cubic metres per month, which is the amount of water a household of 4 people would use in a month using 170 litres per day. The average tariff per 20 cubic metres for these three water utilities, all of which provide a continuous water supply to more than 90% of their connections was of \$169 pesos (\$10 USD) a month (CCA 2011).

Sampling strategy and surveying method

I decided to conduct personal interviews rather than any other interview technique; given the demonstrative nature of this work, it was considered more valuable to have first-hand perception of the respondents' point of view, and be able to take note of their commentaries, over being able to interview a larger group of people, which is one of the advantages of other interviewing methods (Wedgwood, Sansom 2003).

The locations selected for the application of surveys were the La Paz, Plaza Universidad and El Palmar water offices, these lie within high, medium and low-income zones of the city respectively (Figure 7).

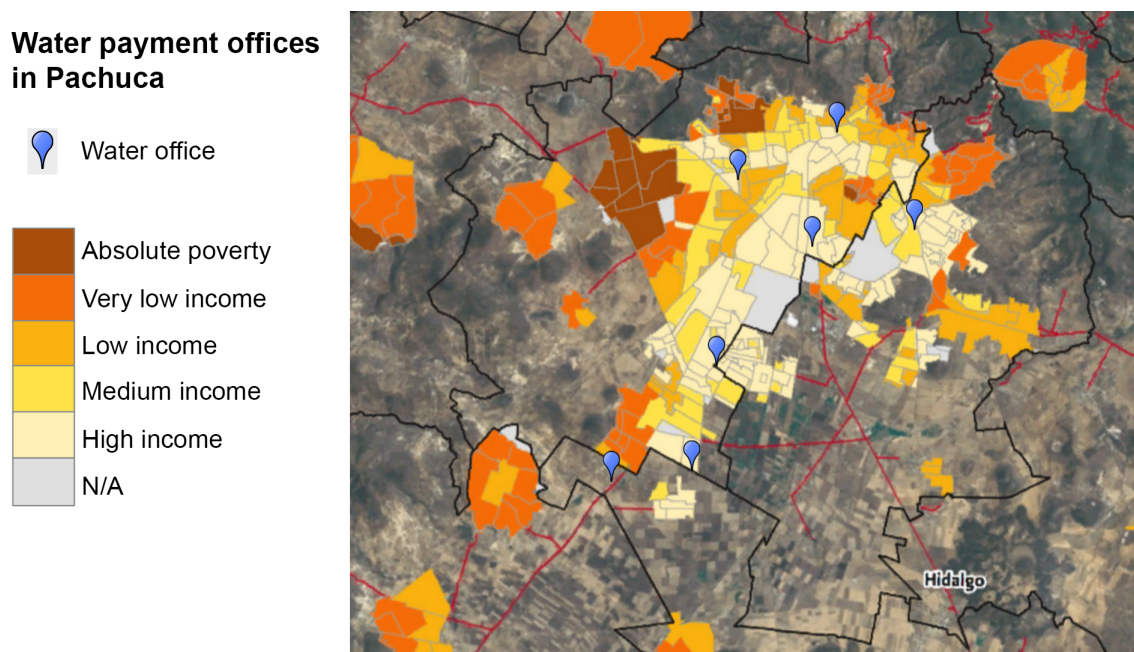


Figure 7. Location of water payment offices in Pachuca contrasted with income level. Adapted from (INEGI 2015).

Design of the contingent scenario

Two contingent scenarios were proposed to the interviewees; in the first one it was explained that future demographic growth would result in higher water demand, and thus the possibility of service deterioration, hence the consumers were asked their willingness to pay for the maintenance of the current level of service despite this upcoming challenges; in the second scenario, the same future conditions applied, but now they were asked for

their willingness to pay for an improved continuous supply of potable water, that would render the current measures for ensuring quantity and quality of water, unnecessary. As for the elicitation method, I chose using a bidding game with a low starting point; as it was mentioned in the previous chapter, the dichotomous choice method offers a higher robustness and is simpler for the respondent, but given the time constraint and that this method requires high level of expertise in statistics(Wedgwood, Sansom 2003), I decided not to use it.

Design of the questionnaires

The questionnaires were designed considering three kinds of information: socioeconomic data (9 questions), information on the current level of service received (10 questions), and the willingness to pay elicitation (5 questions). The socioeconomic section would provide a base of information and allow to find possible links between factors such as household location and income, income and perception of the service, or level of education and valuation of the contingent scenario. It would also be useful to identify possible inconsistencies such as a higher willingness to pay for the service than what the monthly income would allow. This section included enquiries such as gender, age, monthly income, occupation, level of education and household location. The current level of service section was aimed at learning about the users' perception of the existing level of service, as well as to find out about their patterns of use and current expenditure on water; it included questions such as how often do they get the service, what the quality of the water received is, usage of coping measures and the approximate amount of their last water bill. The willingness to pay section included the contingent scenario description, asked for willingness to support such a programme and if so, entered a low starting point bidding game with 8 intervals (\$50/\$75/\$100/\$150/\$250/\$500/\$750/\$1000) for valuation. In total 24 questions were included in the questionnaire, contemplating between 20-30 minutes to be completed (See complete questionnaire in Annex 1).

Data analysis

Since the sample size was considerably small, and the author knowledge in statistics is limited, a simple cross tabulation was selected to analyse the information obtained.

Results

Of the seventy-five interviewees, 41% were men, and 59% women. 77% declared to be heads of household, whereas the rest said to be relatives of the family leader. 39% were of ages between 31 and 50 years old, the second largest group were from 51-65 years old at 36%, in third place both groups between 18-30 years old and more than 65 years of age with 12%, finally, only one interviewee said to be under the age of 18. Most declared to be housewives (25%) or employees (24%), followed by professionals (16%) and pensioned people (15%). Regarding monthly income, 35% declared to earn between \$2,500-\$5,000 pesos (\$147-\$294 USD), 23% between \$5,000-\$10,000 pesos (\$294-\$588 USD) and 16% reported a monthly income below \$2,500 pesos (\$147 USD). The average household size was of 3.5 persons with an average of 0.7 children below 14 years old.

Regarding the existing level of service received, half of the respondents said it was “regular”, 31% said it was “good”, and 12% it was “bad”; but 47% considered the amount of water distributed was “enough”, 31% said it was moderate and 23% considered it to be not enough. Half of the respondents declared to receive water in their houses on a daily basis, 40% have the service three times a week and the remaining 10% two times a week or less frequently; these responses were fairly similar to the conditions described by the water commission(CAASIM 2014). On the other hand, the hours of service acknowledged by the respondents, were significantly lower than those claimed by the CAASIM, only 20% declared to receive water 24 hours a day, 8% receive it 12-24 hours, 40% between 6-12 hours, and 15% for less than 6 hours. On water quality, most users claimed to receive water with excessive chlorine smell or taste (31%), 29% of the respondents acknowledged to receive clean water, but would not drink it, 40% said the water that reaches

their households has residues, does not have normal colour, or smells bad. As a consequence, no respondent declared to drink water directly from the pipe, 92% buy bottled water, 4% said to drink boiled water and the remaining 4% drink filtered water. The average water bill was of \$210.9 pesos (\$12.4 USD), with 42% of the respondents paying less than \$100 pesos (\$5.9 USD), 37% between a \$100-300 pesos (\$5.9-17.6 USD), and 21% above \$300 pesos. When asked what they considered was the reason for the lack of water in Pachuca, 37% responded demographic growth, closely followed by a 35% of the respondents who considered ill management and corruption was the reason for the poor service (Figure 8).

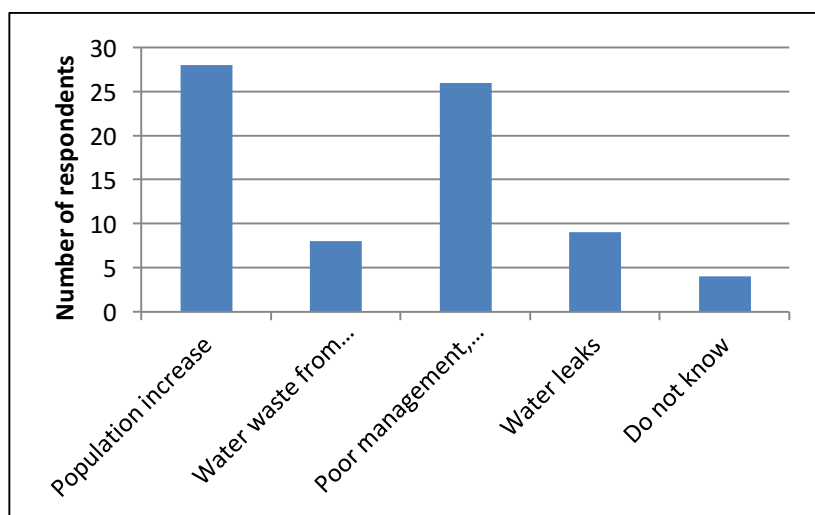


Figure 8. Perceived reasons for the lack of water in Pachuca.

No correlation was found between level of service perceived and monthly income, which confirms the utility's claim that people of higher socioeconomic status do not necessarily receive better water services. Continuity had a similar behaviour, showing no clear correlation with monthly income; on the other hand, two out of three users reporting not to know about how often they get the service in their houses, reported the highest monthly income. When contrasting continuity with the actual amount paid for water, consumers with water available on a daily basis paid just slightly more than the rest; 6% and 14% higher than people receiving the service three times a week or less frequently, respectively.

It was interesting to find that 40% of those who perceived the service as “very good” and 35% of those who said it was “good” received the service only three times a week or less frequently; furthermore, only 32% of the people in these categories reported a completely continuous supply. This confirms the assumption that consumers are used to poor levels of service, and supports the results found by Andey (2007) and Joshi (2002), that pointed out that users are satisfied with the services as long as they receive what they consider enough water, irrespective of the mode of service. 99% of the respondents store water in rooftop tanks, including a 37% that have also underground deposits, it is important to note though, that the only user to report not having either a ground level or rooftop tank, considered the service as “very bad”.

Finally, when asked to value the maintenance and improvement contingent scenarios, all the respondents agreed to support such programs. The average willingness to pay for the maintenance scenario was of \$159.3 pesos per month (\$9.4 USD) with a standard deviation of \$96 pesos, 32% less than their average current water bill of \$210.9 pesos (\$12.5 USD). On the other hand, willingness to pay for an improved, continuous supply was 65% higher, at \$263.3 pesos per month (\$15.5 USD), with a standard deviation of \$192 pesos. The overall results were similar to those obtained by Soto (2006) for the maintenance scenario but almost twice as high as Soto’s for the improvement scenario (Soto Montes de Oca, Bateman 2006).

As it was expected, consumers surveyed at the office located in the higher income zone were willing to pay 30% and 34% more (\$190 pesos) than those in the medium and lower income zones for the maintenance scenario, similarly they were willing to pay 28% and 54% more (\$325 pesos) for the improvement scenario. When comparing between genders men were willing to pay 20% more than women for a maintained service, at \$176.6 pesos per month (\$10.5 USD), as well as for an improved supply at \$274.2 pesos (\$16.3 USD). The group of ages between 18 and 30 years old was willing to pay significantly more for both the maintenance and improvement scenarios (Figure 9). Similarly, people with the highest level of education, had a 36%

and 52% higher than average valuation for maintenance and improvement scenarios.

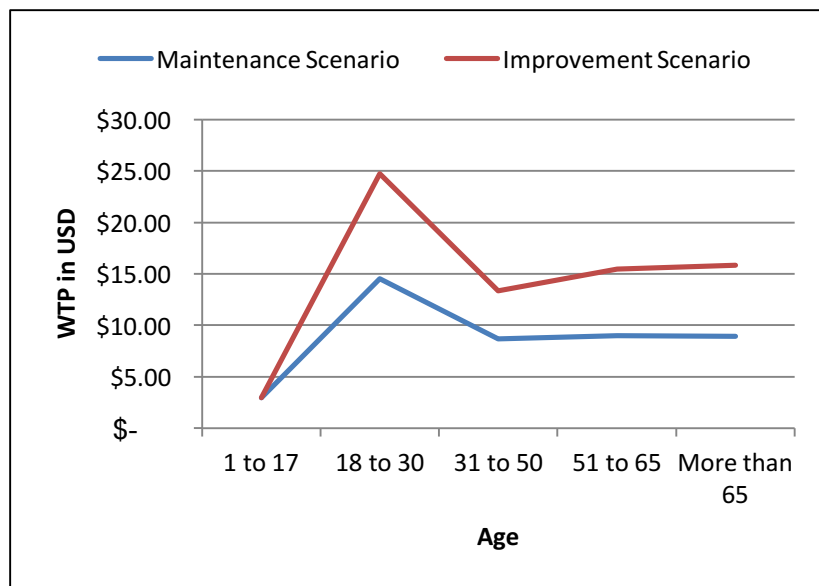


Figure 9. Willingness to pay by age.

A clear correlation was found between monthly income and willingness to pay; people reporting the highest income were willing to pay 2.5 times higher bills for the improvement scenario than the two lower tiers; more interestingly, as monthly incomes increase, so does the gap between their own improvement and maintenance valuations, thus for the lowest monthly income respondents, the valuation of the improvement scenario was 51% higher on average than their maintenance valuation, whereas for the highest monthly income users, this gap was of 92% (Figure 10). This finding suggests that, people with higher incomes are more attracted by the possibility of improvement, whereas poor households may have reached the maximum amount they can afford. Nonetheless, when contrasting level of service perception with willingness to pay, the pattern is repeated; users that find the service to be “very good” have a higher gap between their improvement and maintenance valuation than poorer households (Figure 11).

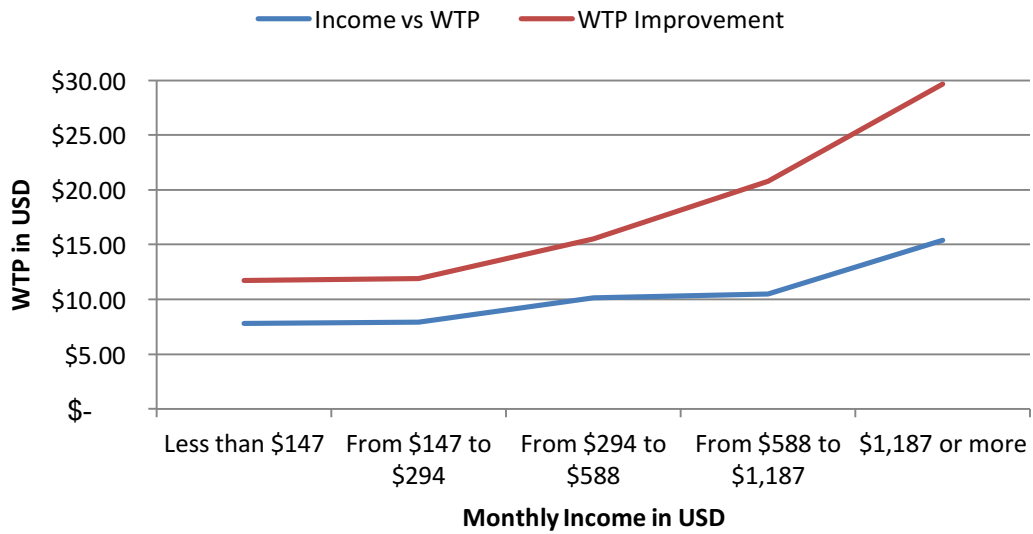


Figure 10. Willingness to pay by monthly income.

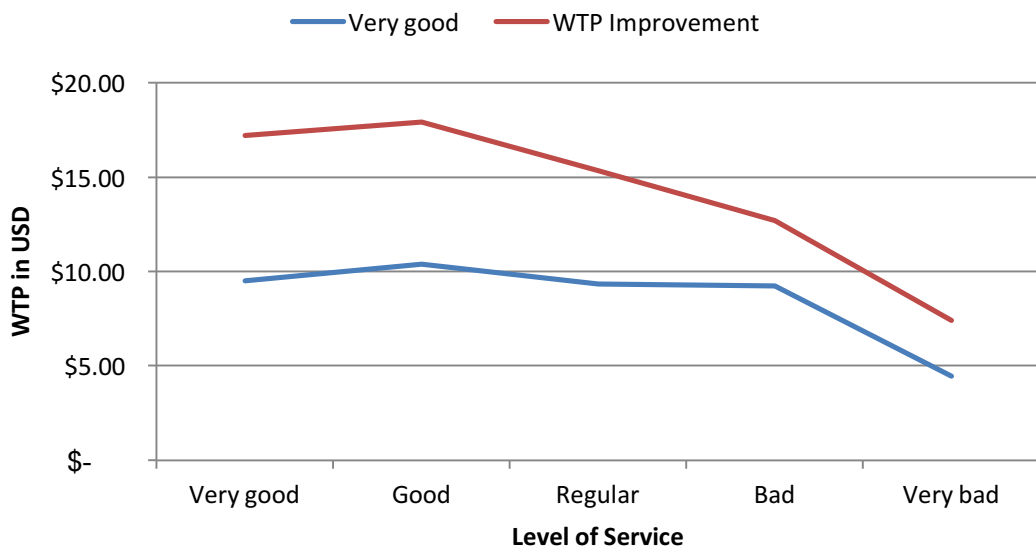


Figure 11. Willingness to pay by level of service perceived.

No correlation was found between the current level of water quality received and willingness to pay; for both the maintenance and improvement scenarios, users reporting getting higher water quality valued the contingent scenarios only 7% and 4% higher than those reporting poor water quality. It was found that users with higher continuity in their service valued both their maintenance and improvement scenarios more than users with more intermittent supplies. This might sound counterintuitive, since it is expected for users with lower continuity to be willing to pay more for the improvement of their supply (as compared to the maintenance scenario), than users who already enjoy of

better levels of service (Soto Montes de Oca, Bateman 2006). Since practically all the respondents declared to use rooftop tanks for storage, this result suggests that all the users surveyed end up enjoying a similar perceived continuity within their households, irrespective of the actual frequency of the service provided by the utility; thus, this results could mean, that users who receive a higher level of continuity, may trust the utility more, as to believe that the improvement scenario is feasible, and therefore, be willing to pay more for it to become a reality. When contrasting current bill amount paid and willingness to pay, correlation was found for both maintenance and improvement (PCC=0.36 and PCC=0.40, respectively) (Figure 12).

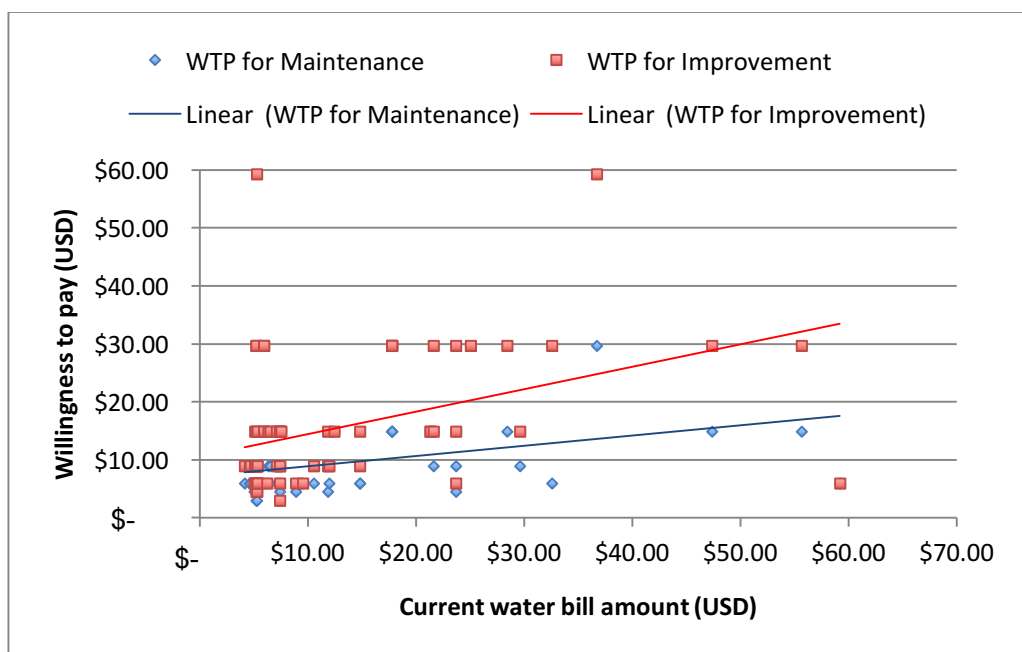


Figure 12. Current water bill contrasted with willingness to pay for maintenance scenario (blue) and improvement scenario (red).

Qualitative feedback

One of the strengths of conducting the interviews face to face was having the possibility of receiving peoples' feedback personally, and thus being able to capture their opinion and additional comments. Not only do these confirm the findings of the quantitative study, but they provide deeper insight on the consumers' perception of the service (Table 2). Some of the most recurring opinions were: the hardness of water; discontent with people that do not pay

for water, and the proposal of fines for them; claims for the government to pay for any improvements to the service; reporting that the utility does not repair leakages when these are reported; and that they cannot believe a continuous service, particularly providing potable quality water, can be possible.

Table 2. Qualitative feedback of respondents.

Issue	Commentaries
Water quality	<p>(Four respondents): "The water is too hard, it is very rich in salts that damage the pipes and taps in the house"</p> <p>"Water is a filth"</p> <p>"Due to tandeo (intermittent supply), the water we get when the service is resumed has chocolate colour"</p>
Water expenditure	<p>(Three respondents): "There are many people that do not pay; there should be fines for those that do not pay"</p> <p>(Three respondents): "The government should be the one paying for it (improvement of services)"</p> <p>"If everybody paid (for water) it would not be necessary to increase the tariffs"</p> <p>"My water bill has been as high as \$4,000 pesos a month" (forty times higher than average, denoting metering inaccuracies).</p> <p>"I would gladly pay more since I would not spend again in bottled water"</p>
Water management	<p>(Four respondents): "Leakages take too long to be repaired"</p> <p>(Two respondents): "We have water, but they use to shut the service without previous notice"</p> <p>(Two respondents): "Mexico city takes our water, they have been doing it for decades"</p> <p>"A different administration is required"</p> <p>"There is no good planning"</p> <p>"Water should not be privatised"</p>
Contingent scenario	<p>(Three respondents): "Water (from the tap) is never going to be drinkable"</p> <p>"I can't even imagine such a service"</p> <p>"It would be a dream"</p>

Despite having an apparently high productivity of 4.6 employees per 1,000 connections, many people complained about having to wait up to two weeks for the utility staff to repair visible leakages in the network.

Statements of people who declared that could not imagine receiving a continuous potable water service could hint hypothetical bias, but having talked to the respondents I would rather consider these opinions as a signal of *institutional bias*, which Wedgwood defines as when consumers do not believe that the water utility is capable of providing the service described in the continent scenario (Wedgwood, Oriono et al. 2001). A long history of poor water services and unmet political promises have shattered people's trust in the water utility.

Conclusions

The contingent valuation carried out in the city of Pachuca confirmed previous results of studies that found that people are willing to pay for improved water services, resulting in higher satisfaction levels within the served population, higher revenues for the utilities, less water losses and overall, a higher cost recovery which ensures the utility's autonomy and future development (Rouse 2013a).

Results were \$159 pesos a month for the maintenance scenario and \$263 pesos (65% higher) for the improvement scenario, which is 25% higher than the current average water bill. Results were lower than expected in proportion to current water tariffs, but this sum is calculated to be enough to cover the costs of maintaining and operating a continuous water supply \$169 pesos (\$10 USD). Results were not only higher than those yielded by previous studies (Soto Montes de Oca, Bateman 2006, Vásquez, Mozumder et al. 2009), but showed also markedly different behaviours. Presumably, due to the difference between initial conditions of water provision (much lower tariffs in the case of Soto), sampling strategy and surveying method (face to face, as opposed to phone interviews). Many users reported "good quality" water and still use bottled water as their drinking water source, which indicates distrust in the water distribution system.

Since willingness to pay studies show that operative and maintenance could be covered by slightly higher tariffs, the question remains: who is going to pay for the capital investments. Some studies have shown consumers' willingness to cover the capital costs that represent new connections (Singh, Ramasubban et al. 1993). That may be an answer to the financial problem, but still the political will can be a more difficult obstacle to surpass.

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