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PEOPLE-CENTRED APPROACHES TO WATER AND ENVIRONMENTAL SANITATION

Household Affordability and Willingness to Pay for Water

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Generally, urban water supply provisions are often constructed without consultation with the community concerned through assessing their affordability or ability to pay (ATP) and willingness to pay (WTP). This is evident in the water supply system of the study areas for the BTC-funded project towns in Champhone and Laongam. The utilities were unable to set appropriate water tariffs that were consistent with ATP and WTP. This study investigated and assessed those criteria and compared them to monthly household income. The ATP for connection is about 51.7% in Champhone and 70.2% in Laongam and monthly water charge is 2.3% and 4.8% of average household income respectively. The WTP for connection is about 38.0% and 75.7% with a water charge of 1.5% and 2.4% respectively. Overall, the WTP for monthly water charges is less than ATP and is less than the amount that is generally assumed (3 - 5% of income).

Introduction

Poor people in developing countries want the government to finance water supply because many households (HHs) do not have money to pay for improved systems. Governments themselves are often short of cash, so funds are spread thinly – "Some for all rather than all for some" (World Bank, 1993). It is widely recognized that many poor communities must contribute a connection fee and monthly charge for water supplies, and that sustaining and extending services depends on household ATP and WTP. Carefully designed, these indicators can assess the service demand and determine an appropriate tariff for maximum cost recovery (World Bank, 1993).

Affordability or ATP for water is expressed by the ratio of monthly HH water consumption expenditure, the monthly income and can be measured by the cost of existing equipment for water collection and storage, working time for obtaining water and price from existing built sources. The ATP is able to answer the question: "What people actually do for water?" (http://www.adb.org/scripts), and can be measured by the Revealed Preference Method on what people actually do (see Picture 1), not on what they say they will do (Griffin, 1993). WTP is the maximum amount consumers are prepared to pay for water based on the difficulty of obtaining it, available sources, water quality and service level. It can be estimated by the bidding games of the Contingent Valuation Method (CVM) by asking how much people are prepared to pay for their water. Common parameters include: education level, income level, gender perspective and attitudes towards government policy (Griffin, 1993).

The development of water supply in small towns is seen by the Lao government as an important requirement for growth and economic development. In 2000, two small

Picture 1. Water collection in Champhone

town – namely Champhone (population 9,282) and Laongam (population 4,595) – were selected for conducting a feasibility study for pilot water supply projects implemented by the Lao-Belgian Technical Cooperation (BTC) Project, LAO/00/003. In Champhone, groundwater is available that is saline in the downtown area and there was a poor water supply system covering 464 out of 1,646 HHs.

In Laongam, water is available at a deep level, and the cost for exploting this resource is too high for poor and middle-income families. Nearly half of the total HHs are served by the existing gravity-fed water system and the remainder of the HHs consume stream water (zero cost). The water supply providers (branches of the Provincial Water Supply State-Owned Enterprise) of both towns are not able to collect the whole amount of monthly water charge, due to the users' unwillingness to pay for water (for example 30% of Laongam monthly water charge is uncollected). The Project aims to improve the water supply system and needs to assess the water users' ATP and WTP for the purpose of developing the water tariffs.

This paper summarizes the learning from a research study conducted on an assessment of household affordability and willingness to pay by the author, which was carried out

under the BTC Project for the above mentioned two small towns.

Method

To ensure a range of water sources and socioeconomic characteristics were collected, the sampling method was based on both purposive and random methodologies to get the information from the following categories of HHs:

- occupation: commercial, town workers, and farmers (to classify the income ranges),
- groups of people with different sources of consumed water (stream water, dug well, tube well, water supply, etc.),
- connected and non-connected HHs

The sample size was taken by the crossing of the above categories, i.e. 186 of 1,646 HHs in Champhone and 128 of 844 HHs in Laongam. The team of local interviewers (trained in a one-day workshop) met with the village chief, and district and provincial water sector staff. The village chief arranged for the HH interviews. The face-to-face questionnaire surveys (refer Picture 2) were conducted with a HH head or an adult member of the HH. The author also observed key interviews to gather qualitative data. The data were analyzed in Excel and SPSS programs. The surveys were conducted during January to February 2003.

Findings

Affordability

This section focused on the cost of all equipments for collection and storage of water, development of water sources (for example boreholes, shallow wells etc.), existing supply charges, collection time, price of water obtained from existing natural or built sources and total expenditure for current consumption.

Ability to pay for connection fee

The connection fee is the amount that HH pays to connect to a piped system from the nearest source. Generally, it is paid at the time of connection, but poor HHs can pay in installments, 50% before connection and the rest within two months.

- Cost of equipment for collection and storage of water:
  Generally of all equipment for collection and storage of water indicates the ATP level of the HHs. The equipment costs were estimated during the survey by asking 'how much the HH had spent for equipment to secure water for consumption?'. HHs had containers with an average total storage volume of 0.72 m^3 in Champhone and 0.62 m^3 in Laongam and spent on average Kip 164,286 and Kip 134,752 respectively (refer to Table 1) for masonry jars, metallic tanks, overhead tanks, buckets and handcarts for carrying water (see Picture 1).
- Installation cost of built sources
  The installation costs for built sources included: well boring, tube materials, concrete rings and individual pumping system. Table 1 shows the average installation costs for Champhone (Kip 395,212) and Laongam (Kip 346,960) resulting in total ATP for connection fee at Kip 559,498 and Kip 481,721 respectively.

Ability to pay for water supply charge

Based on Revealed Preference Method data, two approaches were used to estimate the ATP for water charge and then averaged.

Direct approach

This approach compares the time spent on activity to what a person could earn in employment income instead of doing that activity for water. The survey results show that everyday, one HH member spends an average of 26 minutes (Champhone) and 40 minutes (Laongam) on water collection. Two methods were used to estimate the working time value:

- Household response based method: Table 2 (see attachment) shows an average cost of Kip 24,100/month in Champhone and Kip 34,044/month in Laongam.
- Wage rate based calculation method: Interviewing village heads, HHs and manual workers established an average area labor rate. The labor value in both towns was the same, Kip 15,000 per 8-hour day. Hence,

  $$A = (Lc/T)*t$$

  Where: A = value of time worked, T = standard working hours (8 hour/day), Lc = daily labor rate (Kip 15,000) and t = average of collection time (26 minutes in Champhone and 40 minutes in Laongam).

*Indirect approac*h

Not all HHs consumed water from a single source but rather a combination of their own built sources, water vendors, and piped water. Expenditures for these solutions included electricity for pumps, vendor supplied water, costs for illegal connections, built source costs and any existing monthly water charges. The results of the average ATP for water charge are shown in Table 2.

Willingness to pay for water supply

Willingness to pay for connection fee

Using the Contingent Valuation Method, the respondents were given bidding game questions and a choice of answers for both one-time connection fee payments and a flat monthly water charge. Their responses are presented in Table 3. Almost all respondents chose either of the first two ranges, an average of Kip 412,000 (Champhone) and Kip 520,000 (Laongam).

Willingness to pay for monthly water charge

The respondents were asked two questions about the costs for improving the water system, and given a range of possible

answers. Referring to the respondents' neighbors, with the same income level as their own, it was asked: "If the water supply improved to a particular standard (clean, sufficient pressure, 24-hours service), how much your neighbors would be willing to pay?" and "How much would you be willing to pay, if the water supply system improved to that standard?"

Table 4 shows a similarity in response to these two questions. The average WTP is Kip 15,900 per month in Champhone and Kip 16,700 per month in Laongam. The data was further analyzed by examining connection status, gender, income, education and government policy on water supply affecting to people's behaviors. The basic parameters of WTP are shown in Table 5.

Analysis of willingness to pay by connection status

Table 6 shows that WTP varies between connected and non-connected and between towns. In Champhone, it is clear the connected are willing to pay more than those who are not connected, but the situation is reversed in Laongam.

Analysis of willingness to pay by gender

Table 7 shows that in Champhone, the HH head defines the role of women. If the HH head is female, they are willing to pay less for both connection fee and water charge than men. From observation, it was also clear that women do not have equal control over or access to HH cash resources. In Champhone, most men spend more time at home and spend only

Picture 2. Face-to-face interview in Laongam

2-3 months per year on their husbandry, so they play a more important role in decision regarding HH expenditures.

In Laongam, women were willing to pay as much the as men. The reason is that women generate income by vending and trading, experience the difficulty of collecting water, so are inclined to spend money for a solution. However, the conclusion of WTP in terms of a gender perspective shows that most decisions on spending are made by men. It was interesting to note that women had little confidence to answer the WTP bidding game.

Analysis of willingness to pay by income

The survey determined the average annual income per HHs of about Kip 12,995,000 (Champhone) and Kip 8,240,000 (Laongam). Table 8 shows that in Champhone, the WTP depends on income; the higher the income level, the more is the WTP for both connection fee and water charge. In Laongam, the 2nd range of income – poor HHs are willing to pay more for both connection fee and water charge.

Analysis of willingness to pay by respondent's education

Table 9 shows that in Champhone, respondents with little education want to pay less and those with higher education are willing to pay more. This is perhaps because they understand the cost structure of connection fee and water charge (tariff is fixed on 1,000 Kip/m3 for all consumers) and their lifestyle suggests it's better to pay something rather than spend time collecting water. In Laongam, it was the reverse, because the existing water tariff was setting by decreased block structure – who consumes less, pay more and vise versa.

Analysis of willingness to pay by government policy on water supply

To determine respondents' attitude toward the government being the responsible body to supply water, they were asked a yes/no question, "Do you believe the government should provide a standard water supply?" In Champhone, 176 out of 186, and in Laongam, 120 out of 126 replied in the affirmative. There were no negative responses; however, a few respondents replied they did not know.

Table 1. Distribution of respondents by their reasons to rely on government

Reasons	Champhon (%)	Laongam (%)
1) Water supply is the governments task	39.2	37.7
2) It should be provided by international agencies	11.4	8.2
3) It should be provided by the government and communities participating together	42.6	53.1
4) Rely but have no idea and others reasons	6.8	1.0
Total	100.0	100.0

Table 1 shows that while respondents expect the government to supply water, 42.6% (Champhone) and 53.1% (Laongam), recognize it would take time. Table 11 shows that in Champhone, 100% of respondents who expect external support for water systems (Reason 2) are willing to pay the lower range of connection fee but more for water charge. The respondents who understood the water supply should be provided by Reason 3 are willing to pay more for both connection fee and water charge.

For those believing the government should provide water, respondents in Champhone are more willing to pay for both connection fee and water charge while those in Laongam are willing to pay more for water charge.

Relationship between affordability and willingness to pay

In Champhone, most HHs made investments in water sources resulting in a lower WTP than ATP (Kip 147,498). The ATP and WTP differential is only –8,534 Kip/month. Compared to the average monthly income (Kip 1,082,900), both ATP and WTP are not yet at the assumptive level of 3 – 5% of monthly income. In Laongam, WTP exceeds ATP by Kip 41,000 because most people collect water from natural sources or buy water from vendors. In this case, WTP for water charge is nearly two times lower than ATP at minus 16,352 Kip/month. (See Annex 1)

Conclusions and recommendations

- The most important finding pertains to the nature of the demand for water in Champhone and Laongam. The actual water supply situation in these areas was considerably more complex than assumed. It seems clear that the perspective within which policy makers viewed small town water supply is in the process of being rendered out-of-date by the pace of development.
- The ATP is greater when traditional water sources involve greater opportunity cost e.g. longer walking distance to get water, or longer time for water collection.
- The WTP is not totally dependent on income level; it depends on water characteristics (quality and service level) of water and the difficulty of obtaining it. However, the WTP in this study denotes only the initial estimation on the basis of existing water characteristics; it is not the WTP for water supply after the provision.
- By this study, the value of water consumption can be measured by the matching of the ATP and WTP.If the ATP is lower than the value of water, the WTP increases vis-à-vis increasing income. Likewise, the connectors are willing to pay more than non-connectors (in case of Champhone).
- If the ATP is higher than the value of water, it is clear that WTP decreases. The connectors are willing to pay less than non-connectors (in case of Laongam).
- In Champhone, despite higher ATP for connection fee, the WTP is lower. In this case, therefore, the provider needs to persuade and convince people to participate more; at least it should reach the level of their respective ATP.
- The water supply sector should raise the educational awareness of grassroots participation to persuade local people's understandings of water supply provision policy, which is not only the government's task. Otherwise people would wait for government provision and do not want to pay. At least, the policy should help people to understand that water supply should be provided by government and communities.
- In both Champhone and Laongam, the WTP is less than ATP; in fact, there are variations among people in terms of income levels. Hence the tariff setting would rather start at WTP level and should not exceed the ATP level within a demonstrable tariff setting program.
- To bring the WTP to the ATP level, it needs an awareness campaign program as follow up to this research during and after the implementation of the provision.
- For further study, this research suggests a study on the linkage between WTP and quality of delivery services, greater understanding of how WTP increases once services are available and consumers are able to see the value of the water and services.

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Annex 1

Household ability to pay for connection fee

Parameters of HH affordability	Champhone (Kip)	Laongam (Kip)
(1). Average connection fee paid for existing water supply since the system had constructed	211,360	207,167
(2). Average cost spent for water containers	164,286	134,752
(3). Average installation cost for making existing water source(s)	395,212	346,960
Total ATP for connection fee: (1) + (2) =	559,498 ($55.9)	481,721 ($48.1)

Household ability to pay for water charge

Parameters of HH affordability	Champhone	Laongam
(1). consumption volume and storage (liter/HH/day)	430	284
(2). Collection time (min/day)	26	40
(3). Market price of water at the built source (Kips/200 liter/Jar)	500 (water from dug well and tube well)	0.0 (collect from stream)
(4). Collection time against others earnings (Kip/month)	24,100	34,044
(5). Collection time at monthly wage rate (Kip/month)	24,375	37,500
(6) Average of (4) and (5)	24,237	35,772
(7). Total for water gathered by indirect approach (Kip/month)	24,139	30,333
Average ATP for WC is [(6)+(7)]/2	24,188	33,052

Distribution of responses for connection fee bidding game

Ranges (Kip)	Champhone (%)	Laongam (%)
1st range: Kip 200,000 - 400,000	71.9	50.9
2nd range: Kip 400,00l - 600,000	27.1	45.5
3rd range: Kip 600,001 - 800,000	0.0	1.8
4th range: Kip > 800,000	1.0	1.8
Total	100.0	100.0

Distribution of respondents and their opinions about their neighbours for water charge bidding game

Ranges (Kip per month)	Champhone (%)		Laongam (%)	
	Respondents (%)	Their neighbours (%)	Respondents (%)	Their neighbours (%)
1st range: <10,000	55.2	56.0	40.2	42.0
2nd range: 10,000 - 21,000	35.4	32.6	54.5	53.6
3rd range: 20,001 - 30,000	5.5	5.1	4.5	3.6
4th range: 30,001 - 40,000	2.8	2.9	0.0	0.0
5th range: > 40,000 Total	1.1	3.4	0.9	0.9
	100.0	100.0	100.0	100.0

Distribution of respondents by household characteristics

Socio-economic and HH characteristics	Champhone (person)	Laongam (person)
Connection status		
Connectors	68	58
Non-connectors	118	68
Gender		
Male	134	105
Female	52	21
Income ranges (Kip/year)		
<5 millions (very poor HH)	43	53
5 – 10 millions (poor HH)	67	48
10 – 15 millions (mid-income)	42	21
>15 millions (high income)	34	4
educational levels		
No schooling	23	15
Primary schooling	81	54
2nd schooling	65	51
Higher education	7	3
Missing	10	3

Distribution of responses on willingness to pay by connection status

Water charge bidding game	Champhone (%)		Laongam (%)	
	Connector	Non-connector	Connector	Non-connector
1st range: <10,000	44.9	62.8	55.6	26.8
2nd range: 10,000 - 21,000	43.5	31.0	40.7	67.9
3rd range: 20,001 - 30,000	7.2	3.5	1.9	5.4
4th range: 30,001 - 40,000	2.9	2.7	0.0	0.0
5th range: > 40,000	1.4	0.0	1.9	0.0
Total	100.0	100.0	100.0	100.0

Distribution of responses on willingness to pay by gender

Bidding games	Champhone (%)		Laongam (%)	
	Male	Female	Male	Female
Connection fee				
1st range: Kip 200,000 - 400,000	*65.7*	*86.2*	52.9	*50.0*
2nd range: Kip 400,00l - 600,000	32.8	13.8	41.2	37.5
3rd range: Kip 600,001 - 800,000	0.0	0.0	5.9	*12.5*
4th range: Kip > 800,000	1.5	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0
water charge				
1st range: <10,000	*50.4*	*64.6*	*37.9*	*52.9*
2nd range: 10,000 - 21,000	39.8	25.0	56.8	41.2
3rd range: 20,001 - 30,000	4.9	4.2	4.3	5.9
4th range: 30,001 - 40,000	1.6	2.1	0.0	0.0
5th range: > 40,000	3.3	4.2	1.1	0.0
Total	100.0	100.0	100.0	100.0

Distribution of responses on willingness to pay by income ranges

Income ranges	Champhone (%)				Laongam (%)			
Bidding game	very poor	Poor	Mid-income	High income	Very poor	Poor	Mid-income	High income
Connection fee								
1st range: Kip 200,000 - 400,000	91.7	66.7	60.9	64.3	75.0	34.8	55.6	50.0
2nd range: Kip 400,00l - 600,000	8.3	33.3	34.8	35.7	25.0	60.9	44.4	50.0
3rd range: Kip 600,001 - 800,000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4th range: Kip > 800,000	0.0	0.0	4.3	0.0	0.0	4.3	0.0	0.0
Total	100	100	100	100	100	100	100	100
Monthly water charge								
1st range: <10,000	76.3	54.7	43.6	35.7	40.5	45.5	41.2	20.0
2nd range: 10,000 - 21,000	21.1	40.6	43.6	35.7	52.4	50.0	52.9	80.0
3rd range: 20,001 - 30,000	2.6	4.7	12.8	25.0	7.1	2.3	5.9	0.0
4th range: 30,001 - 40,000	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0
5th range: > 40,000	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0
Total	100	100	100	100	100	100	100	100

Distribution of respondents on willingness to pay by educational background

Bidding game	Champhone				Laongam			
Connection fee								
1st range: Kip 200,000 - 400,000	*85.7*	*69.8*	*66.7*	*60.0*	*25.0*	*46.6*	*75.0*	*100*[I]
2nd range: Kip 400,00l - 600,000	14.3	27.9	33.3	20.0	75.0	46.6	25.0	0.0
3rd range: Kip 600,001 - 800,000	0.0	0.0	0.0	20.0	0.0	3.6	0.0	0.0
4th range: Kip > 800,000	0.0	2.3	0.0	0.0	0.0	3.6	0.0	0.0
Total	100	100	100	100	100	100	100	100
Monthly water charge								
1st range: <10,000	*71.4*	*48.1*	*62.7*	*60.7*	*38.0*	*37.0*	*50.0*	*60.7*
2nd range: 10,000 - 21,000	19.0	39.0	25.0	32.1	53.8	63.0	25.0	32.1
3rd range: 20,001 - 30,000	19.6	5.2	3.6	5.4	7.7	0.0	25.0	5.4
4th range: 30,001 - 40,000	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0
5th range: > 40,000	0.0	1.3	0.0	1.8	0.0	0.0	0.0	1.8
Total	100	100	100	100	100	100	100	100

Distribution of respondent's WTP by their reasons why the government should provide water

Bidding games	Champhone				Laongam			
	Reason 1	Reason 2	Reason 3	Reason 4	Reason 1	Reason 2	Reason 3	Rea-son 4
Connection fee								
1st range: Kip 200,000 - 400,000	74.3	100	50.0	90.9	95.0	100	30.3	100
2nd range: Kip 400,00l - 600,000	25.7	0.0	41.7	9.1	0.0	0.0	66.7	0.0
3rd range: Kip 600,001 - 800,000	0.0	0.0	8.3	0.0	5.0	0.0	0.0	0.0
4th range: Kip > 800,000	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0
Total	100	100	100	100	100	100	100	100
Water charge								
1st range: <10,000	68.8	47.8	31.6	60.0	48.5	62.5	66.7	-
2nd range: 10,000 - 21,000	27.9	44.9	31.6	20.0	48.5	37.5	33.3	-
3rd range: 20,001 - 30,000	3.3	4.3	15.8	10.0	0.0	0.0	0.0	-
4th range: 30,001 - 40,000	0.0	1.4	15.8	10.0	0.0	0.0	0.0	-
5th range: > 40,000	0.0	1.4	5.3	0.0	3.0	0.0	0.0	-
Total	100	100	100	100	100	100	100	-