

Willingness to Pay for Drinking Water Supply in Vavuniya UC Area

Gnanachandran. G and Uthayakumar. S.S.

Department of Economics, Faculty of Arts,
University of Jaffna
gnanachandran4@yahoo.com

Abstract.

This study covered Vavuniya Urban Council area, which includes eight (08) Gramasevager divisions and eleven wards. About 75,000 residents live in this UC area. The current water treatment facilities were built when there were a more than 20,000 families living here. The fifteen fold increase in population during last decade has made access to water a major public health concern. Families that can afford to buy bottled water do and those that cannot are susceptible to water borne disease at illness at an ever increasing rate. With this background, the aim of this study was to get an insight a present issue while estimating WTP for improved water service.

Eight GS divisions within the UC limit were selected 50 households as sample sites, collecting information on current water needs, health concerns, household socio economic characteristics, and from a contingent valuation (CV) experiment, how much they would pay for access to improve water service in the home. Only 26% of households surveyed currently have a water meter. And the maximum that any house hold pays for water service is 1140/-. Eighty six percentage households are report buying water. Many household have private wells. Households' purchasing water outside the home has average expenditures of 705 Rs per month with the highest reporting 2400Rs per month.

Further, willing to pay more for an improved water supply in vavuniya UC area showed that domestic consumers' willingness to pay more for an improved service was influenced by age of the head of the household, head of the house hold, household income, work, home owner, Education, and Payment of the water.

Finally a conclusion can be derived that, in the urban area public willingness to pay of household a considerable attention for many factors when improved water service in vavuniya UC area.

Keywords: Drinking Water Supply, Willingness to pay (WTP), Domestic Consumers, Households.

Introduction

The vavuniya district falls within the dry zone srilanka. The temperature is generally suitable for cultivation. The average temperature is 23.3°C and it is low during the period of October to January. The average rain fall of the district is 1461.2mm. From early October to late January is the Maharainy season and from late April to late July is the Yala season.

A rational consumer will, due to the constrained maximization facing him, give preferences to the alternatives that give higher utility. A good or service associated with highest WTP would be the one that yields highest utility to the consumer and vice versa.

A critical problem in valuation of an environmental product like the facilities for safe drinking water is that the explicit markets for environmental quality don't usually exist. As a result, the assignment of a monetary value for an environmental product is primarily based on non-market data. Such as the result of surveys.

Consumers' Willingness to pay (WTP) for getting benefits expressed in money terms a central concept of this framework. In this approach, respondents (Consumers) are offered a hypothetical market, in which they are asked to express the willingness to pay for the existing or potential environmental conditions not reflected in any real market.

The most common form of questioning on hypothetical futures is called the contingent valuation method (CVM). It involves directly asking individuals what they would be willing to pay for particular goods or services contingent on some hypothetical change in the future state of the world.

The monetary values obtained in this way are thought to be contingent upon the nature of the constructed market, and the commodity described in the survey scenario.

Drinking Water Supply in Vavuniya

Vavuniya district is studied in the Northern Province of Sri Lanka. It covers an area of about 196,690.96 Ha (1966.90 sq km). This district accounts for 10% of land area of the entire North East province and 3% of the total area of Sri Lanka. Boundaries of the Vavuniya are North Mullaitivu District, South Annurathapuram, East Trincomalee & Anuradhapuram, West Mullaitivu & Mannar districts. Administratively this district constitutes part of the Wannu Electoral districts.

This district has 4 divisional secretary divisions and covers 102 Gramaniladharies divisions and 495 Villages. There are 5 local bodies functioning in this district. There are one urban council and four pradeshiyasabhas. According to the last statistical handbook 2008, Total Population of 182,957 inhabitants. At that time the ethnic division among the major groups was thus Tamils 86.8 percent, Sinhalese 7.4 percent, Moors 5.8 percent. The study area is situated in Vavuniya DS Division. The following table and any figure show the population trend of that division.

Objectives

1. To find out whether households are willing to pay (WTP) for water service improvements;
2. To find out how much the consumer is willing to pay.
3. To identify variables that explain the consumer's WTP for improvements in water reliability, pressure and quality.
4. To assess the preferences of urban households regarding the management of water delivery.

Literature Review

Kim and Cho (2002) used a contingent valuation method to determine consumer WTP for the removal of high copper concentrations in their water. The general finding was that in smaller communities (in Minnesota, USA) that people were willing to pay would not

cover the costs of improved treatment processes and systems. Similarly Cho, Easter, McCann & Homans (2005) looked at concentrations of iron and sulphate in community water supplies in south-western Minnesota.

Again using a CV approach, on average, individuals were willing to pay US\$5.25 per month (in 1995 U.S.dollars) to reduce the level of iron and US\$4.33 per month to reduce the level of sulphate in their water to bring levels down to the USEPA's standards. Respondents who already thought their water quality was poor were willing to pay more to improve its quality. Again the aggregate WTP of the population was insufficient to meet the costs of achieving these goals suggesting the necessary changes would not be economically viable.

A similar finding was found in a Latvian WTP study that investigated consumers' WTP for cleaning up pollution in surface water supplies. Here Ready, Malzubris & Senkane (2002) showed that while Latvian consumers were prepared to pay up to 0.7% of their household income for improvements in surface water quality this sum, once aggregated, was insufficient to implement the necessary changes. WTP for securing safe drinking water can be related to factors such as age, location, socio-economic status (SES) and level of education. For example Nielsen, Gyrd-Hansen, Kristiansen, & Nexøe (2003) found that older respondents were reluctant to pay any more to avoid future health threats from drinking water than younger ones. Al-Ghuraiz, & Enshassi (2005) found relationships between WTP and location among the population of the Gaza Strip. Here those living in poor villages without access to good quality supplies were prepared to pay substantial amounts to secure safe supplies.

Methodology

This analysis examines what are the factors /variables determine the willingness to pay for the improved drinking water supply in Vavuniya town. Such as social characters, Economical characters and Household characteristics determine the WTP of improved services.

Data Collection and Sampling Technique

The data necessary for the study can be categorized in to two groups according to their source i.e.: Primary data & Secondary data.

Primary data was collected by a field study by direct interviews of individual who obtain and use water supplied by the water works department of Vavuniya Urban council. A Structured questionnaire was used for the purpose of obtaining information.

Secondary data was collected from the records available at the Vavuniya UC water work branch, Statistical branch of the Vavuniya District Secretariat.

In order to drive at actual estimates of WTP, a survey was administrated.

Analysis

The Survey is broken in to four sections providing a richest of data for covariate analysis. The first collects information pertaining to house hold demographics. Part two asks questions about health issues in the house hold. Part three elicits information concerning house hold infrastructure and services-available to the household and section four is the actual contingent valuation experiment, which contains four different elicitation formats.

Format 1 uses an open ended CV with a preliminary (augmenting) paragraph. (AOE)

Format 2 uses an open ended CV without any introductory paragraph (OE). **Format 3 & 4** uses the bidding game approach with format 3 starting at Rs.250 and descending (DB) and format for the ascending bidding method (AB) starting at Rs. 50 .

AOE- I am going to ask you a question about how you value water services. Your answer will not determine how much you will have to pay. The amount will only be used to value to value water services. How much would you be willing to pay per month to receive water in your house available 24 hours a day?

OE- how much would you be willing to pay per month to receive water in your house available 24 hours a day.

DB-would you be willing to pay Rs.250 per month to receive water in your house available 24 hours a day? If yes the games the ends, if no then the amount is reduced to Rs.200, Rs.150, Rs.100, Rs.50, Rs.0

AB-would you be willing to pay Rs.50 per month to receive water in your house available 24 hours a day? If NO the games ends. If yes the amount is increased to Rs.100, Rs.150, Rs.200, and Rs.250.

Services

Variable	Mean	StDev	SE Mean	Min	Max
Metered water	0.26	7.45	2.82	16.00	38.00
Monthly bill	644	423	160	46	1140
Buying water	0.8600	0.350	0.049	0.000	1.00
Amount paid	705.8	655.0	92.6	0.0	2400

Only 26% of households surveyed currently have a water meter. And the maximum that any house hold pays for water service is 1140/- .Eight six percentage households report buying water. Many household have private wells. Households' purchasing water outside the home has average expenditures of 705 Rs per month with the highest reporting 2400Rs per month.

Vavuniya town still has its water related illness (table). Among those surveyed, 12.3% reported having a case of dengue fever. Almost 6.1% reported at least one case of severe diarrhea. And nobody affected by malaria. Two percentages reported having to deal with cholera. Eight percentage reported having to deal with intestinal worms.

Willingness to pay

Rather than Jump directly to the regression analysis it is useful to look first at some non-parametric analysis of willingness to pay. For the open-ended response formats, less than 15% of the respondents were willing to pay more than 200 Rs. As the price falls from 200Rs to 50Rs we go from 15% to almost 75% of the respondents included. The next 10% of the respondents having zero willingness to pay.

For the bidding game formats, 30% of the respondents in the descending bid (DB) format. And only 30% of the respondents in the ascending bid (AB) format. About 27% of the responses in the DB format more than 200Rs. As we move from 200Rs to 50Rs the percentage increase more than 70%. About 40% of the responses in the AB formats were 50Rs. As we move from 50Rs to 250Rs the percentage increase about 60%.

In order to determine if there was anything special or different about the 2 household, to express zero WTP. There are no major differences between households who are willing to pay something and those that are not willing to pay anything. However, there are three statistically significant differences between these 3house holds and the others.

01. They are older.
02. They are more likely to have received their home through a government program.
03. They are less likely to be purchasing water outside the home.

Table.2 Non parametric WTP estimates

	AOE	OE	DB	AB	Total
No of respondents	10	10	15	15	50
Mean WTP	109	130	132	103.33	118.58
SD	98.1	111.2	112.3	96.21	105.12

Based on the direct responses to the valuation questions, we can see in the table. Those households are willing to pay between RS 103 and Rs132 per month. Its descending bid dichotomous choice formats that provides the highest willingness to pay and the highest variance around the mean. One of the benefits of this type of analysis is that it helps to hypothesis about expected results from the regression analysis.

In order to gain more insight in to WTP and its covariates, we conducted multivariate regression analysis with similar specifications ton Whittington et al (2002) and Briscoe et al. (1990). Micro Economic theory suggests that WTP should vary across individuals with different resident characteristics (D) different level of current services, different health situations (H).Therefore, the following equation was estimated using OLS.

Table.3 Willingness to pay estimates

	Mean WTP	SD
Full	118.5	105.12
AOE	109	98.1
OE	130	111.2
DB	132	112.3
AB	103.33	96.21

The lowest estimate comes from the augmented open ended (AB) format 103.33. And the highest is from the descending bid (DB) format (132). If we take the lower bound estimate from the AOE model and the upper bound estimate from the AB model, we obtain a range of WTP estimates from 50Rs to 250Rs. There for many factors are most influenced of Willingness to pay for the improved drinking water supply in vavuniya town.

Conclusion

The study area is Vavuniya urban council area. This Urban Council area includes eight (08) Gramasevager divisions and eleven wards. That the implementation of the questionnaire the aim was to evaluate WTP for improved water service in Vavuniya UC area. The main objective of the research was to develop or identity, if present a WTP for improved water service in Vavuniya UC area.

The methodology is contingent valuation confirmed that consumers willing to pay more for an improved water supply. On average household in these 08 GS divisions communities are willingness to pay more than Rs 118.58 per month.

Fifty six percentage of survey respondents are head of the household is male. And the average respondent is 44 years old. On average the respondent has present neighborhood lived in 20years.mean income is 16,430/-per month, which is slightly more than 2.5 times the minimum wage. Almost 58% of respondents own their home. Sixty percentage people are employed. Fifty eight percentage people lived in own home. Other 42% people lived in rent house or government quarters. Average education level of the people is still GCE OL. Average payment for the water is Rs 404 only. Average cost of the electricity bill is Rs 277 only.

Only 26%of households surveyed currently have a water meter. And the maximum that any house hold pays for water service is 1140/-.Eight six percentage households report buying water. Many household have private wells. Households' purchasing water outside the home has average expenditures of Rs. 705 per month with the highest reporting Rs. 2400 per month.

Vavuniya town still has its water related illness (table). Among those surveyed, 12.3%reported having a case of dengue fever. Almost 6.1% reported at least one case of severe diarrhea. And nobody affected by malaria. Two percentages reported having to deal with cholera. Eight percentages reported having to deal with intestinal worms.

The methodology is contingent valuation confirmed that consumers willing to pay more for an improved water supply. On average household in these 08 Gs divisions communities are willingness to pay more than Rs 118.58 per month.

Further, willing to pay more for an improved water supply in vavuniya UC area showed that domestic consumers' willingness to pay more for an improved service was influenced by age of head of the household, head of the house hold, household income, work, home owner, Education, and Payment of the water. These findings are consistent with consumer demand theory.

Therefore households should demand and pay for WTP for improved water service in vavuniya UC area, as this will bring about tremendous benefits for them. Finally a conclusion can be derived that, in the urban area public willingness to pay of household a considerable attention for many factors when improved water service in vavuniya UC area.

References

- Abley, J. (2000). *Stated preference techniques and consumer decision making: new challenges to old assumptions*. Cranfield School of Management Working Papers, 2/00, SWP;2/00.<https://aerade.cranfield.ac.uk/bitstream/1826/664/2/SWP0200.pdf>
- Abou-Ali, H. (2003). Using stated preference methods to evaluate the impact of water on health: the case of metropolitan Cairo. *Scandinavian Working Papers in Economics*, No 113.<http://swopec.hhs.se/gunwpe/abs/gunwpe0113.htm>
- Adote Abrahams, N., Hubbell, B.J. & Jordan, J.L. (2000). Joint production and averting expenditure measures of willingness to pay: Water expenditures really measure avoidance costs? *American Journal of Agricultural Economics*, 82 427-437.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In Kuhl, J., and Beckmann, J., (eds.) *Action control: from cognition to behaviour*. Springer, Berlin, 11-39.
- Baker, C. D, Lentz R. and Curry S. (2006): Strategy of widespread implementation of numerous, independent small scale Household Water Treatment Programs. World Business Council for Sustainable Development, World Water Week in Stockholm.

- Bhandari, B. and Wickramanayake, B. (2001). Community Management and Water Quality in Rural Water Supply System in Nepal, *Asia Pacific Journal of Rural Development*, 10 (2):53-67, Thailand.
- Ministry of Finance (2003), Project Plans and Monitoring, Kathmandu, Nepal.
- National Planning Commission (1998). *The Evaluation Report of Eighth Five-Year Development Plan (1992–1997)*.