Functionality and Its Key Determinants

Hello Monitoring Report 2015

Prepared by:

Maheshwar Prasad Yadav

Program Manager

Nepal Water for Health (NEWAH)

Kathmandu, Nepal

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Table of Contents

1. Introduction 3

2. Objective of the Study 3

3. Methodology.....3

4. Major Findings 4

4.1. Functionality Status.....4

4.2. Functionality and its Relationship with Caretaker 6

4.3. Functionality and its Relationship with WSUCs.....8

4.4. Availability and Uses of Spare Parts.....10

4.5. Non-functionality and its Reasons 12

5. Conclusion.....14

References.....15

1. Introduction

This report comprises the key findings of hello monitoring round 1 conducted from August to September 2015 under the remote monitoring (charity: water NP.NEW.RM.14.170) program. This project has been implemented for increasing access to improved WASH services in Nepal from December 2014 to March 2016. This study consists of the charity: water-supported projects under grants 060, 092, 121, and 145 that were implemented in Sindhuli, Chitwan, Baglung, Nuwakot, Dhading, and Tanahun districts of Nepal from 2010 to 2013.

2. The objective of the Study

The major objective of this study is to examine functionality and its determinants of water schemes in the Sindhuli, Chitwan, Baglung, Nuwakot, Dhading, and Tanahun districts of Nepal. The specific objectives are as follows:

- To assess the functional status of water points and their respective WSUCs in all water supply systems working and maintained regularly.
- To identify key determinants of the functionality of water schemes to keep them working for increasing access to improved water, sanitation, and hygiene (WASH) services in Nepal.

3. Methodology

The study is carried out by using primary data collected from the projects implemented under the charity: water grant 060, 092, 121, and 145 from 2010 to 2013. Moreover, 347 water point sites under gravity flow systems are considered as the population for the study. The study has determined its sample by using the simplified formula for proportions of a finite population (Yamane, 2007). The study assumes 95 percent level of confidence and 5 percent level of significance (margin of error). Based on these assumptions, the study is sampled by using the formula given in equation 1.

$$n = \frac{N}{1 + N(e)^2} \qquad \ldots (1)$$

Where n is the sample size; N is the population size; and e is the level of precision.

Given that, n =? N = 347 water point sites; e = 5 percent

$$n = \frac{347}{1 + 347\ (0.05)^2} = 185.81 \cong 186\ sites$$

Thus, the sample size of the study is 186 water point sites. These sites selected for the study are representatives of charity: water grant 060, 092, 121, and 145 as shown in Table 1.

Table-1: Number of Sites Selected for the Study

Grant	Year	Districts	Water Schemes	Gravity-fed Water Point Sites (N)	The weightage (%)	Sample (n)
60	2010	Baglung, Chitwan, Nuwakot & Tanahun	5	6	2%	3
92	2011	Sindhuli & Dhading	8	43	12%	23
121	2012	Sindhuli & Chitwan	54	55	16%	29
145	2013	Sindhuli & Chitwan	44	243	70%	130
Total	**4**	**7**	**111**	**347**	**100%**	**186**

***Sources**: The database of NEWAH.*

***Note:** N indicates the total number of water point sites that were constructed under charity: water grant 060, 092, 121, and 145 from 2010 to 2013 and n indicates the number of sites selected for the study.*

The caretaker of the gravity-fed community systems is taken as the study unit for the hello monitoring survey. Sampling is the process of selecting enough elements from the population. Proportionate and stratified sampling techniques are used to draw the required number of samples. A scheduled telephone interview is conducted to get the required information for the study. Though the minimum sample size is 186 sites, the study comprises 218 sites out of 347 water point sites. Moreover, the analysis was conducted using IBM SPS Statistic 20.

4. Major Findings

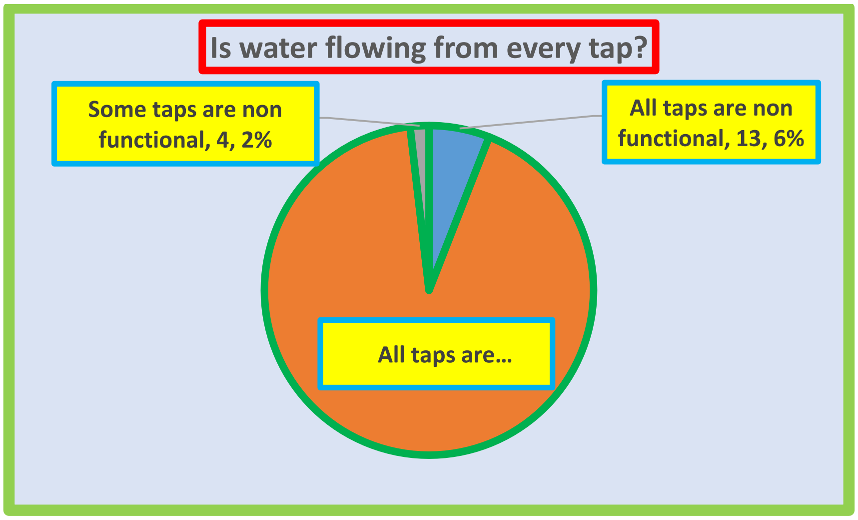
In this section, an attempt is made to examine the functionality status and its determinants by analyzing data collected from hello monitoring round 1. Hence, this section comprises functionality status and its relationship with the caretaker, WSUCs, and availability of spare parts. The analysis consists of 1,218 tap stands of 218 water point sites from 50 WSUCs.

4.1. Functionality Status

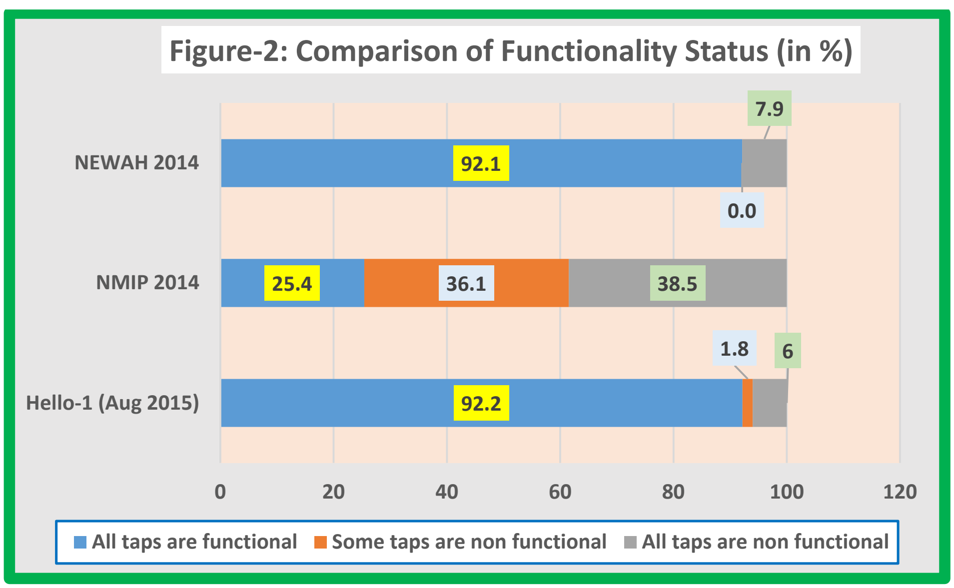
Functionality classifies into three categories: all taps are functional, some taps are functional, and all taps are non-functional. The functional status of 218 water point sites is given in Figure 1. 92%

of water point sites have all functional taps while 2% of water point sites have some functional taps. Thirteen out of 218 water point sites have all non-functional taps. The results are encouraging though the survey has conducted just after a devastating earthquake affected various locations of the study area from the western and central part of Nepal on 25th April 2015.

Figure-1: Functionality Status



Now, it may be interesting to compare the results of functionality status with the national average and previous studies as given in Figure 2.

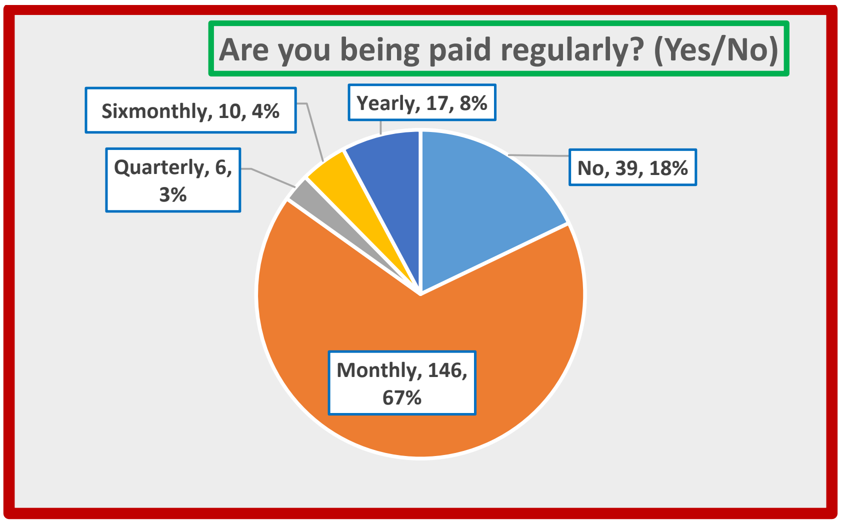


The results are similar to the results of NEWAH 2014 but reasonably better than that of the national average. The national average of all functional taps is 25.4% which is much lower than the results of this study i.e., 92.2%. The results of NEWAH 2014 are 92.1% which is similar to the results of this study. The results of all non-functional taps of NEWAH 2014, NMIP 2014, and Hello-1 (December 2015) are 7.9%, 38.5%, and 6% respectively. Likewise, the results of some functional taps are 0%, 36.1%, and 1.8% for NEWAH 2014, NMIP 2014, and Hello-1 (Aug 2015) respectively.

4.2. Functionality and its Relationship with Caretaker

The caretaker is the key person for the water project to run it successfully. The caretaker payment regularly, its visit, alternate caretaker, and relationship with functionality have been discussed in the section.

Figure-3: Payment to Caretaker



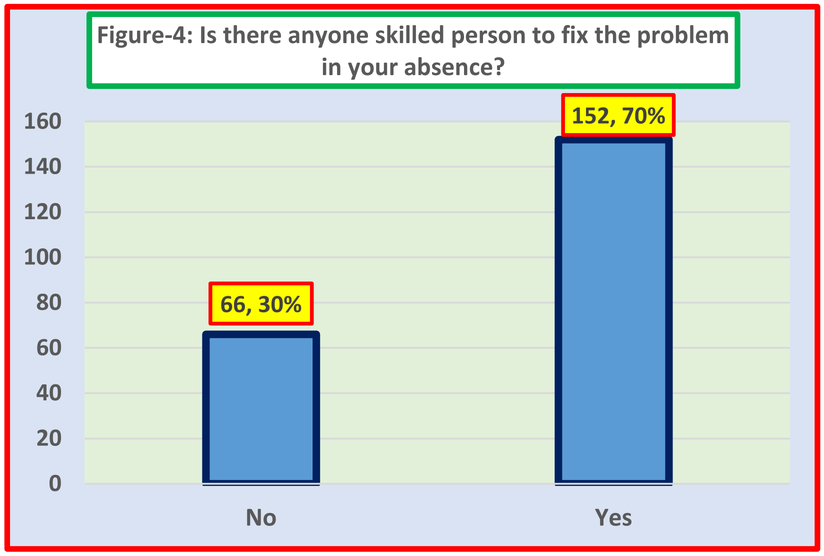
The caretaker is paid differently in different WSUCs such as monthly, quarterly, six-monthly, and yearly. 67% of caretakers get payment monthly while only 3% of caretakers get paid quarterly. The caretakers get payment six-monthly and yearly are 4% and 8% respectively. The rest 18% of caretakers are not being paid at all.

Among others, the survey comprises a question- “When did you last visit all of the taps?” to know the caretaker's last visit to all the taps as given in Table-2.

Table-2: Caretaker visit to all the taps (in days)

Number of water point sites	218
Mean (in days)	8.1
Std. Deviation	3.9
Minimum (in days)	1
Maximum (in days)	23

The caretaker visits all the taps within 8.1 days on average. The visit days ranged from a minimum of 1 day to a maximum of 23 days. Similarly, there is an alternate skilled person in WSUCs to fix the problem in the absence of a caretaker as shown in Figure-4. 70% WSUCs have alternate caretakers while 30% have no alternate caretaker to fix the problems in the absence of a caretaker.



Now, it may be interesting to analyze the relationship between the functionality of taps and caretaker paid regularly. Table-3 depicts the cross-tabulation of the functionality of taps and caretaker paid regularly.

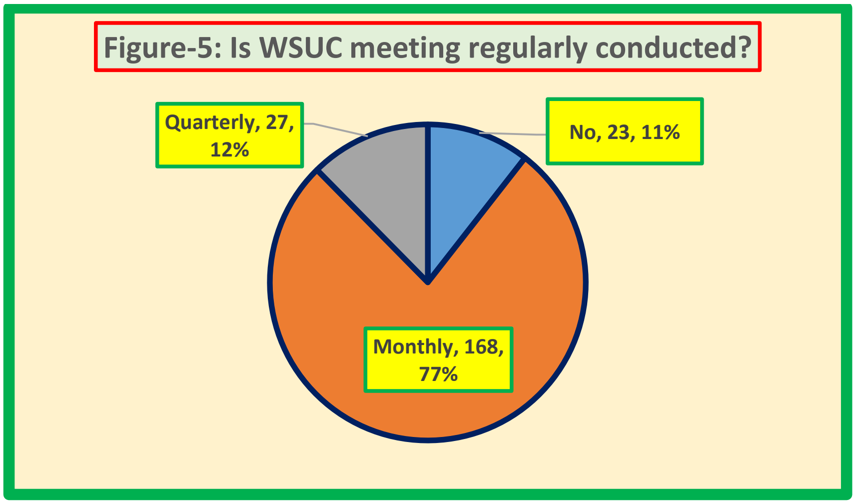
Table-3: Cross-tabulation of functionality and caretaker paid regularly

Is the water flowing from every tap? * Are you being paid regularly? (Yes/No) Cross tabulation								
			Are you being paid regularly? (Yes/No)					Total
			No	monthly	quarterly	six-monthly	yearly	
Is the water flowing from every tap?	All taps are non-functional	Count	6	**7**	0	0	0	13
		% within Is the water flowing from every tap?	46.2%	**53.8%**	0.0%	0.0%	0.0%	100.0%
	All taps are functional	Count	32	**138**	6	9	16	201
		% within Is the water flowing from every tap?	15.9%	**68.7%**	3.0%	4.5%	8.0%	100.0%
	Some taps are non-functional	Count	1	**1**	0	1	1	4
		% within Is the water flowing from every tap?	25.0%	**25.0%**	0.0%	25.0%	25.0%	100.0%
Total		Count	39	**146**	6	10	17	218
		% within Is the water flowing from every tap?	17.9%	**67.0%**	2.8%	4.6%	7.8%	100.0%

The monthly payment to the caretaker shows a better functional status than that of others. In the case of 138 out of 218 water point sites having all taps functional, the caretaker paid monthly. Besides, the sites having all taps functional paid quarterly, six-monthly, and yearly have 6, 9, and 16 sites respectively. In the case of 13 sites having all non-functional taps, the caretaker paid monthly for 7 sites and get no payment for the rest of the 6 sites. Likewise, in the case of 4 sites with some functional taps, the caretaker paid monthly, six-monthly, yearly, and no payment for one site to each category respectively. The results show that the monthly payment to the caretaker is important for functionality.

4.3. *Functionality and its Relationship with WSUCs*

The water sanitation user committee (WSUC) is a key player to operate and manage the water schemes and maintaining them regularly. WSUC meeting is one of the important factors of its activeness and role to manage the scheme. Figure 5 shows the meeting frequency of WSUC to discuss and decide on important agenda for the water scheme.



The responses of 77% of caretakers show that WSUC meets monthly while 12% of caretakers responded that the WSUC meets quarterly. On the other hand, 11% of responses show that WSUC does not meet regularly. Furthermore, the relationship of the WSUC meeting with the functionality of taps has been ditched in Table 4.

Table 4: Relationship of WSUC meeting with the functionality of taps

Is the water flowing from every tap? * Is the WSUC meeting regularly conducted? Cross tabulation						
			Is the WSUC meeting regularly conducted?			Total
			No	monthly	quarterly	
Is the water flowing from every tap?	All taps are non-functional	Count	6	7	0	13
		% within Is the water flowing from every tap?	46.2%	53.8%	0.0%	100.0%
	All taps are functional	**Count**	**16**	**158**	**27**	**201**
		% within Is the water flowing from every tap?	**8.0%**	**78.6%**	**13.4%**	**100.0%**
	Some taps are non-functional	Count	1	3	0	4
		% within Is the water flowing from every tap?	25.0%	75.0%	0.0%	100.0%
Total		Count	23	168	27	218
		% within Is the water flowing from every tap?	10.6%	77.1%	12.4%	100.0%

158 water point sites out of 218 having WSUC meetings monthly have all functional taps. Likewise, 27 sites having WSUC meetings quarterly have all functional taps. On the other hand, 16 sites having neither monthly meetings nor quarterly meetings have all functional taps.

Six sites have neither monthly nor quarterly meetings and 7 sites having monthly meetings have all non-functional taps. Similarly, one site has neither monthly nor quarterly meetings and 3 sites having monthly meetings have some non-functional taps.

Moreover, tariff collection is an important factor for the payment caretakers as well as maintaining the system regularly. Figure-6 represents the status of tariff collection.

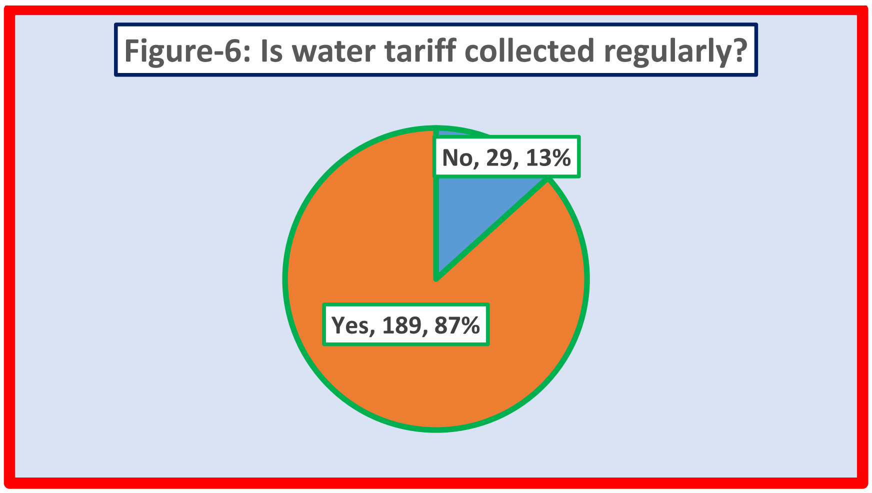


Figure-6: Is water tariff collected regularly?

Out of the total, 87% WSUCs have been collecting tariffs regularly while 13% WSUCs have not been collecting tariffs regularly.

Now it may be interesting to analyze the relationship of O&M funds with functionality. This relationship has been analyzed through analysis of water flowing and total operation and maintenance funds as shown in Table 5.

Table-5: Relationship of O&M fund with functionality

Is water flowing from every tap? * Total maintenance fund collected to date Cross tabulation					
			Is there an O&M fund in WSUC?		Total
			No	**Yes**	
Is the water flowing from every tap?	All taps are non-functional	Count	1	12	13
		% within Is the water flowing from every tap?	7.7%	92.3%	100.0%
	All taps are functional	**Count**	**10**	**191**	**201**
		% within Is the water flowing from every tap?	**5.0%**	**95.0%**	**100.0%**
	Some taps are non-functional	Count	0	4	4
		% within Is the water flowing from every tap?	0.0%	100.0%	100.0%
Total		Count	11	207	218
		% within Is the water flowing from every tap?	5.0%	95.0%	100.0%

There are about NPR 2.1 million O&M funds collected to date from 39 out of 50 WSUCs. The average O&M fund is NPR 41,695 that ranged from NPR 5,000 to NPR 157,000. 191 out of 218 water point sites have O&M funds in their WSUC that have all functional taps. Only 12 and 4 sites are having O&M funds that have all non-functional taps and some non-functional taps respectively. Furthermore, the sites with all non-functional taps having no O&M fund are only one while the sites with all functional taps having no O&M fund are 10 sites.

4.4. Availability and Uses of Spare Parts

The spare part is an important element to maintain and keep all the water schemes functional. The stock of spare parts in WSUC is the key variable to measure its availability. Table 6 shows the availability of spare parts in WSUC stock.

Table-6: Availability of Spare Parts in WSUC Stock

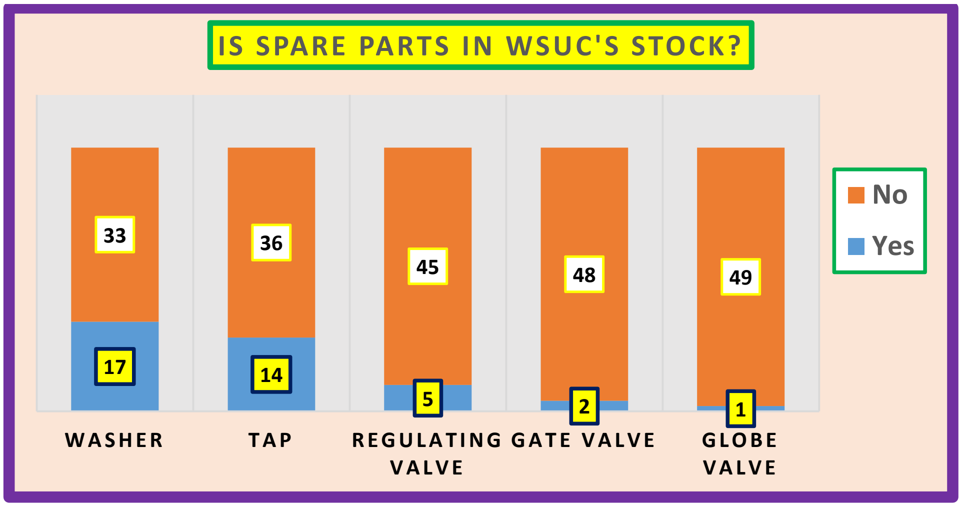
SN	Particulars	Number of tap-stands	Number of water point sites	Number of spare parts in WSUCs Stock				
				Washer	Tap	Regulating valve	Gate valve	Glove Valve
1	Number of WSUCs	50	50	50	50	50	50	50
2	Mean	24.36	4.36	5.34	1.00	0.52	0.04	0.02
3	Std. Deviation	15.69	2.95	11.16	2.15	1.81	0.20	0.14
4	Minimum	6	1	0	0	0	0	0
5	Maximum	94	13	40	10	10	1	1
6	Sum	1,218	218	267	50	26	2	1

There are only 267 washers, 50 taps, and 26 regulating valves available for 1,218 taps. Likewise, there are only 2 gate valves and one globe valve in WSUC stock for 1,218 taps. On average, 5.34 washers, one tap, and less than one regulating valve, gate valve, and globe valve among 50 WSUCs.

Now it may be interesting to analyze the number of WSUCs having spare parts in their stock. The number of WSUCs having spare parts in their stock has been mentioned in Figure 7.

There 34% WSUCs have a washer in their stock while only 28% WSUCs have taps. 10% WSUCs have regulating valves while 4% and 2% WSUCs have gate valves and globe valves in their stock respectively.

Figure-7: Number of WSUCs Having Spare Parts in its Stock



Now it may be interesting to see the relation between spare parts in stock and the functionality of taps. Table 7 shows the relationship between spare parts in WSUC stock and the functionality of taps.

Table-7: Relationship of Spare Parts in WSUC Stock with Functionality of Taps.

Particulars			Numbers of Washer in stock			Numbers of Tap in stock			Number of regulating valves in stock			Number of Gate valves in stock			Numbers of Globe Valve in stock		
			No	*Yes*	*Total*	*No*	*Yes*	*Total*	*No*	*Yes*	Total	*No*	*Yes*	*Total*	*No*	*Yes*	*Total*
Is the water flowing from every tap?	All taps are non-functional	Count	7	6	13	8	5	13	11	2	13	12	1	13	13	0	13
		% within Is the water flowing from every tap?	54%	46 %	100 %	62 %	38 %	100 %	85 %	15 %	100%	92%	8%	100 %	100%	0%	100%
	All taps are functional	**Count**	**127**	**74**	**201**	**135**	**66**	**201**	**172**	**29**	**201**	**192**	**9**	**201**	**198**	**3**	**201**
		% within Is the water flowing from every tap?	**63%**	**37 %**	**100 %**	**67 %**	**33 %**	**100 %**	**86 %**	**14 %**	**100%**	**96 %**	**4%**	**100 %**	**99%**	**1%**	**100%**
	Some taps are non-functional	Count	3	1	4	3	1	4	3	1	4	4	0	4	4	0	4
		% within Is the water flowing from every tap?	75%	25 %	100 %	75 %	25 %	100 %	75 %	25 %	100%	100 %	0%	100 %	100%	0%	100%
Total		**Count**	**137**	**81**	**218**	**146**	**72**	**218**	**186**	**32**	**218**	**208**	**10**	**218**	**215**	**3**	**218**
		% within Is the water flowing from every tap?	**63%**	**37 %**	**100 %**	**67 %**	**33 %**	**100 %**	**85 %**	**15 %**	**100%**	**95 %**	**5%**	**100 %**	**99%**	**1%**	**100%**

The results show many sites do not have spare parts in stock, but the taps are functional 127 sites do not have a washer in stock, but all the taps are functional. The same is also noticed in the case of taps, regulating valves, gate valves, and globe valves. It means that WSUC buys and uses the spare parts as and when required.

Now it is important to see the availability of spare parts locally or at the district HQ level. Table 8 shows the availability of spare parts.

Table-8: Availability of Spare Parts in Local Market or District HQ

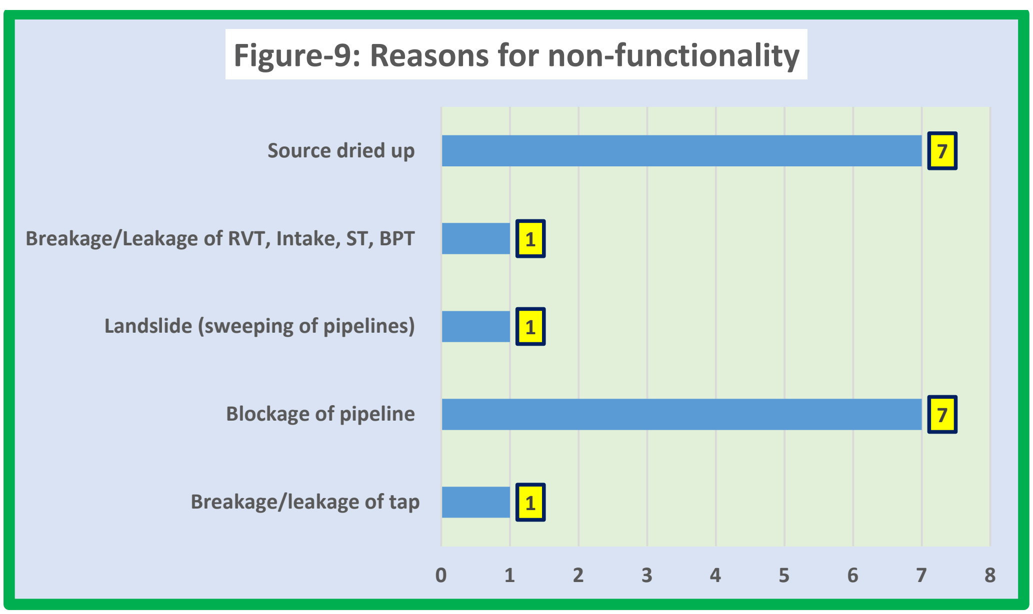
SN	Spare Parts	Available in the local market		Available in district HQ		Total
1	Washer	53	24%	165	76%	218
2	Tap	7	3%	211	97%	218
3	Regulating valve	7	3%	211	97%	218
4	Gate valve	2	1%	216	99%	218
5	Globe Valve	2	1%	216	99%	218
6	GI and HDPE pipe	2	1%	216	99%	218

All kinds of spare parts are available at the district HQ whereas only fewer number of sites have availability of spare parts at the local level. Only 23% of sites have availability of washers at the local level while other spare parts of 3% or lesser are available at the local level. This also shows that WSUC buys and uses spare parts as and when required.

Furthermore, none of WSUC replaced its used spare parts in stock as per hello-1. These results show that spare parts management seems weak in WSUCs.

4.5. Non-functionality and its Reasons

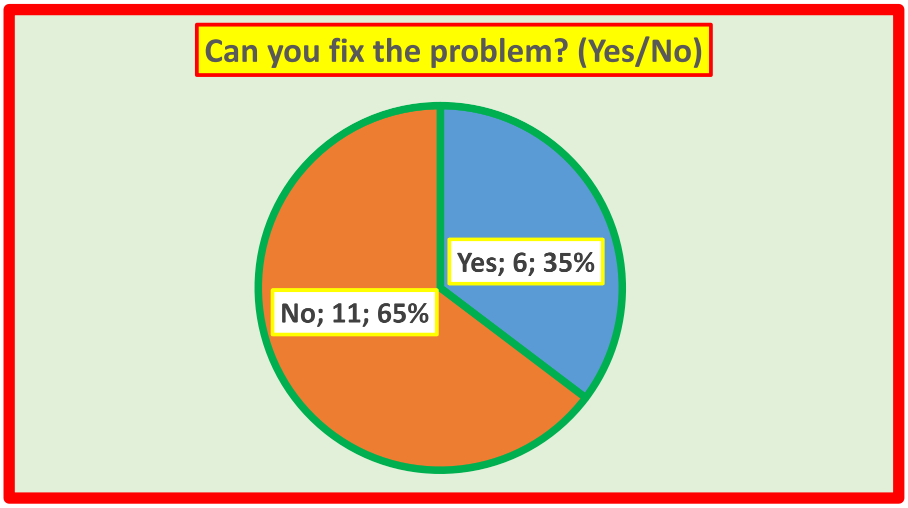
Non-functionality is due to several reasons. There are diverse reasons for the non-functioning of taps in 17 sites. The reasons are shown in Figure 9.



Out of 17 sites, the source dried up is the major reason for non-functionality in 7 sites. The same is noticed in the case of blockage of pipeline in 7 sites as well. The results show that breakage/leakage of RVT, Intake, ST, BPT; sweeping of pipelines due to landline; and breakage/leakage of tap are the reasons for the non-functionality of one site for each category.

Moreover, few cases can be fixed by caretakers, but few are substances that cannot be fixed by caretakers. Figure 10 shows the responses of caretakers on fixing the problems.

Figure-10: Responses of Caretakers on Fixing the Problems



Out of 17 non-functional sites, 6 caretakers responded yes to fix the problems while 11 responded no to fix the problems. Moreover, Table-9 shows the number of days required to fix the problems that can be fixed by caretakers.

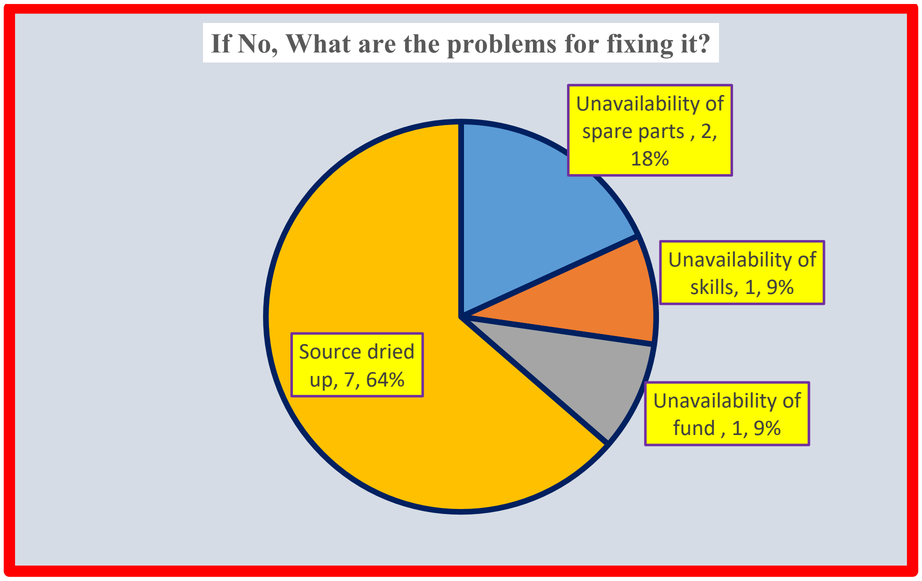
Table-9: Time required to fix the problems that can be fixed by caretakers

Particulars	If yes, how long will it take to fix the problem (days)
No. of observations	6
Mean	4.33
Std. Deviation	3.14
Minimum	1
Maximum	8
Sum	26

There are 6 sites having caretakers responded yes to fix the problems. The average days required to fix the problems is 4.33 days. The days required to fix the problems ranged from a minimum of 1 day to a maximum of 8 days. ***The caretakers who responded yes in the case of 6 sites, they have fixed the problems while preparing this report in early October 2015.***

Furthermore, there are 11 sites having caretakers who cannot be fixing the problems. It is due to several reasons for not fixing the problems as shown in Figure 11.

Figure-11: Reasons for not fixing the problems



Out of 11 sites having cannot be fixed by caretakers, 7 sites are due to the source drying up while 2 sites are due to the unavailability of spare parts. The unavailability of skills and unavailability of funds are the reasons for not fixing the problems for one site for each category. This shows that the source dried up is the major reason for not fixing the problems.

5. Conclusion

The purpose of this study is to examine the key determinants for the functionality of the rural drinking water supply system in Nepal. This study is based on both primary and secondary data. The necessary primary data were collected through telephone interviews using a semi-structured questionnaire while the secondary data were collected through databases and publications. The collected data were analysed through simple statistical tools to derive results leading to major findings of the study. The results show that the key determinants of functionality are the activeness of the users' committee, payment to the caretaker, spare parts availability, and management of operation & maintenance fund in the context of the rural drinking water supply systems in Nepal. This study may be useful for development actors in the sector and policymakers to keep the water supply systems functional and sustainable.

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