FINAL REPORT ON USAID CAMBODIA MSME PROJECT WATER SURVEY

TASK ORDER NO. 04

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CAMBODIA MSME 2/BEE PROJECT

FINAL REPORT ON USAID CAMBODIA MSME PROJECT WATER SURVEY

TASK ORDER NO. 04

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I. INTRODUCTION

1. The USAID Cambodia MSME Project

Cambodia Micro Small and Medium Enterprise Business Enabling Environment (Cambodia MSME or MSME) project, implemented by DAI across 12 provinces in Cambodia, has interrelated mandates: to improve the ability of micro small and medium enterprises (MSMEs) to operate in Cambodia, while improving natural resource management, and access to safe water and sanitation. The project has main objectives: directly support the growth of enterprises and linkages in industry value chains, strengthen the ability of the private sector to advocate for itself, and strengthen the ability of the public sector to respond to private sector needs as well as the demands of the international trade regime. The program's underlying theory is that progress on all of these fronts will enable MSMEs to prosper, grow, and create jobs.

The project implements a range of activities under three components:

- Component One: Strengthen Selected Value Chains
- Component Two: Strengthen Private Sector Voice
- Component Three: Strengthen Public Sector to Improve the Business Environment

This report presents results from a survey of enterprises assisted under Component One: Strengthen Selected Value Chains. Data analyzed in this report in particular was gathered for the water investment strategy assisted in accordance with indicators listed in the project Performance Monitoring and Evaluation Plan (PMEP)[1]. The project is here referred to the WSP Project - Water Services Providers. This report presents a summary of results from the study conducted by Indochina Research Limited (IRL) in 2010.

The purpose of this report is to summarize enterprise performance prior to project intervention as they have been analyzed in the 2008 Kosan Survey[2] and their progress made in 2010 against a set of key indicators provided by the MSME team.

2. The Water Service Provider Activity

The USAID funded Cambodia MSME Project uses a private sector led value chain approach to increase access to safe drinking water for Cambodian households. It helps to expand access to safe water by working with existing private Water Service Providers (WSPs) to their businesses and provide clean, safe water to households.

To understand the nature of these businesses and the challenges they face, the Cambodia MSME project contracted in 2009 KOSAN Engineering to conduct a rapid assessment of the private WSPROs with greatest potential for expansion, located within the 12 provinces targeted by the Cambodia MSME project.

In 2010 the MSME project contracted Indochina Research Ltd Cambodia (IRL) in order to follow up on the results collected through this first stage and to determine patterns among

[1] Cambodia MSME/BEE Annual Performance Monitoring and Evaluation Plan Year 1, December 2008; Revised Draft, November 2009

[2] Kosan Engineering for the Cambodia MSME 2/BEE Project, May 2009 ''Initial Assessment of Existing Private Water Service Providers in Cambodia''.

households for water consumption and among enterprises (both clients and non clients) for water business development.

II. STUDY OBJECTIVES & METHODOLOGY

1. Study Objectives

The objective of this study is to evaluate the impact of the piped water connections of MSME WSPs for both households and enterprises:

For households impact is evaluated in terms of key indicators such as:

- improved health,
- water supply affordability
- water satisfaction levels.

For enterprises impact is evaluated in terms of :

- investment
- benefits,
- costumer increase and feedback
- business viability.

2. Methodology

As the study aimed to approach both the demand side (Households) and the supply side (WSPROs), two methodologies were combined:

- A quantitative face-to-face survey was implemented for the large number of households targeted by the program, using a structured questionnaire. Interviews were conducted with the head of household and lasted for about one hour.

- A semi-qualitative survey was conducted with WSPs through In-Depth Interviews (IDIs) conducted with the owner / head of the WSP business. Interviews lasted for one hour to one hour and a half, using a semi-structured questionnaire.

In order to answer the objectives of the study previously emphasized, the survey materials were organized in the following sections:

Households

- **Water Sources and Usage and Non Usage:** to compare usage and attitudes towards piped water against other sources

- **Piped Water Knowledge and Perceptions:** to determine usage and attitudes of piped water specifically

- **Water Service Provider Satisfaction:** to evaluate the relation of households to their provider and satisfaction of the service provided

- **Health Impact:** to assess the impact of drinking piped water on household health. Key indicators focused on under 5 years old children, due to high levels of critical waterborne diseases among young children in Cambodia.

Enterprises[3]

- **Business Data:** to convey a general background of the WSPs business environment and practices

- **Description of Water Business Installation:** in order to determine notably:

    - water quality,
    - water losses,
    - sales,
    - client payments,
    - expenses (operating costs and replacements),
    - expansion investments,
    - licenses & concessions,
    - willingness for future expansion,
    - profitability

In addition, some sections were developed in common for both the households and the enterprises study:

- Sanitation Awareness
- Media Assessment (with a focus on ''Success Starts With You'' radio program)
- Poverty Assessment

The Poverty Assessment section was provided by the USAID and through demographics and questions on assets owned by each household, allowed the Cambodia MSME Project to draw on additional analysis on profiling each household as poor / very poor. Those results, provided to IRL by the MSME Project will be used in a later section of the report in order to establish the program outreach to the most vulnerable populations.

[3] During the fieldwork, the final approved version of the enterprises questionnaire was unintentionally switched with an earlier version. That earlier draft version included questions later deleted from the final approved version - as those questions were considered not primarily necessary - while other questions added as perceived to be essential to the analysis were not included in the questionnaire used. Enterprises were therefore telephoned once the fieldwork was finalized to answer those 20 questions. However, this should not be considered as a main limitation to the survey results: while the calling stage was conducted more than 2 months after the main fieldwork, respondents had still not forgotten the recent IRL survey and were probably more focused during this few-minute call than after a full hour of face-to-face survey.

3. Sampling

Enterprises - Clients

A selection of 17 WSPs names was provided by the MSME Project as a list of current clients to be surveyed by IRL, allowing the survey to target each of them individually and to use more open ended questions than the households component could allow. IDIs were successfully conducted with all of the 17 WSPs.

Enterprises – Non-Clients

To draw comparison between WSPs involved in the MSME Project, and non-involved WSPs, a sample of 10 non-clients enterprises was surveyed with the same questionnaire. Those 10 non-clients were selected by the MSME Project out of the original list of 35 non-clients provided by the Kosan Survey. While a priority was given to the WSPs assessment therefore justifying the additional control sample of non-clients enterprises, no control sample of non-clients households was conducted.

The final sample of enterprises (both clients and non-clients), was originally planned to be disaggregated upon data analysis into 3 categories, according to the enterprises size (based on the number of households connected), therefore following the Kosan Survey indications:

- Small = 125 - 450 HHs connections
- Medium = 450 – 950 HHs connections
- Large = 950 – up HHs connections

However, while this categorization was used while the draft report was being written, it was later on dropped out due to its limited relevance:

- Only one client could be categorized as small, but the number of connections declared to IRL interviewers was far less than the one noted by the MSME Project team.

- As this number appeared to be a discrepancy compared to the rest of the answers (showing that indeed the client could have been considered as Medium), it was decided not to consider him as small anymore.

- As those discrepancies highlighted a more general tendency for enterprises to downsize their connections when in presence of unknown interviewers (for confidentiality and taxes purposes), the categorization was therefore dropped for the ensemble of enterprises.

Households

Based on the 17 clients selected, the MSME Project also provided IRL with the correspondent number of new household connections for each client, enabling the households sampling to be proportionate to locations and clients databases. The Table 1 shows the details of this sampling[4].

[4] On the total number of households interviewed in relation to their WSP: as WSPs Try Yusith from Kampot (No 12 in table 1) and Sroun Bun Pour from Kandal (No 30 in Table 1) did not report any new connection at the time of the study launch, no households were surveyed for those 2 WSPs. It should also be noted that, since WSPs Ly Heng (No 20 in Table 1) and Moy Sophorn (No 21 in Table 1) happen to be located in the same district (Stung Trang in Kpg Cham), they have been confused by the team during the fieldwork. While

10% of the new households connected by MSMEs WSPs at the time of preparation of the study were selected: in June 2010 the total number of new connections was then of 6,553. The sample selected was therefore of 656 households.

The total number of households to be interviewed was disaggregated according to each WSP new connections, using the same share of 10%: if a WSP indicated a total number of new connected households of 100, 10 households were selected from the WSP clients list to be interviewed[5].

20 households connected by Ly Heng should have been interviewed, they were not, to the profit of Mot Sophorn, whose households connected interviews should have been of 80 and were finally of 100.

[5] Full lists of 6,553 new clients contacts from each WSPs were provided to IRL, with the aim of establishing a random selection of 10% potential respondents. However, an internal error occurred at the IRL Offices during the selection: households were not selected randomly from the list but were selected based on the fact that they were in the same district / commune / village as their WSP. While a full random selection would have been to take the whole list of the WSPs clients households, and randomly select them, without any attention paid to their location (as some WSPs can cover different districts / communes / villages). The impact of not having a fully random selection of households is that the final sample may not fully be representative of households profiles covered by each WSPs, notably in terms or rural / urban, poor / non-poor.

Table 1: Sampling Frame for Households and WSPs.

Tracking	WSP Name	Province	Total Households	Certified	Total New Connections	Number of HHs to Survey (10%)
21	Moy Sophorn	Kpg Cham	1200	800	800	80
33	Khun Aphivath (Peam Chi Kang)	Kpg Cham	1000	750	750	75
37	Khun Aphivath (Bavet)	Svay Rieng	1000	250	250	25
39	Ham Ngoun	Kandal	2220	1108	658	66
16	Un Yuthy	Kpg Speu	1000	750	750	75
1	Srey Sokhom	Takeo	1328	300	300	30
10	Kheng Taiveng	Kandal	557	416	416	42
15	Sang Vuthy	Kpg Speu	214	214	214	21
9	Touch Sarein	Kracheh	109	109	179	18
20	Ly Heng	Kpg Cham	300	200	200	20
12	Try Yusith	Kampot	865		0	0
30	Sroun Bun Pour	Kandal	680		0	0
8	Touch Kim	Prey Veng	650	450	450	45
40	Chhorn Dalis	Kandal	896	316	586	59
41	Kry Kao Ny	Kandal	700	600	200	20
32	Sakor Cambodia Co. Ltd (Pha'Av)	Kpg Cham	600	400	400	40
38	Khun Aphivath (Suong)	Kpg Cham	500	400	400	40
Totals			**13,819**	**7,063**	**6,553**	**656**

4. Locations

As the sample was based on clients' census and households and representative of the universe of connected households, the locations are the ones where the MSME project has been active and has developed relations with WSP clients. It should therefore be noted that neither the locations, neither the sample claim to be representative of the global population of Cambodia.

The following tables present an overview of the clients / non- clients enterprises (Table 2), and Households (Table 3), distribution over the provinces. Colors indicate the categorization of each urban commune (blue) according to the 2008 Census, or semi-urban (green).

The following criteria are used to define urban communes:

- All provincial towns
- Population density exceeding 200 per km^2
- Percentage of male employment in agriculture below 50 percent
- Total population of the commune should exceed 2,000.

As explained earlier, the issue faced during the random sampling stage has probably affected the overall representation of urban / rural distribution of households. Households have been selected from the list, based on their localization within the same district / commune / village as their WSP. As WSPs tend to be established in more active areas, or at least less remote ones, this may have biased the final sample to be slightly more "semi-urban" and less rural than it should have been, as WSPs do cross local administrative borders to reach other communes and villages (and even when distance allows, districts). The households sample may therefore appear slightly less "poor" and "very poor" has it should probably have.

Table 2: Sampling Frame for Enterprises (Clients & Non Clients) Interviews

PROVINCE	DISTRICT	COMMUNE	VILLAGE	CLIENTS	NON-CLIENTS
Kompong Cham	Stueng Trang	Obeng	Mesorchrey	5	2
	Stueng Trang	Preaek Kak	Boeng Daeng		
	Kang Meas	Peam Chi Kang	Peam Chi Kang		
	Soung	Soung	Soung		
	Pha Av	Pha Av	Pha Av		
Svay Rieng	Bavet	Bavet	Bavet	1	0
Kandal	Ksach Kandal	Kpg Chomlong	Kpg Chomlong	5	3
	ksach Kandal	Preak Tamak	Preak Tamak		
	S'ang	Traeuy Sla	Preae Balat Chhoeng		
	Koh Thom	Koh Thom II			
	Mouk Kompol	Bakang	Chombork Meas		
Takeo	Bati	Trapeang Sab	Smau Khnhei	1	0
Kampong Speu	Chbar Mon	Svay Kravan	Svay Kravan	2	1
	Odongk	Veang Chas	Chamkar Luong		
Kracheh	Kracheh	Roka Kandal	Roka Kandal Muoy	1	1
Kampot	Angkor Chey	Phnum Kong	Pou	1	0
Prey Veng	Peam Ro	Neak Loeung	Neak Loeung	1	0
Battambang				0	2
Kpg Thom				0	1
TOTAL				**17**	**10**

** Blue = Urban / Green = Semi-urban*

Table 3: Sampling Frame for Households Interviews

PROVINCE	DISTRICT	COMMUNE	VILLAGE	Number of Respondents	TOTAL
Kampong Cham	Stueng Trang	Obeng	Mesorchrey	80	**255**
	Stueng Trang	Preaek Kak	Boeng Daeng	20	
	Kang Meas	Peam Chi Kang	Peam Chi Kang	75	
	Soung	Soung	Soung	40	
	Pha Av	Pha Av	Pha Av	40	
Svay Rieng	Bavet	Bavet	Bavet	25	**25**
Kandal	Ksach Kandal	Kpg Chomlong	Kpg Chomlong	66	**30**
	ksach Kandal	Preak Tamak	Preak Tamak	20	
	S'ang	Traeuy Sla	Preae Balat Chhoeng	42	
	Koh Thom	Koh Thom II		0	
	Mouk Kompol	Bakang	Chombork Meas	59	
Takeo	Bati	Trapeang Sab	Smau Khnhei	30	**1**
Kampong Speu	Chbar Mon	Svay Kravan	Svay Kravan	75	**96**
	Odongk	Veang Chas	Chamkar Luong	21	
Kracheh	Kracheh	Roka Kandal	Roka Kandal Muoy	18	**18**
Kampot	Angkor Chey	Phnum Kong	Pou	0	**0**
Prey Veng	Peam Ro	Neak Loeung	Neak Loeung	45	**45**
TOTAL				**656**	**656**

** Blue = Urban / Green = Semi-urban*

III. STUDY CONTEXT

This report bases results and analysis on answers provided by households and WSPs interviewees. However we thought necessary to warn the reader on the context of data collection in Cambodia, in particular when it comes to interviewing small and medium enterprises. In a country where the private sector is currently still under development and searching balance in terms of legislation and professionalism, the business context can sometime appear to be quite ''blur''. Business leaders, whether running a small family shop or large factories are generally reluctant to share with unknown individual information perceived as being secret. That information generally includes more or less all numbers linked to the company, as they are seen as the key for the business development. The fear is that, if share with the wrong person, that information will either be used by a competitor to grow or take over market shares, or by the authorities who will seize the opportunity to increase taxes based on real volumes of sales and profit (while those numbers are in almost all cases, largely underreported).

Another element to be taken into account is that the small and medium enterprises such as those surveyed in this report are generally family owned. Employees are not always declared as such as they are very often ''just members of the family helping out''. Books are not always keep in order or up-to-date as number of Cambodian families seize opportunities when it comes to business: the need for books is therefore not seen as necessary as one could expect.

In addition ways of categorizing / defining investments is rather unknown or misunderstood by those small and medium enterprises, and the data used in this report may therefore widely vary from one respondent to another.

Last but not least, when considering the households responses in regards to pipe water on health, acquiescence bias should be taken into account. Ways of appreciating and responding to questions and moreover surveys show variations across different countries and cultures. In Asia, and in particular in Cambodia, acquiescence bias is fairly common. In other words, the respondents have a tendency to agree with all the questions or to indicate a positive connotation. In addition to this, quantitative studies can just offer a reflection on what are respondents saying, never on what is actually really happening or being done, which can be documented only through observational studies.

In our case here, we can suspect that parents, when asked if they gave to their children piped water only, and in particular prior to the child sickness, chances are high that they would claim giving the ''right'' water rather than ''admitting'' that indeed, water from the pond was used as the main source of drinking.

This therefore brings limitation to some of this health assessment: pipe water may have had indeed a better result on health but households may have over-reported the sole usage of piped water compared to reality.

IV. EXECUTIVE SUMMARY

- The majority of all households' surveyed report piped water to be their main source of water. Consumption of piped water is registered to be lower for the wet season than for the dry season. *Alternative (traditional) water sources are more available and perceived to be of better quality during the rainy season.*

- The quality of piped water receives the best scores on taste when compared to other water sources. Regardless of this it is clear that piped water is associated with a smell of chlorine.

- Most people (80%) do not drink water directly from the faucet. The water is normally boiled or filtered before drinking.

- Water Service Providers that deliver water from the ground score higher on perceived quality than service providers delivering water from the surface.

  For the exercise of comparing 2010 results with 2008 results 8 water service providers qualified. For the purpose of consistency we base all comparisons between 2008 and 2010 on these 8 WSP's.

- For this sample we see that the average number of piped water connections has increased from 1041 to 1600 connections.

- Development of profitability tells a very encouraging story. From 20 cents in 2008 we register a profit margin of 46%[6] for 2010.

- Investment figures for WSP's are not consistent with regard to registered number of employees and years of operation. This inconsistency makes analysis of investment for the purpose of estimating present value and internal rate of return (IRR) difficult.

V. HOUSEHOLDS PROFILES

- 3/4 of the sample is located in rural areas that reflect the national proportion of an average 80% Cambodians living in rural.

- The average family size is about 5, which is also very close to the national census which records an overall 4.7 persons / HH (2008).

- For more information on ''poor'' and ''very poor'' categorization of the households, please refer to the PAT results section.

VI. WATER CONSUMPTION

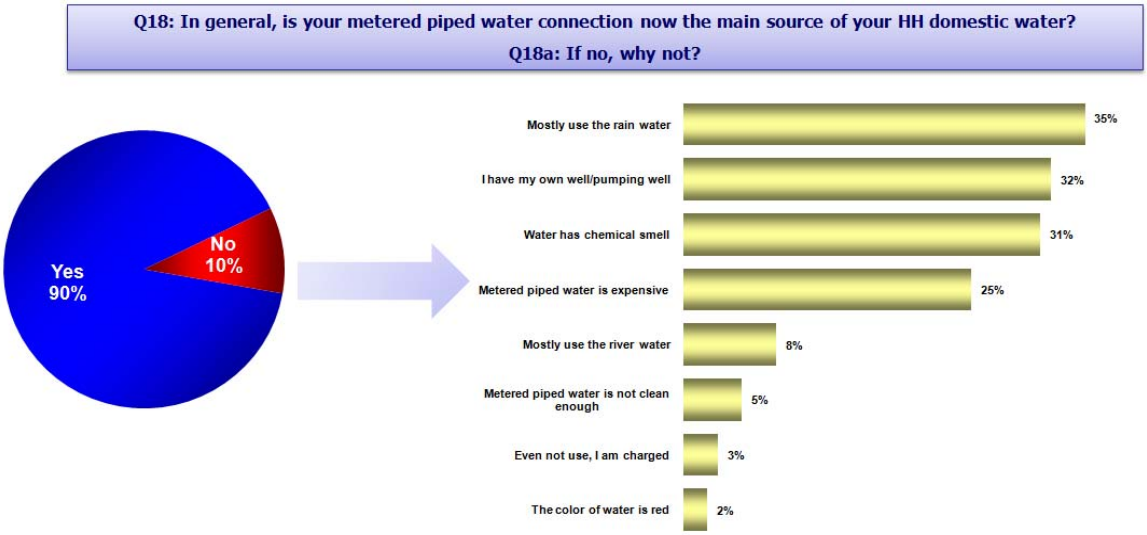
1. Main water source

90 % of all respondents reported that they use piped water as their main source of water for their household. Looking to identify reasons for not using this piped water as a primary source of HH water it is registered that people still harvest rain water while some have their own well.

From this segment quality is registered to be the primary reason for non usage (bad smell, red color and not clean enough: 38%)

[6] (Volume sold multiplied by price= Revenue, Revenue minus operational costs =profit , profit margin is profit seen as a percentage of revenue)

Chart 1: Main Water Sources for Domestic Usage (Multiple Answers)



2. Piped Water Consumption

As would be expected water consumption by pipe is registered to be bigger in dry season compared to wet season. We can see that people still make use of alternative sources of water in the wet season as availability is high. The driving forces of this behavior are cost and quality.

If the household has access to quality water they will tend to use this as opposed to being charged for using piped water. The reduced usage of piped water during the wet season supports this argument.

Table 4: Piped Water Consumption: Wet & Dry Season

	Average usage (m3, cubic meter)
Dry season	**7.15**
Wet season	**5.2**

3. Price of piped water consumption

There is not registered any significant difference on the consumption of piped water between the rural and urban population; this despite the registered difference in price which does not seem to impact behavior.

Table 5: Piped Water Price: Rural & Urban

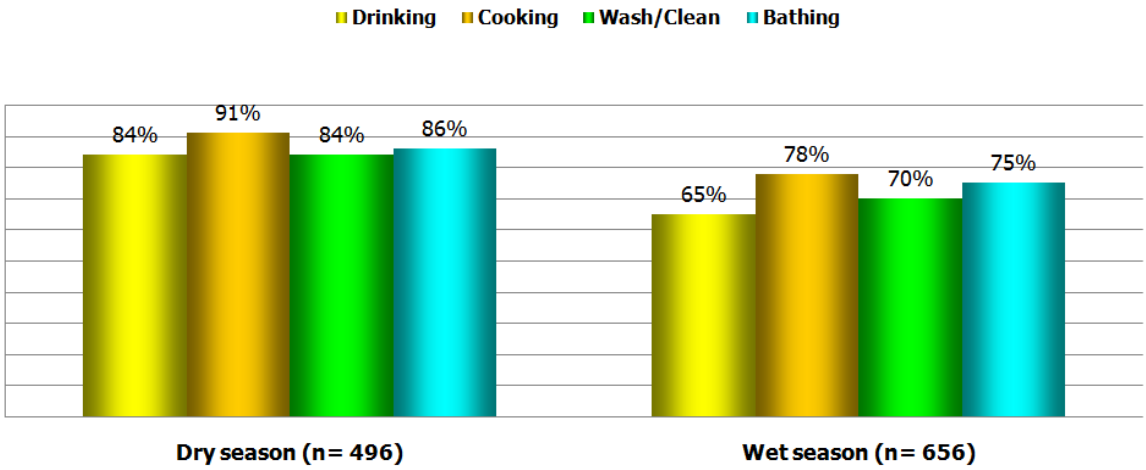
	Average price per m3 (price in Riel)
Urban	**1788 KHR**
Rural	**2047 KHR**

VII. WATER USAGE

1. Usage of piped water for different purposes

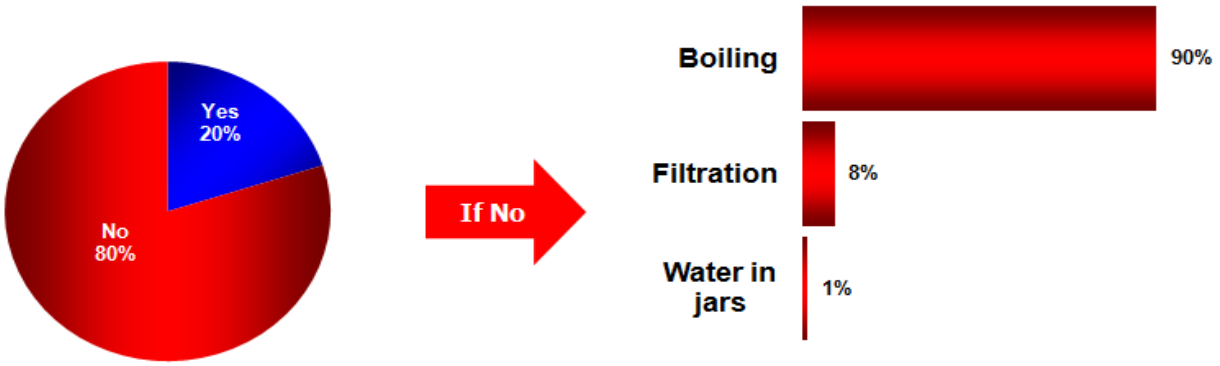
The study shows that piped water is used more frequently in the dry season. Further we can see that piped water is most often used for Cooking. The consumption of piped water used for drinking is reduced significantly during the wet season when drinking water, to a greater extent, is harvested from rain.

Chart 2: Piped Water Consumption: Dry & Wet Season



Use of drinking water directly from the faucet is not common practice. Approximately 80% of the respondents report that they do not take drinking water from the faucet. The majority boil the piped water before drinking while a small number of people use water filter and jars.

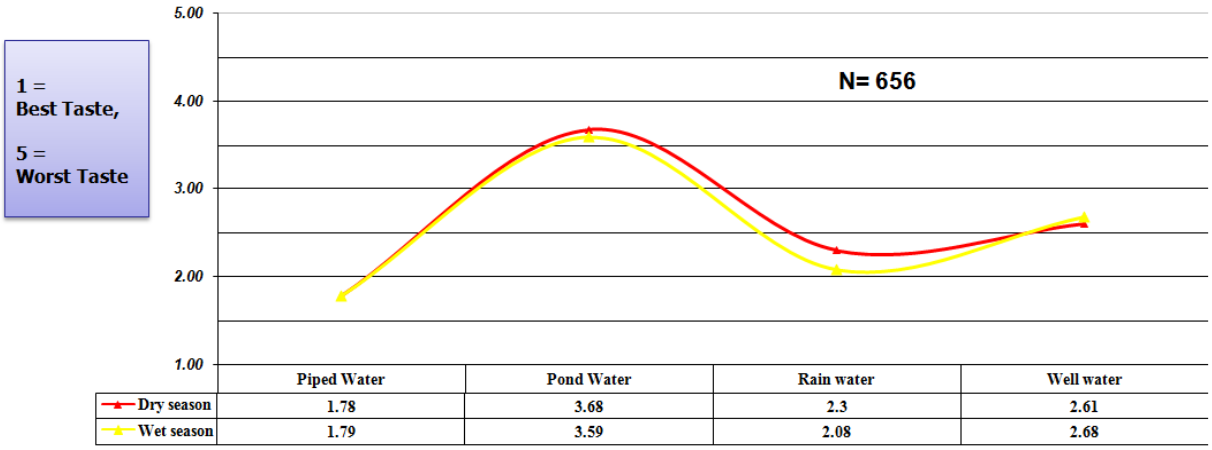
Chart 3: Drinking Water Treatments



VIII. PERCEIVED QUALITY

1. Quality and Sources

Chart 4: Perceived Quality of Taste by Source

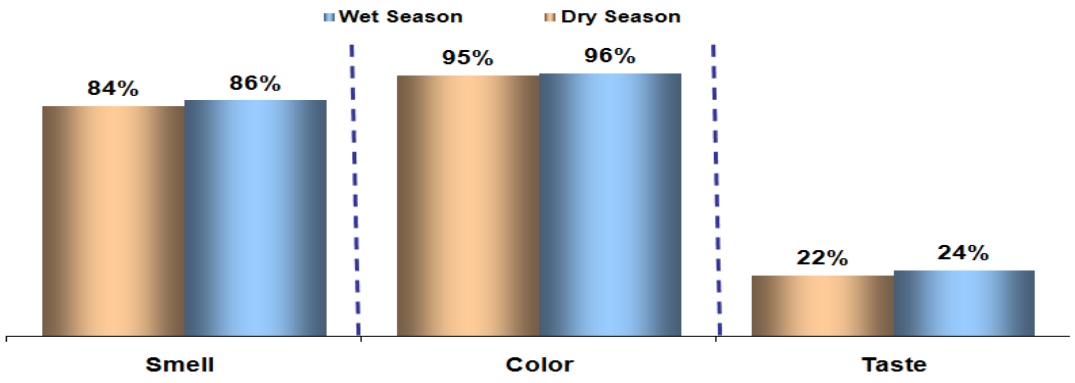


The quality of piped water receives the best scores on taste when compared to other water sources. Rain water also receives high score on quality followed by well water and ultimately pond water that is perceived to be of bad quality by the majority. The same results are registered when the respondents are asked to evaluate the overall quality of the water from different sources.

2. Quality and Seasons

The perceived quality of water with regard to smell, color and taste does not seem to vary much from dry to wet season.

Chart 5: Perceived Quality by Season

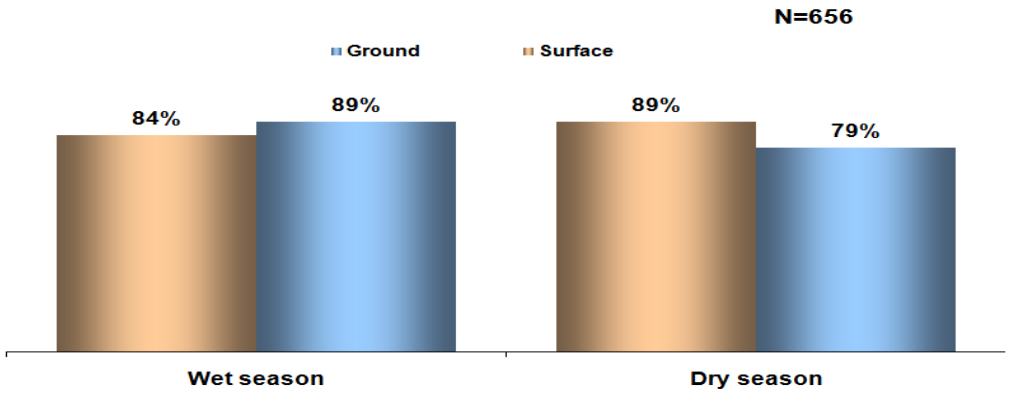


3. "Smell" and "Source" of Piped Water

Most of the households interviewed associate piped water with a smell, mostly chlorine/chemical. While not much difference is found between wet and dry season there is a notable difference when we look at the source of water:

Different Water Service Providers use different sources when they supply households with piped water[7]. Ground water shows significant better scores when the respondents evaluate piped water on smell (respondents are not aware of the source of the water). It could be that ground water does not need as much chemicals as surface water during the dry season- surface water could be exposed to a larger degree of pollution during this season.

Chart 6: Perceived Smell by Source



[7] Ground water is water found under-ground. Surface water is lake, pond, river or stream.

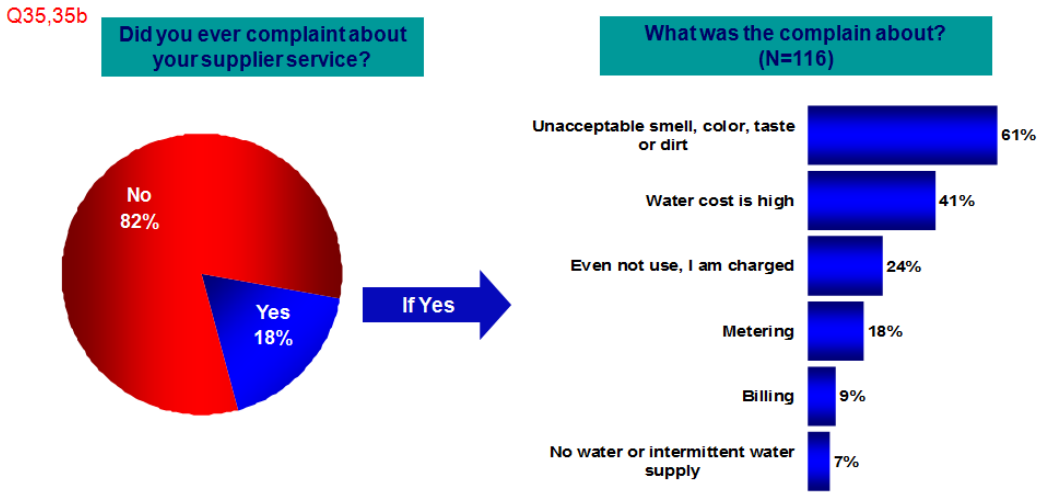
IX. SERVICE DELIVERY FEEDBACK

1. Complaints

82% of the customers interviewed have never complained about the service level of the Water Service Provider.

Those who do complain (18%) do so because of an unacceptable smell, color, taste or dirt. From those who complained, a total of 77% reported satisfaction with the response of the Water Service Provider. Given the low number of complaints and the positive response based on the way by which complaints were handled, we do not see any problems with the service delivery process. Any business will have to expect a certain level of complaints, by looking at the way by which complaints are handled we get a better picture of actual service level. The WSP's seems to be controlling this process to a satisfactorily level.

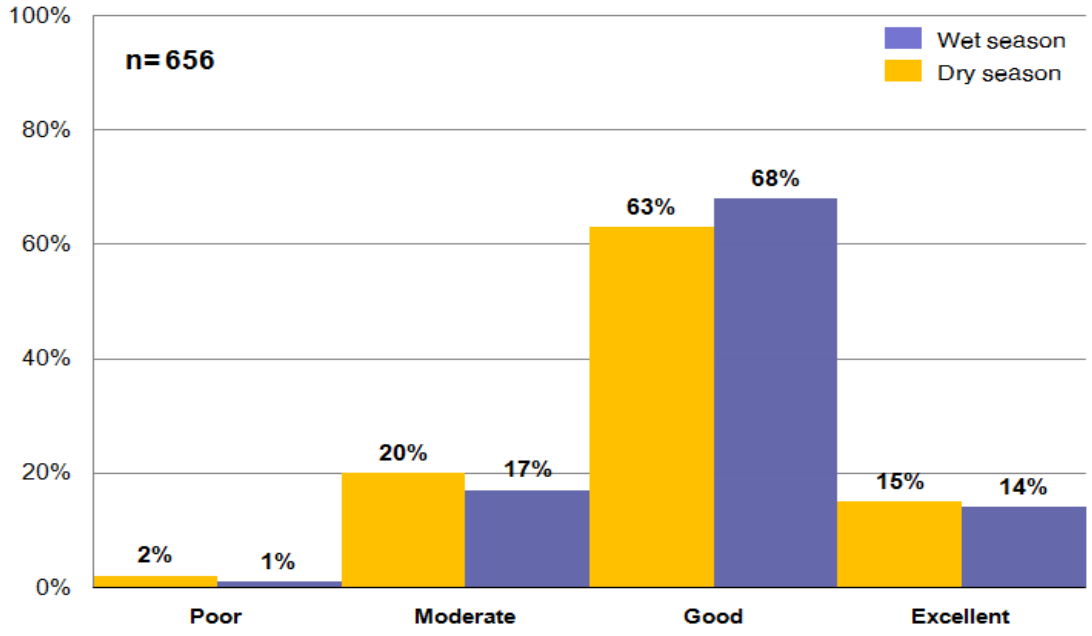
Chart 7: Complaints Reasons



2. Satisfaction with Water Service Provider

Overall satisfaction with Water Service Provider is registered to be high. However, when respondents are asked to evaluate their WSP in the Dry season there is a slight decrease in number of positive responses. This difference could be related to the WSP's ability to perform as the volume of water consumption increases.

Chart 8: Satisfaction by Season



Looking at reported number of "piped water interruptions" we get a feeling of the WSP's ability to deal with off peak and high peak scenarios. In table 9 we see that interruptions happen in dry as well as wet season. In table 10 we see that interruptions happen more frequently in dry season. With the water consumption 2(m3) higher per household in the dry season we propose that this is the primary reason for the registered reduction in satisfaction.

Table 6: : Experienced Interruptions by Season

	Dry season (n=496)	Wet season (n=656)
Yes	48 %	47 %
No	52 %	53 %

Table 7: Frequency of Experienced Interruptions by Season

	Dry season (n=496)	Wet season (n=656)
Few times per week	11 %	4 %
Few times per month	60 %	72 %
Few times per year	29 %	24 %
Average consumption	7.2 m3	5.2 m3

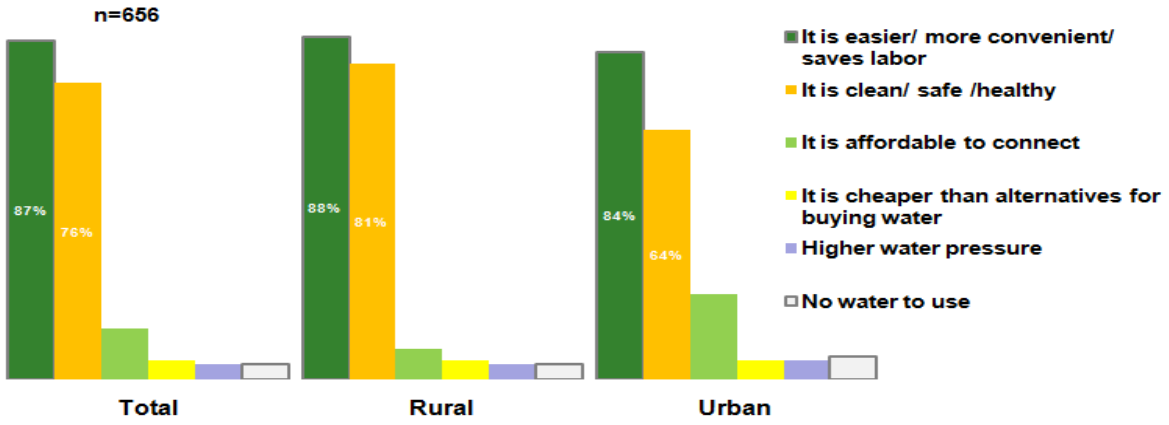
X. HEALTH & SANITATION IMPACT

1. Reasons for Getting a Piped Water Connection

The main reason for purchasing piped water is that of practicality, "it is easier, more convenient and saves labor". "Health and cleanliness" is also registered as a major reason for getting a piped water connection.

While the main decision to buy is the same for both rural and urban, we see there is significant higher percentage of rural respondents that mention clean/safe/healthy. This is probably caused by their level of exposure to health and sanitation awareness campaigns which target the rural population.

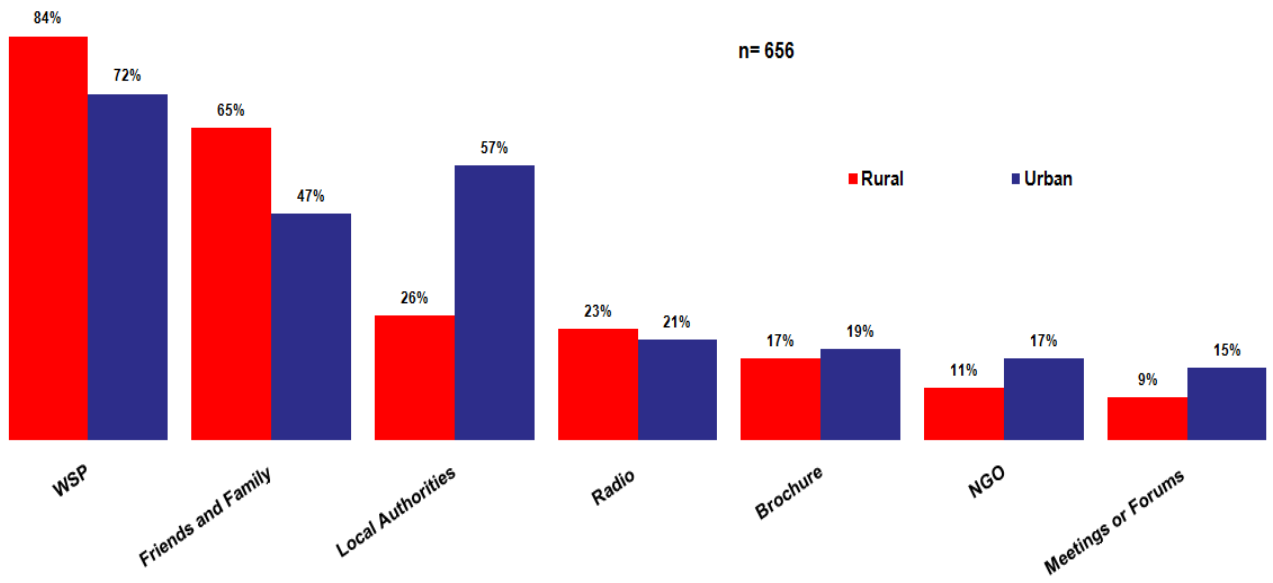
Chart 9: Reasons for Getting a Piped Water Connection: Urban / Rural



2. Piped Water Awareness

The main source of awareness for piped water is the "WSP" (water service provider) followed by "friends and family". Rural areas are registered to be more exposed to these channels while urban areas are more exposed to information from the local authorities.

Chart 10: Piped Water Sources of Awareness

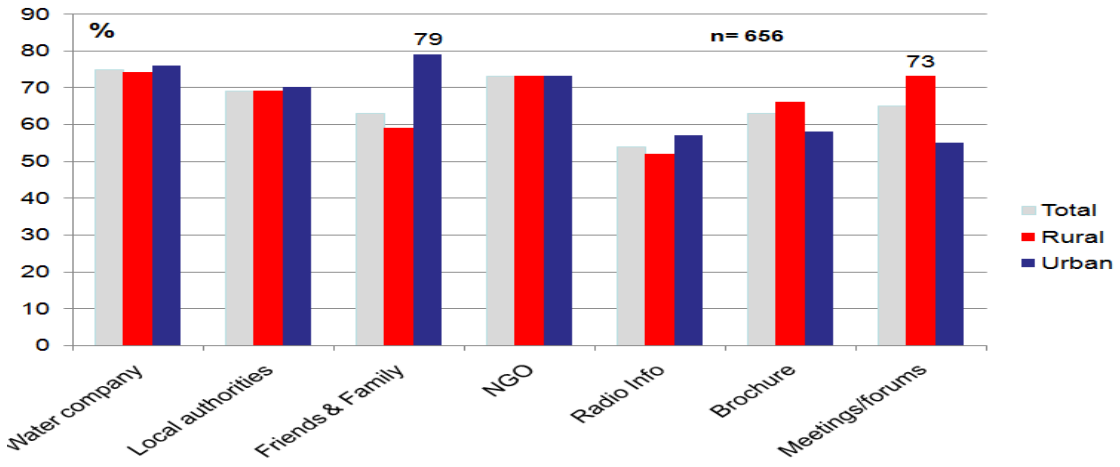


3. Major Influence on Getting Connected

While comparing source of awareness to major influence on decision to get connected, we see that these two factors are not necessarily correlated. In fact, the study shows that the decision to get connected involves on average a greater number of influencers. We believe that the decision is made when a sufficient (unknown) number of channels are working together –the idea of getting connected gets better the more you talk about it! .

"Friends and family" and "Meeting/forums" is where we find that there is a difference between the urban and rural decision making process. While "Meetings and forums" is more common for rural areas "friends and family" seems to be a stronger source of influence for urban areas.

Chart 11: Piped Water Sources of Awareness

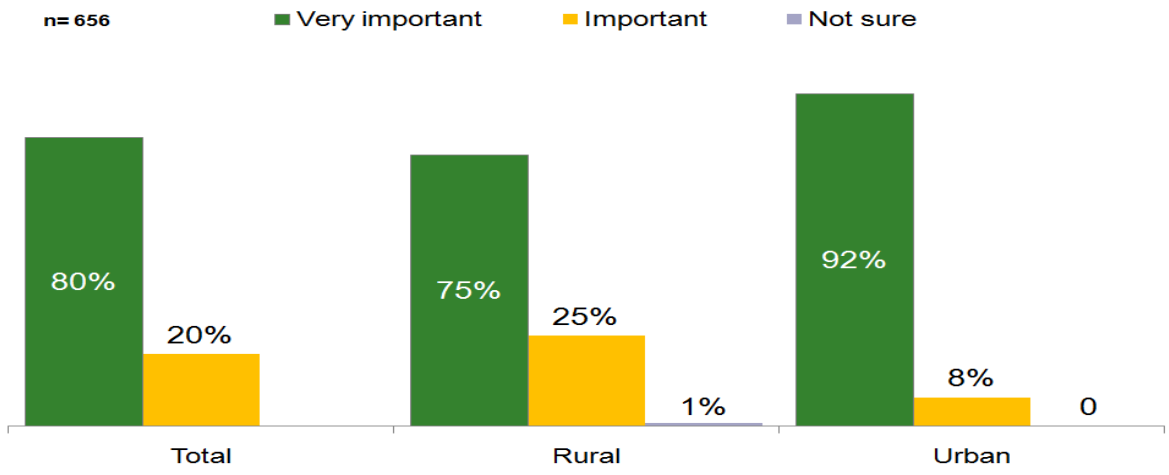


4. Importance of Sanitation

When asked about the importance of sanitation we register a significant difference between urban and rural respondents. For the rural respondents we register only 75% indicating that sanitation is very important for the family's health, this is 17% lower than the response of urban respondents.

These differences could be the result of different social norms where expectations to sanitation are higher in urban settings.

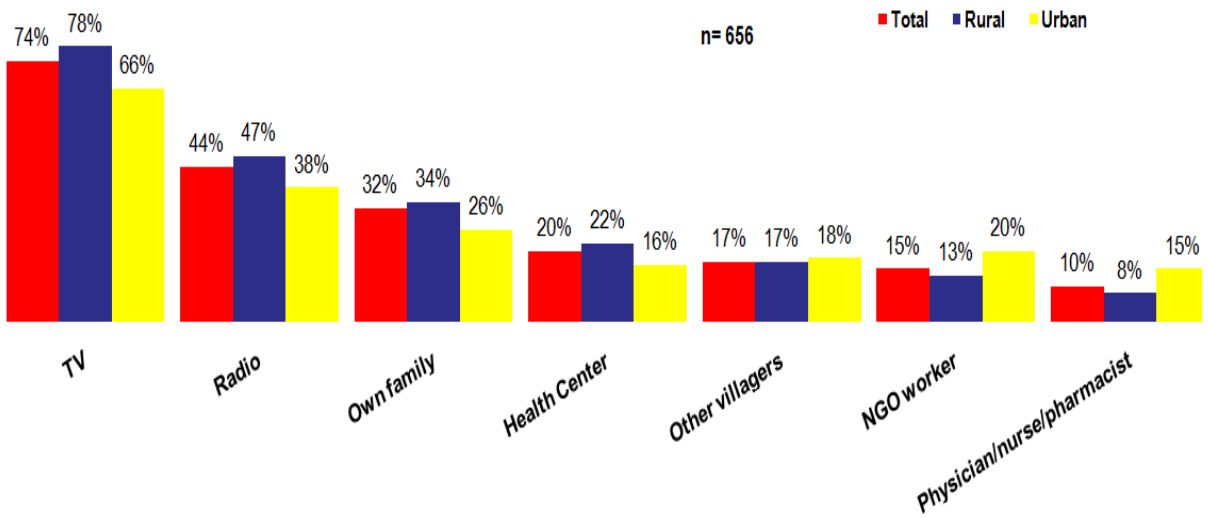
Chart 12: Importance of Sanitation to Family's Health: Rural & Urban



5. Sources for Sanitation Awareness

The most important sources of sanitation awareness are TV and Radio, followed by own family. There is no significant difference between urban and rural responses.

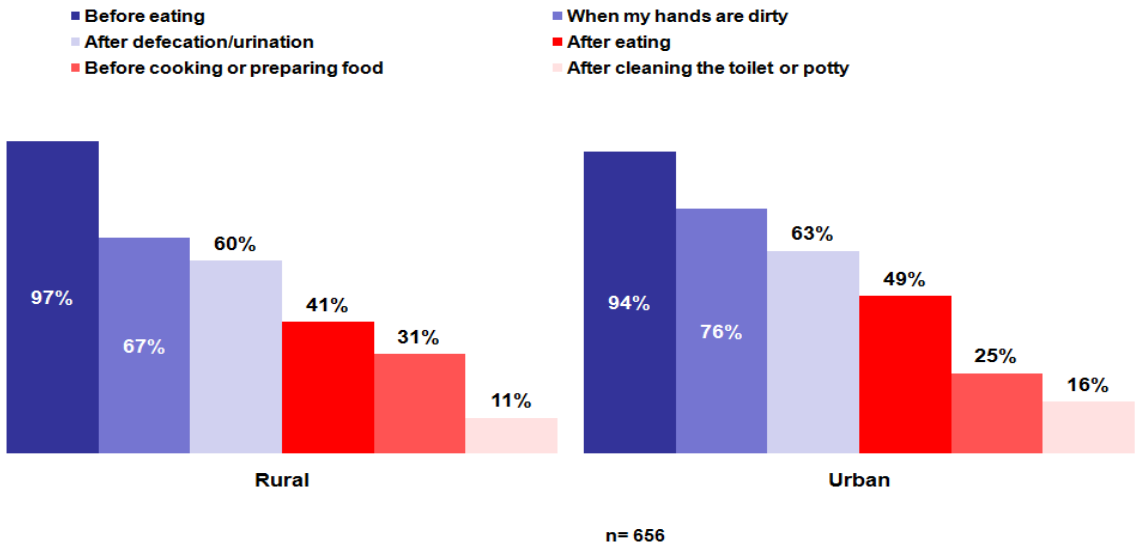
Chart 13: Sources of Sanitation Awareness: Rural & Urban



6. Importance of Hands Wash

Knowledge about hand hygiene is limited. While people perceive it to be important to wash before eating, under half of all respondents consider it important to wash their hands before making food. Only a few perceives it to be important to wash after having cleaned the toilet/potty.

Chart 14: Situations Where Washing Your Hands is Important: Rural & Urban

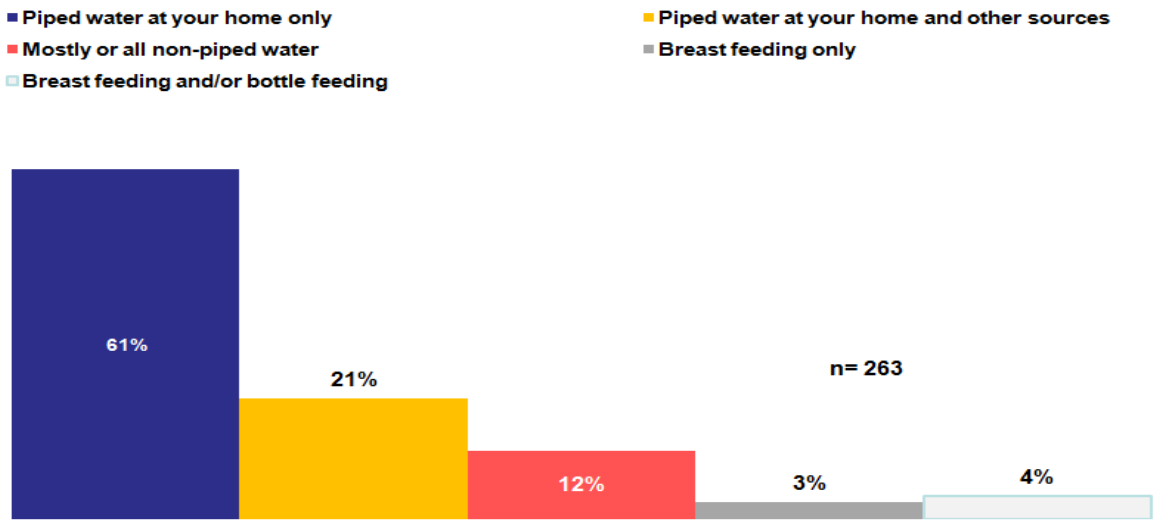


7. Frequency of Children Getting Sick: Diarreah Incidence

From 656 respondents, 263 report having children under 5 years old. Of these 263 parents 27% report having children with diarrhea the last two weeks.

Having identified the primary source of water for children under 5 yrs with diarrhea, we register that the majority actually have been drinking only piped water prior to getting sick. The very same relationship is identified for children with fever indicating a weak correlation between staying healthy and drinking piped water only.

Chart 15: Source of water for children <5 years the week prior to getting sick



The impact on health of having access to piped water appears to be finally quite limited. But some elements have to be taken into account, notably (1) the acquiescence bias of respondents, (2) other sources of potential contamination and (3) the limitation of the sole usage of piped water to impact health related indicators. Comments on those 3 points can be referred to in appendix.

80% of all the respondents boil, or treat the water before drinking it. In the case of those who don't boil the water, but drink it directly from the faucet, we also find the same relationship: incidence of diarrhea is registered to be only 10.5% and primary source of drinking water prior to getting sick was piped water for 63%.

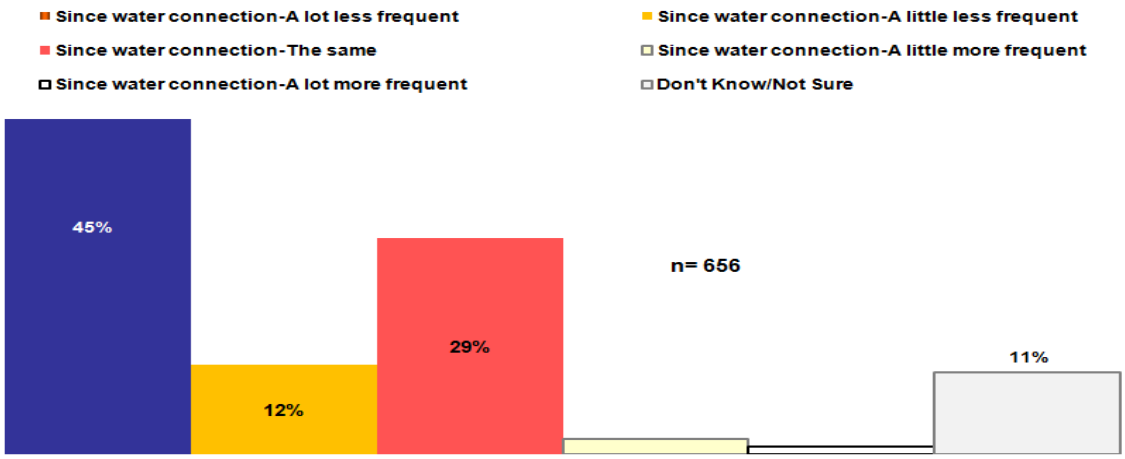
Looking at other factors that may have a larger impact on the spreading of diarrhea, routines for sanitation seems to be a strong candidate. With regard to situations where washing your hands are perceived to be important (11.6), we see that there are some misconceptions to be found:

While close to everyone wash their hands before eating, only 60% wash their hands after having been to the toilet, and no more than 41% (rural, 49% for urban) consider it important to wash their hands before cooking.

It is however interesting to see how perception contradict these results. When respondents are asked to recollect about the incidence level of diarrhea before they got connected, their

response is clearly in favor of water as a source of the disease. The majority (63%) report that they have less medical expenses after having connected their household with piped water.

Chart 16: Frequency of Children <5 Having Diarrhea After Piped Water Connection



XI. WATER SERVICE PROVISION

1. Household connections

Number of household connections is increasing for both clients of MSME and non clients. Household which are clients of MSME are however, registered to have a better development, in terms of number of households, than that of non clients.

Table 8: Households connections, development

	Life- cycle	Min	Median	Mean	Max	Valid N
Client	year 2009	213	735	1,074	3,400	16
Non-client	year 2009	200	715	682	1,500	10
Client	*2010	842	2640	3276	9220	17
Non-client	*2010	250	1521	1584	3650	10

**2010 is based on 6 months of consumption; the next 6 months are estimated.*

However, when looking at the volume sold we register a higher volume (m3) for non clients than for MSME clients. The average volume in 2009 was 62 255 (m3) for clients, and 82 740 (m3) for non clients. In the first half of 2010 we still register the same relationship even though it is observed that clients seem to be slowly closing the gap. With 71855 (m3) sold in the first half of 2010 clients of MSME reduce the gap from 20 486 (m3) to 13 924 (m3). And finally, looking at the projected output for the remaining 6 months of 2010 we see that clients are much more positive than non clients.

2. Profitability

While comparing profitability of 2010 with 2008 (base-line study), we clearly see that things are improving. While average profit per household was USD 0.20 we register an average profit per household of USD 12 in 2010.

While interpreting these numbers there are a couple of things that should be emphasized:

While the volume of sold water for 2010 is based on the household survey, the volume for 2008 is based on information from the Water Service Provider. Furthermore, the volume provided by the Water Service Provider in 2008 represents annual sales while the volume for 2010 is based on the first 6 months.

It should also be noted that there are costs not accounted for in this calculation of profitability: Owners salary, free water, bad debt, transport cost etc.. In addition the process of interviewing and line of questioning leaves room for error. Recall is according to memory, not bookkeeping, and given the complexity of what the respondent is required to remember there will be inaccuracies. There is also the aspect of secrecy around actual figures. For some WSP's showing a high profit level may be associated with the risk of losing financial support.

Profit as a percentage of revenue is calculated to be 46% for 2010. For 2008 profit is registered to just under USD 1. It must be stressed that only 8 of the WSP's qualified for this comparison. Whilst two of these 8 had a significant negative profit in 2008 the low average is influenced by this. 46% is a high profit margin for any business but should be justifiable for this type of business where cost of sales is limited to delivery and administration.

Table 9: Revenue & Profit for 2008 and 2010

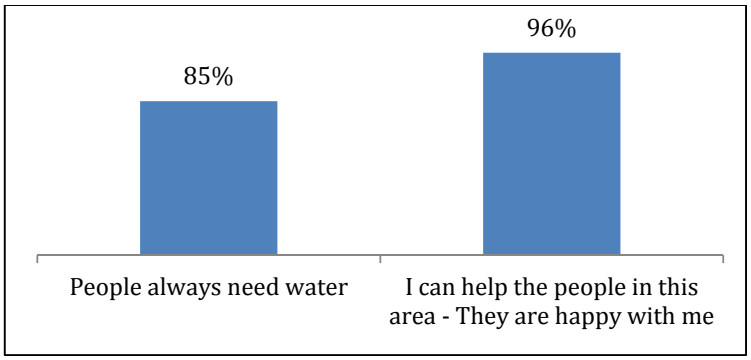
	Revenue in (USD)		Profit in (USD)		Number of households		Profit per house (USD)		Profit margin (%)	
ID	2010	2008	2010	2008	2010	2008	2010	2008	2008	2010
2	35028	21726	27228	12471	800	400	34	31	57.4	77.7
6	64476	14143	28491	-18457	1708	450	17	-41	-130.5	44.2
9	22167	56786	9876	34136	1410	1,018	7	34	60.1	44.6
11	51284	13000	-8510	-58271	3903	2,900	-2	-20	-448.2	-16.6
12	23356	10286	9143	4429	800	382	11	12	43.1	39.1
13	36263	11429	25001	3574	1200	670	21	5	31.3	68.9
14	90656	41333	53572	17883	2550	1,500	21	12	43.3	59.1
16	66912	24333	33338	5900	2168	1,007	15	6	24.2	49.8
Mean	*48768*	*24129*	*22267*	*208*	*1817*	*1041*	12	0.2	0.9	45.7

3. Future Expansion of the Water Business

Water Service Providers are happy with their business. The two main reasons mentioned for, why they believe in their business, are "people always need water", and "I can help people in this area, they are happy with me". So the "job" provides more than just an attractive business opportunity – it provides security (long term) and it also provides status in form of playing a role that is perceived to be of importance.

These are important motivating factors for staying in the business.

Chart 17: Motivations Factors for Staying in the Piped Water Business



Apart from this, there is also the economic incentive. With an average profit margin of 46% it is not surprising to see that 25 out of 27 water service providers are planning to expand their business in the future.

Table 10: Will for Future Expansion

Future expansion	
	Count
Yes	25
No	2
total	27

On average a water service provider is connected to 1297 households (per. July 2010). The average potential in each WSP's respective coverage area is 7075 households, meaning to say that average penetration is 18%.

4. Investment

The investment profit ratio shows a lot of variation. One would expect that investment would be higher in the initial phases of development; however, the data does not support such expectations. Looking at the number of years the business has been operation we see that some of the older operations have very high investments over the last 3 years.

The Water Service Providers with the highest investment are not the ones with the highest number of households. Neither are they the ones with the highest volume of sales. Given the large variation and inconsistency in the Investment profit ratio, it is not advisable to use this information as a basis for in depth analysis of financial performance.

Table 11: Investment / Years of Operations

ID	Profit 10	*Invest.	* I/p ratio	*yrs. Op	Empl. 08	Empl. 10
2	27228	383460	8.3	3	3	5
6	28491	578400	11.9	7	6	15
9	9876	30469	1.8	16	8	12
11	-8510	14370	-1.0	4	12	11
12	9143	13625	0.9	10	0	2
13	25001	39600	0.9	3	13	27
14	53572	51000	0.6	4	16	20
16	33338	17025	0.3	2	7	7
Mean	18864	140994	3.7	6	8	12

**invest.= investment since 2008, * I/p ratio= investment profit ratio using profit for 6 first months of 2010 x2.*
**yrs. Op= number of years since operation started.*

5. Water Quality & Complaints

No water service provider is registered to rate the standard of his water as above standard. 25 of 27 WSPs rate the quality of the water they deliver as standard. 2 WSPs rate the quality as below the standard while none rates the quality as above standard.

The 2 service providers that rate the quality of their water to be below the standard are non clients of MSME.

Table 12: Standard Levels of Quality

Water quality	Count
Below standard	2 (non clients of MSME)
Standard	25
Over standard	0
Total	27

When we refer to ''standard'', we do not imply any specific standard or accreditation certifying the quality of the water but rather an overall perception of quality that WSPs have of their own water. In other words, ''standard'' refers here to a quality that is generally reached by other providers, generally expected by consumers. A respondent saying that the water provided is below standard implies that he / she perceives that his / her water offers less quality than other providers. When the majority of the WSPs claim that their water is ''standard'', they imply that the quality of the water they provide is not different (worse or better) from other providers. This standard as a perception has therefore nothing to do with – for example – the quality checks operated by authorities that 100% of MSMEs clients say they comply to (against 90% of non clients).

Comparing the results with the 2008 survey (base-line) we see that 20 % of the WSP's interviewed reported that they perceived the quality of the water they delivered to be below standard. In contrast we register only 5% in 2010 indicating an improvement of the quality of water delivered.

That no water service providers perceive the water delivered to be above standard could indicate that the importance of the quality of water delivered is perceived to be low. An

alternative way of looking at this would be that the quality of water don't live up to the standard of the WSP's, or it could be that the WSP is modest and does not want to use the premium classification while referring to water delivered. In any case, focus on the quality of water as a way of differentiating your product would probably result in both satisfied customers and a better business performance. This is something that should be encouraged at an early stage of development while the company is setting up the foundation of his future business.

When asked about the frequency of complaints we observe that clients of MSME report a higher frequency of complaints than non clients.

Table 13: Water Service Provider's Report of Complaints Received

Complaints	Count	Non clients	Clients
Sometimes	14	7	7
Often	4		4
Never	9	3	6
Total	27	10	17

Comparing the results with the 2008 survey (base-line) we see that 46% of the WSP's reported receiving complaints. For 2010 we register 67% of the WSP's receiving complaints, indicating an increase in number of complaints by 21%[8].

6. Number of Employees

Comparing the number of employees we observe that there is on average an increment of 4 from 2008 to 2010. The average for all 27 WSP's is 11 while it is 14 for MSME clients (n=17).

The higher number of employees for MSME clients can be seen as possible contributing factor to profitability. The assumption of such an analysis is that there is a certain amount of work that would need the attention of a minimum amount of people, when this factor is not present this might impact the company's ability of efficient service delivery, which ultimately may result in a reduced financial performance.

A positive development of number of employees is a good indicator of a healthy business. The amount of people the company employs also has direct and indirect impact on the society in which it operates. People take home a salary and they will use this salary for buying food, tools and other necessities. The people that own the businesses they use benefit from this behavior. In this way we may say that the induced impact of employment is beneficial to the society as a whole. Ultimately, it will have a positive impact on the business itself that will benefit from a stronger purchasing power in its local environment.

[8] We must stress the fact that we are basing this comparison on very small sample sizes. A total of 35 WSP's were interviewed in 2008 while 27 WSP's were interviewed in 2010. We are dealing with the individual service provider's estimation of how often he receives complaints, this may be influenced by many unknown factors such as; perceived importance of question, level of stress while interviewed, differences in mnemonic capabilities, seasonal factors and generalizing based on recent trends that does not necessarily reflect the real picture.

Table 14: Number of Employees 2008 & 2010

ID	P.margin 10	*yrs. Op	Empl. 08	Empl. 10
2	77.7	3	3	5
6	44.2	7	6	15
9	44.6	16	8	12
11	-16.6	4	12	11
12	39.1	10	0	2
13	68.9	3	13	27
14	59.1	4	16	20
16	49.8	2	7	7
Mean	*45.9*	6	8	12

**years of operation*

The relationship between service delivery and financial performance is important to understand. The WSP is providing a service and his performance will be evaluated based on how well he performs. It would be beneficial to educate WSP's about specific elements related to that of marketing a service product. Focus should be on providing the best possible experience; word of mouth will come as a result of this. If the service level is poor, the word of mouth will be poor too. If the level of service is good, this will have a positive effect on how customers contribute to the projection of a positive company image.

XII. REACHING POOR HOUSEHOLDS

This section results from the PAT (Poverty Assessment Tool) analysis tool conducted by the MSME Project on the basis of IRL water survey[9].

The PAT is used to verify that USAID meets the target that half of all USAID microenterprise funds benefit the very poor. The PAT consists of a short, country-specific household survey—administered in twenty minutes or less—and a data entry template. Using such a tool, an implementing partner can gain an accurate estimate of the share of its beneficiaries who are very poor[10].

The PAT questionnaire in Cambodia includes 15 questions on households incomes, expenditures, owned durables, and so on, that enable to assert poverty indicators. Indicators for each country-specific USAID Poverty Assessment Tool (PAT) are selected from large sets of indicators found in national poverty assessment surveys. These surveys are administered on a nationally representative sample of a country's population, and the data collected from them reflects how the majority of a country's population would answer specific questions. Analysis could be conducted on how the majority of the population of a specific region of a country would answer a question, but the PATs were constructed using only nationally representative data.

[9] The methodology of the Household survey was not based on a fully random sampling technique. Lists with members were provided by the MSME Project. The lists were provided by 6 different locations and the first 100 (+) were selected. This method resulted in a reduction of dispersion of the sample selected leading to a split between rural and urban that was skewed in favor of the urban population. With a random sample the rural representation would have been better and the survey results would have had better indications of the project's ability to reach the poor and the very poor.

[10] http://www.povertytools.org, consulted 11/08/25.

The purpose of using national data instead of regional data is to achieve the goal of creating one tool per country which assesses poverty in a standard way throughout the entire country. Indicators were selected by running a statistical program that selected the top fifteen indicators out of the entire pool of indicators from a national poverty assessment survey that correlated with a poverty level that defines a household as "very poor." The key objective of each tool is to differentiate the "very poor" from the "not very poor." This is how the 15 questions were chosen for the Cambodia survey[11].

''Poor'' and ''very poor'' categories are defined by two different poverty lines:

1. Cambodia PAT measures poverty by estimating the percentage of a client population who are "very poor" that is, the percentage who fall below the international extreme poverty line (PPP$1.25/day). Using simple questions and accurate models, the USAID PATs categorize client households as ""very poor"" or "not very poor""—in other words, as being above and below the extreme poverty line—based on a short client surveys and an accompanying data entry program.

2. In addition, the program ran by MSME also allows the percentage below the international poverty line of $2.50 per day per capita: this is the percentage that are considered "poor."

With a total of 656 households interviewed 18% of the respondents were poor or very poor. For comparison, looking at the benchmark "sanitation" we can see that the water survey has about half of the poor. The non random procedure will have had an impact on this since urban population was overrepresented as a result, and therefore limiting the actual representation of ''poor'' and ''very poor'' reached by the project.

Table 15: Households Types Surveyed[12]

	Sample size	% poor	% very poor
Water	656	16.6%	1.4%
Sanitation	491	35.8%	3.7%

[11] We are grateful to Shannon Sarbo, Business Acquisition Manager at DAI, for her assistance in providing references and a background on the PAT.

[12] Thanks to Shannon Sarbo for providing us the data.

APPENDIX:
NOTES ON PIPE WATER & ITS LIMITED IMPACT ON HEALTH

Acquiescence Bias

Ways of appreciating and responding to questions and moreover surveys show variations across different countries and cultures. In Asia, and in particular in Cambodia, acquiescence bias is fairly common. In other words, the respondents have a tendency to agree with all the questions or to indicate a positive connotation. In addition to this, quantitative studies can just offer a reflection on what are respondents saying, never on what is actually really happening or being done, which can be documented only through observational studies.

In our case here, we can suspect that parents, when asked if they gave to their children piped water only, and in particular prior to the child sickness, chances are high that they would claim giving the ''right'' water rather than ''admitting'' that indeed, water from the pond was used as the main source of drinking.

This therefore brings limitation to some of this health assessment: pipe water may have had indeed a better result on health but households may have over-reported the sole usage of piped water compared to reality.

Other Sources of Contamination

In Cambodia, households generally use a variety of water sources, depending on access, availability, convenience, cost, and perceived quality. As piped water is therefore rarely the only source for drinking water, the problem may come from other contaminated and unsafe sources. Despite the fact that Cambodia has many water resources – surface water, ground water and rain water – most land-based water resources suffer from pollution due to human activities. The water bodies near cities or populated areas are usually more polluted than the remote water bodies due to excessive discharge of pollutants generated by humans[13].

But it may also come from many different issues: the consumption of contaminated ailments, limited sanitation practices such as washing hands before eating but not before cooking. Water is therefore obviously essential for hydration and for food production, but sanitation is an equally important, and complementary, use of water. With rural sanitation coverage of just 8%, the absence of sanitation facilities leads most rural dwellers to use rice paddies, banana groves, and other water sources to dispose of their own waste – thus polluting the water on which they depend. Other studies have shown that the simple practice of washing hands with soap can reduce diarrheal diseases by over 40%[14].

Still, considering not only Cambodia's water resource potential, but also its under-development for household use, pipe water distribution is a key contributing factor to the overall safe water access. Many areas in the central plains and plateaus still lack water in dry season and are therefore dependent on unreliable rainfall patterns.

[13] WSP 2008 "Economic Impacts of Sanitation in Cambodia", WSP-EAP
[14] www.drinking-water.org, accessed January 2011 ; National Census 2008.

Sole Usage of Pipe Water vs WASH Interventions

While it is recognized that access to sage water is indeed a key to a better health and the reduction of diarrhea diseases, this cannot be considered as the only indicator. WASH interventions such as those developed by USAID emphasized the combination of adequate water supplies, sanitation and good hygiene as essential to tackle down those diseases[15].

In a report assessing the failures of children mortality of diarrhea, the WHO also emphasize that while improving unsanitary environments alone – including an improved access to safe water – is not enough if children ''remain susceptible to the disease and are not effectively treated once it begins'', showing that children with poor health and nutritional status are more vulnerable to acute diarrhea[16].

In order to reduce the burden of childhood diarrhea, WHO is therefore recommending a 7-point strategy for comprehensive diarrhea control, including a treatment package to reduce child deaths, and a prevention package to reduce the number of diarrhea cases in the future. Improved water supply is just one of the 5-point prevention packages showing the limitations of delivering safe water only.

Treatment and prevention packages should be inclusive of all the following elements:

Treatment package		**Prevention package**	
1	Fluid replacement to prevent dehydration	3	Rotavirus and measles vaccinations
2	Zinc treatment	4	Promotion of early and exclusive breastfeeding and vitamin A supplementation
		5	Promotion of hand washing with soap
		6	Improved water supply quantity and quality, including treatment and safe storage of household water
		7	Community wide sanitation promotion

[15] http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/sectors/mods/docs/ofda_wash_sector_update.pdf, accessed August 2011.
[16] ''Diarrhea: why children are still dying and what can be done'', WHO Report 2009, http://whqlibdoc.who.int/publications/2009/9789241598415_eng.pdf, accessed August 2011.