

37th WEDC International Conference, Hanoi, Vietnam, 2014

**SUSTAINABLE WATER AND SANITATION SERVICES
FOR ALL IN A FAST CHANGING WORLD**

Assessing household RWS functionality service levels: lessons from the field

S. Barakzai & A. Kome, Nepal

BRIEFING PAPER 1915

Many different academic and theoretical definitions of rural water supply (RWS) functionality have been developed over the years, but the issue of sustainable services has once again come to the fore as countries claim to have met their MDG targets, yet the corresponding health and economic benefits have not progressed commensurately.

SNV (Netherlands Development Organisation) began its functionality of rural water supply (FRWS) programme in Asia in 2007. In 2011 we switched from measurement of water scheme functionality levels to measuring household (HH) service levels, and the results of the 2011 baseline surveys conducted in Laos and Cambodia in 2013 are the basis for this paper. The paper focuses on practical lessons learnt related to the selected data collection methodologies for monitoring and evaluation of quality, quantity, accessibility and reliability (QQAR) of RWS programmes to assess functionality levels of service of HHs.

On track to achieve the rural water supply MDGs?

The MDGs provided the motivation for significant improvements to be made in rural water supply coverage in many countries however the issue of use of safe, reliable RWS as opposed to just coverage remains. International data on functionality levels is incomplete, and often uses differing definitions of functionality predominantly assessing scheme service levels, rather than HH functionality. Even with this incomplete data only 20-40% of coverage is estimated as actually providing users with safe, reliable water services (Improve International 2013).

Using the JMP Improved/ Unimproved classifications as a proxy to assess service levels fails to capture the full scope of functionality issues and various studies have attempted to identify the critical factors affecting RWS services and to define criteria for *basic levels of service*. As part of the WASHcost programme four indicators Quality, Quantity, Accessibility and Reliability (QQAR) and a generic matrix for assessing the service level of RWS schemes was developed (Moriarty et al 2011).

SNV Asia started their Functionality of Rural Water Supply (FRWS) programme in 2009, investigating the various service delivery models. The review found a predominance of government or donor construction supplies ostensibly handed over to communities for operation and maintenance, but in reality for all future management with little ongoing support to maintain functionality levels. Self-supply was seen to be widespread in a number of countries, but very little data on the coverage from self-supply or the key functionality issues of self-supplied RWS is available.

Defining household RWS functionality service levels

SNV's approach aims to identify inequalities in service provision, thus impacts are defined as improvements at HH level, whilst outcomes relate to increased capacity of service providers. Thus improved household levels of service inform our FRWS impact indicators whilst increased RWS service levels, due to improved capacity of service providers, inform our outcome indicators

In 2010 SNV adapted the service level matrix using the four QQAR indicators to calculate an Overall Level of Service (LoS) for each household. The *basic*, or *benchmark*, LoS was set at the national standard of the programme country, for example minimum distance to supplies or minimum water quantity per person

per day. Where national standards do not exist or were not practicable, reference to national or international standards was made. For example, in Nepal, though water quality standards exist, they are not yet enforced by government and there are pragmatic limitations on applying them. Therefore it was agreed that *Quality* would be assessed based on the JMP classification of the RWS; as a proxy for water safety; coupled with the HHs perception of the water quality.

Table 1 below is the resulting LoS matrix for the SNV Nepal FRWS programme. Explanation of the factors influencing the selected limits is provided below.

Table 1. SNV FRWS service level matrix for Nepal							
Service level	Quality		Quantity (l/p/d)	Accessibility (mins/ p/d)		Reliability (months/yr)	Overall LoS
High	HH perception of quality	Improved RWS	>100	<30mins	Within HH compound	12	The lowest score of each HH's four individual indicators
Intermediate			50-100		<100m	10-11	
Basic (as national standards)			20-49		100-1000m	8-9	
Substandard		Unimproved RWS	5-20	31-60 mins	>1000m	5-7	
No service			≤5	>60 mins		0-4	

Accounting for multiple and seasonal household supplies

Many of the rural communities where SNV operates use more than one supply around the year. Therefore it was important to consider the service level of all supplies, particularly where water quality between seasons was expected to vary greatly. All three FRWS programme countries asked HHs about their main three supplies, providing space to record this information where relevant.

The survey tool asked about at least two seasons in all countries. Cambodians also recognise a third 'very dry' season, but to avoid an overload of data which could not be sensibly analysed only 'wet' and 'dry' season data was collected. Although some country programmes initially felt that this combined with collecting data from multiple water supplies would lead to an excess of data, in fact we found that seasonality had the greatest effect on service levels in Cambodia, followed by Laos and then Nepal.

The service level which each of the supplies provides the HH is calculated. For simplicity of comparing LoS of HHs, the average of the service levels for each supply for all seasons is then averaged for each of the QQR indicators, and the lowest of the resulting QQR scores gives a single HH Overall LoS.

Assessing household RWS functionality service levels in the field

The main challenge was how to assess service levels in the field, for the baselines and future progress monitoring. Decision trees for each of the QQR indicators were developed, which enabled users to identify the correct LoS depending on the responses provided by each HH (Figure 1).

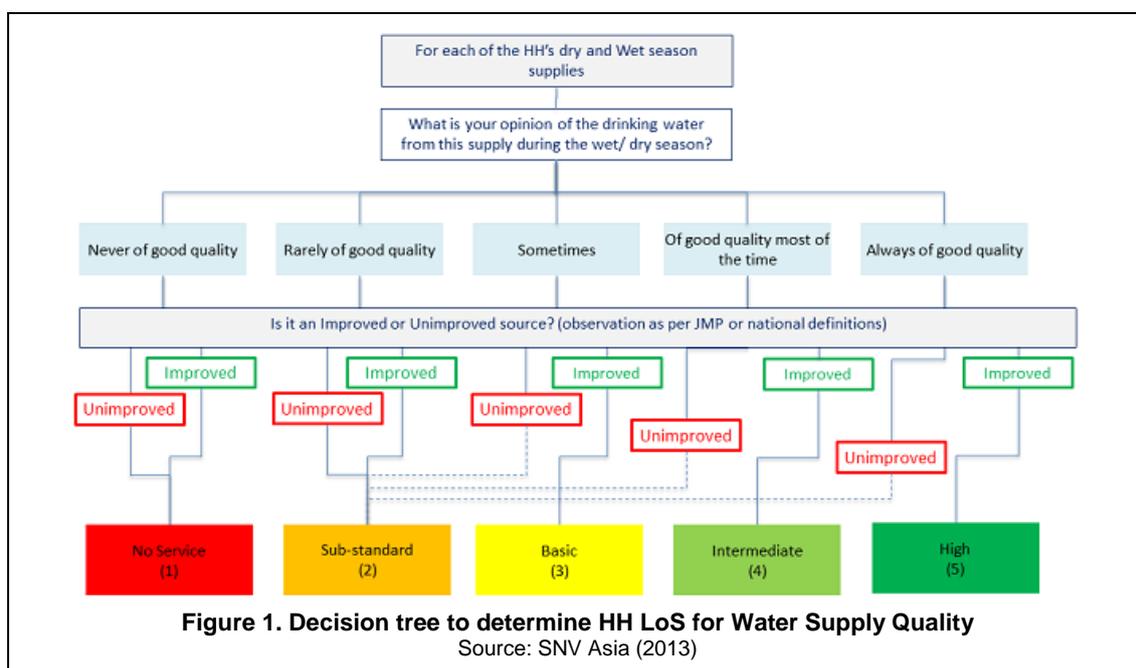
Understanding the logic behind each service level enabled SNV to secure the agreement of the finalised matrix limits with partner staff, but local level partners found it challenging to understand. Although it would be ideal if all enumerators fully understood the logic behind the matrix in practice, when coupled with SNV's preference for participatory monitoring, involving local government and community partners; this was not found to be possible. Thus a further simplification was required for data collection in the field. SNV Laos' baseline, conducted in the summer of 2013, was the first to apply the HH survey methodology, where only responses to the subquestions from the 'decision tree' questions are recorded, and the actual LoS is calculated only as part of the data processing phase.

Lessons learnt from the Laos survey tool design, testing and final implementation were shared with the other FRWS Asia programmes. SNV Cambodia adapted the survey tool for their context and incorporated the Laos lessons learnt in their own baseline conducted in September 2013. SNV Nepal is the currently applying a further variation of the HH survey tool, again adjusted for country context, and building on the lessons from the previous two baseline experiences.

Therefore, by applying a multi-country approach to the FRWS programme, SNV Asia has been able to share the learning between countries which in turn are able to contribute to the design of a harmonised programme, benefiting from testing and proving the methodology in a variety of contexts.

Measuring household RWS quality level of service

As noted above, although in each of these countries some form of national standard for drinking water quality exists, in all three cases actual implementation of water quality monitoring is not regularly carried out for rural supplies. In Laos and Cambodia some implementing agencies test water during drilling to verify aquifer quality, but regular testing is absent after construction and systems for lab or field testing are often not institutionalised. Furthermore we recognise that rural HHs often favour supplies which would be considered ‘unsafe’ by WASH professionals and failure to capture this preference would reduce our ability to design appropriate programme interventions. The *Quality* decision tree therefore prevents supplies which are Unimproved or perceived by HHs as “rarely of good quality” to achieve the *basic* LoS.



Hence the chosen method of assessing the *Quality* LoS used a combination of HH perception and JMP ‘classification’. The survey tool asks the enumerator to identify the water source as surface, ground or rain water with additional options for bottled or tankered water where applicable to the country situation. It is essential to take photographs of each supply for triangulation and verification as enumerators are often not able to identify when a supply is protected or unprotected, which prevents them from determining the JMP Improved/ Unimproved classification. In some cases where water was pumped enumerators mistakenly identified this as a piped supply, although it came from a borehole or river. The inclusion of an extra water supply question coupled with the photo enabled us to cross-check and correct erroneous enumerator entries.

Measuring household RWS quantity level of service

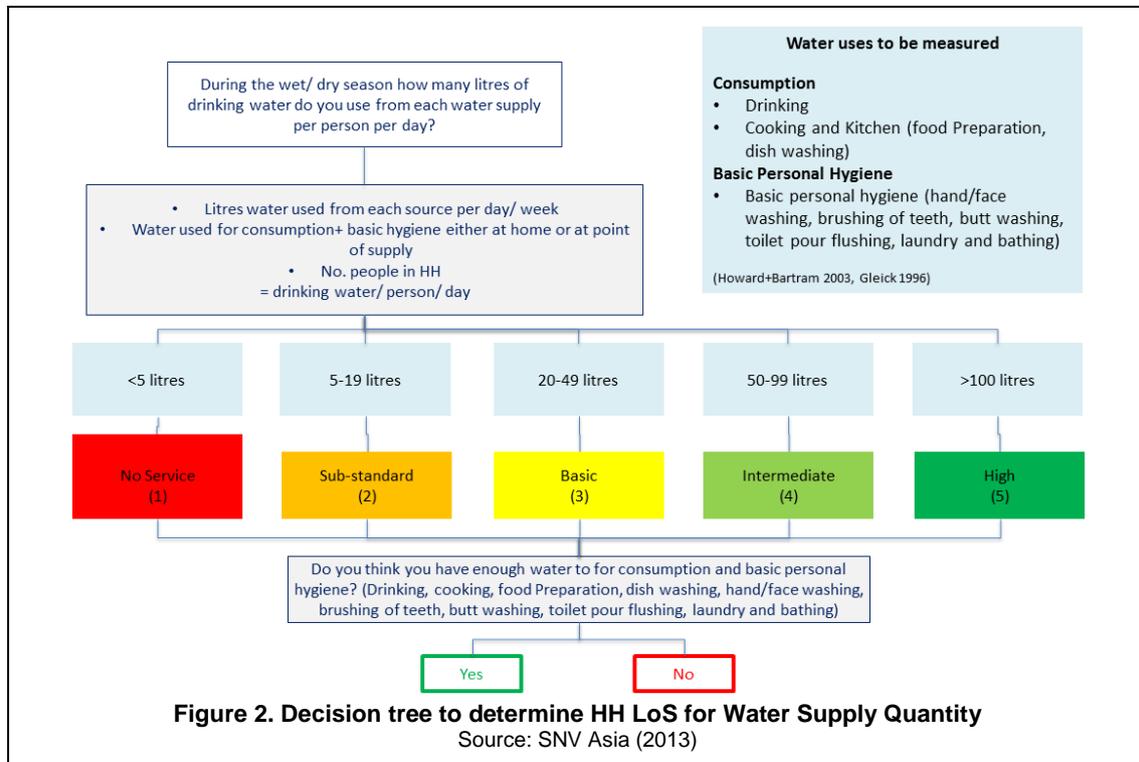
Most countries have national guidelines stating minimum daily water consumption, but we found that the water uses included under the minimum volume are often poorly defined and the documents not legally binding. For example in Lao PDR a Nam Saat version of Jordan’s Handbook of Gravity Flow Water Systems refers to a minimum of 45 litres/p/d, but the handbook’s status is unclear and it is over 20 years old.

Therefore, literature on domestic water needs and uses were reviewed including Howard and Bartram’s 2003 publication Domestic Water Quantity, Service Level and Health, which suggested *basic/ intermediate* access at 20-50 litres per person per day, and clearly defined ‘drinking water’ as for consumption and personal hygiene. After discussions between the three country teams, thresholds for the ranges of quantity LoS were agreed as shown in Table 1 and Figure 2.

Two main challenges arise when trying to determine the quantity of water used by the HH. The first is the issue of recollection, since respondents are asked to remember the amount of water used at different times

of year. The second is framing the question which reflects the way that HHs assess water quantity, be it in litres, buckets, bottles or other unit of measurement.

To address the first issue the survey tool asked some lead in questions to remind the interviewee about the varying service levels they get from each supply in different seasons. Specifically we asked whether there is water available from each supply in each season, if the HH uses water from each supply in all seasons and their perception of water quality in each season.



For the second aspect, different measurement options were considered. The selected method was to issue enumerators with a bucket of known volume. A practical exercise during enumerator training established the capacity of the bucket. The bucket is then to be used in the field to assess the capacity of HH water containers, filling either from the container to the bucket or vice versa. This method was tested initially for the Laos baseline and then Cambodia and will probably be used in Nepal.

To guide interviewees, separate questions are asked about the quantity consumed for each of the defined drinking water uses. The option is provided for enumerators to record whether the respondent is estimating their own use; e.g. for drinking and personal hygiene; or for the whole HH; for cooking or laundry. Guidance was also provided for estimating volume where HHs use water at the point of collection, for example at the river or tapstand.

Ultimately the quantity per person per day for all the ‘drinking water’ uses is calculated for the entire HH and recalculated into volume per person per day during the data processing phase.

Measuring household RWS accessibility level of service

Many countries already have defined the maximum distances or times they expect their population to have to go to get water. This is often reflected in their Multiple Indicator Cluster Surveys or Demographic Health Survey tools. The decision tree applies a combination of time and distance to account for topography, transportation and physical capacity of the water collector.

Enumerators asked how many trips are made each day or each week to each supply. The time to go, wait, fill and return from each water supply to the house was recorded and used to estimate the time spent collecting water per HH member. The survey tool then asks for the respondent to point out the supply and an assessment of the distance from the house is made by the enumerator.

The *Accessibility* decision tree therefore prevents supplies which are more than 1km away or where more than 30mins/p/d is spent collecting water to achieve the *basic LoS*. The raw distance and time data are used to assess the *Accessibility LoS* in the data processing phase.

Measuring household RWS reliability level of service

Although the WASHCost matrix suggested options of hours/ day or months/ year, for the rural context in our country programmes we found it difficult to define an assessment system which could cater for both options, and thus only used months/year which was felt to be the most appropriate.

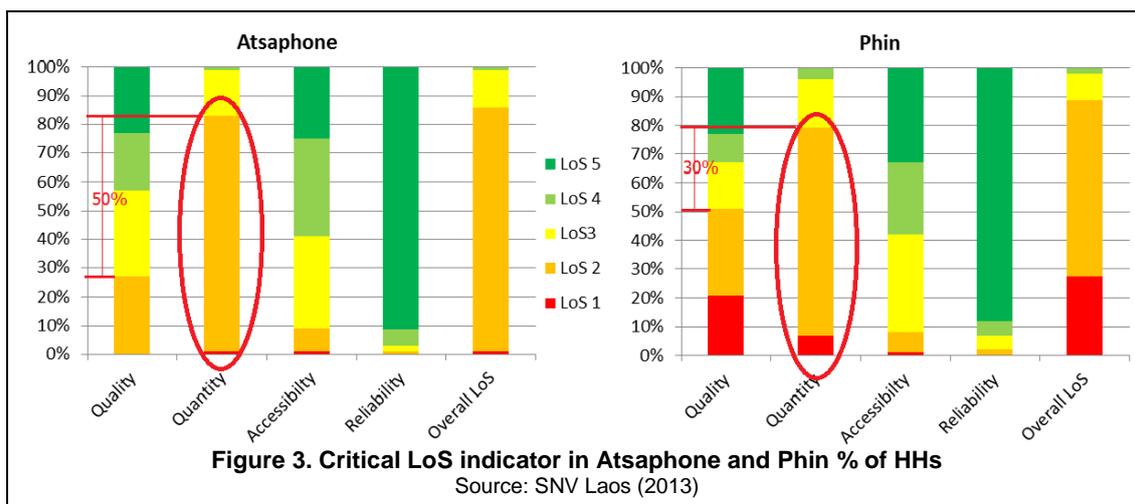
None of the countries have national guidance on this indicator, and although one might expect that a *basic* level of service from any RWS would be to provide water all year round, in many cases this does not reflect reality. Defining *Reliability* is complex. It may mean having water all year around whether it is useful, of required quality, or not. Alternatively *Reliability* may mean knowing that you can use it when you want it, for example that rain water will be available in the rainy season or that a tap will have water between 8 and 11 am.

Therefore, recognising these complexities, but needing to test a method to measure LoS, the service levels were set such that 12 month supply was rated as the highest service level.

Determining a household's overall level of service

In order to provide a single indicator for each HH's functionality service level, an overall indicator score is calculated based on the lowest of the HH's four individual QAR scores. Only 14% of Atsaphone HHs, 40% Phin HHs and 23% of the Cambodia sample met the basic LoS.

Figure 3 shows the proportion of HHs in each district by their LoS for each of the FRWS indicators. We see that around 80% of HHs have a *Quantity* LoS below the benchmark. Quality is therefore the FRWS indicator which most greatly affects a HH's Overall service level and addressing *Quantity* would benefit 50% of Atsaphone and 30% of Phin HHs before *Quantity* would influence HHs' LoS. In Cambodia, HH LoS was mainly influenced by their *Quality* service level and this was most heavily influenced by low use of improved water supplies.



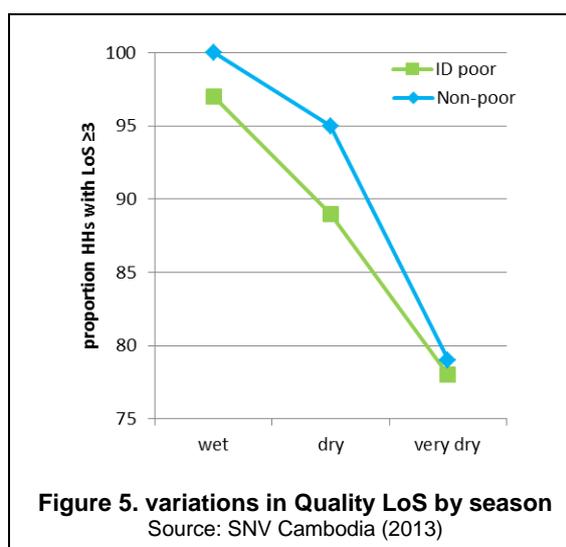
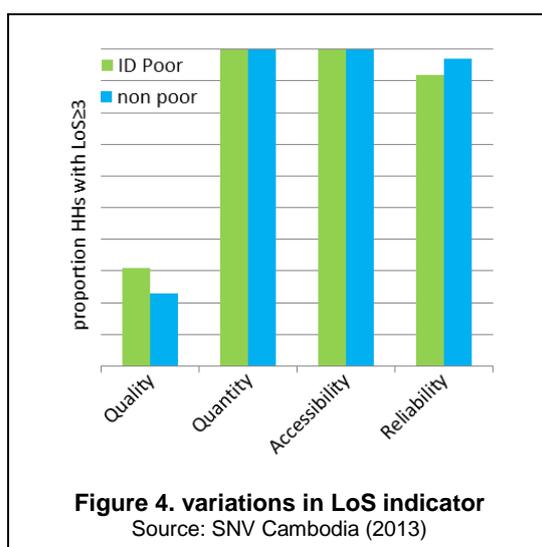
Furthermore, as common sense would expect, HHs with non-functioning boreholes had lower Overall LoS than the general population.

Limitations and lessons learnt

Measuring functionality is not simple, requiring the monitoring team to have an appreciation of the various RWS technology types, ability to distinguish between protected or unprotected, Improved or Unimproved amongst other issues. Translating the QAR matrix into decision trees enabled only the basic questions to be included on the HH survey tool, so that LoS could be calculated in the data processing phase.

The assessment of Quantity is probably the most risky element of this approach and requires the team to be fully orientated on the techniques for assessing quantity but also clarity about the uses covered by the definition of drinking water. Inclusion of quality checks, such as triangulation questions and photographs is essential. Although it may seem obvious, by far the greatest lesson learnt related to spending sufficient time and attention to training of local staff on use of the training tool, including review and adaptation to suit their understanding and preferences.

The resulting data allows identification of inequalities in service level enabling programmes to focus on the QAR indicator which causes the greatest barrier to service levels. For example Figure 4 highlights that Quality service levels are the biggest challenge for both ID-poor and non-poor HHs whilst Figure 5 shows that Quality LoS decreases more rapidly for Poor HHs than non-poor HHs in the dry and very dry seasons.



What new insights did we gain?

The process of designing the functionality matrix components, thresholds, and decision-trees opened up discussion on how functionality actually affects HHs and communities, and awareness was reinforced when local WASH partners undertook data collection in the villages. Even before the data analysis was completed they personally witnessed the effect of the four aspects of functionality service level on HHs.

Using the four QQAR indicators enabled us to identify the critical indicator influencing low service levels experienced by HHs enabling each country programme to target the functionality indicator which would benefit the most users. Our survey tool also allows identification of inequalities in service levels, with disaggregated findings by socio-economic group, ethnicity, caste, gender of HH head etc.

Furthermore, the ability to assess HH service levels between seasons and across multiple sources has provided critical information to focus our programme design in each country. Despite limitations and challenges in measuring RWS functionality using the QQAR LoS approach, the ability to see the dire situation some HHs face in different seasons encourages us to continue to learn from and review our approach whilst working towards appropriate and sustainable solutions with local and national stakeholders.

Acknowledgements

The authors would like to thank the SNV Asia WASH teams for contributing to the ongoing design and implementation of the Asia FRWS programme, testing the methods and sharing lessons learnt. We acknowledge the support of government agencies and local partners who undertook the baseline surveys.

References

- Howard G, Bartram J (2003) *Domestic Water Quantity, Service Level and Health*, Geneva: WHO
- Improve International (2013) *Statistics on Water & Sanitation System Failures* accessed <http://improveinternational.wordpress.com/handy-resources/sad-stats/>
- Moriarty, P. et al., (2011). *Ladders for assessing and costing water service delivery*. (WASHCost Working Paper 2, 2nd ed.) The Hague: IRC International Water and Sanitation Centre.
- SNV Cambodia (2013) *FRWS Baseline Study in Chum Kiri District, Kampong Speu, Phnom Penh*, SNV
- SNV Laos (2013) *Baseline Survey for FRWS in Savannakhet*, Vientiane, SNV.

Contact details

S Barakzai
SNV, P O Box 1966, Kupondole
Kathmandu, Nepal
+977 (1) 5523444
sbarakzai@snvworld.org
www.snvworld.org

A Kome
SNV, Jl. Kemang Timur Raya No. 66,
Jakarta Selatan 12730, Indonesia
+ 62 (21) 719 9900 ext 129
akome@snvworld.org
www.snvworld.org