Management of Water Quality

A Karuna Trust – Arghyam Initiative

Midterm Evaluation Report

March 2014

Centre for Budget and Policy Studies

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Abbreviations

AEE	Assistant Executive Engineer
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
BCC	Behaviour Change Communication
BIS	Bureau of Indian Standards
BRC	Block Resource Coordinator
CBPS	Center for Budget and Policy Studies
CRC	Cluster Resource coordinator
CGWB	Central Ground water Board
DDWS	Department of Drinking Water Supply
DWSM	District Water and Sanitation Mission
DHFW	Department of Health and Family Welfare
DSO	District Surveillance Officer
EE	Executive Engineer
FGD	Focus Group Discussion
FTK	Field Testing Kit
GE	Gastroenteritis
GIS	Geographic Information System
GoK	Government of Karnataka
GP	Gram Panchayat
GRW	Grass-root Worker
HMIS	Health Management Information System
HRD	Human Resource Development
IEC	Information, Education and Communication
IMIS	Integrated Management Information System
JE	Junior Engineer
KT	Karuna Trust
lpcd	Liters per capita daily
M&E	Monitoring and Evaluation
MDWS	Ministry of Drinking Water and Sanitation
MIS	Management Information System
MMF	Monthly Monitoring Format
MO	Medical Officer
MoRD	Ministry of Rural Development
MoU	Memorandum of Understanding
MVS	Multi Village Scheme
NGO	Non Governmental Organization
NRDWP	National Rural Drinking Water Program
NRDWQM&SP	National Rural Drinking Water Quality Monitoring and Surveillance Program
NRHM	National Rural Health Mission

O&M	Operations and Maintenance
OHT	Over Head Tank
PDO	Panchayat Development Officer
PHC	Primary Health Center
PHI	Public Health Institute
PRED	Panchayat Raj Engineering Department
PRI	Panchayat Raj Institution
R&D	Research and Development
RDPR	Department of Rural Development and Panchayat Raj
RGNDWM	Rajiv Gandhi National Drinking Water Mission
TDS	Total Dissolved Solids
THO	Taluk Health Officer
UN	United Nations
USD	In US Dollars
VHSC	Village Health and Sanitation Committee
VWSC	Village Water and Sanitation Committee
WHO	World Health Organisation
WQM	Water Quality Management
WQM&S	Water Quality Monitoring and Surveillance

Executive Summary

The importance of adequate and quality water supply in promoting human health is well recognized. Poor quality water has a direct impact on the quantity of water available for consumption. Accordingly, the governments at the centre and the state have conceptualized and are implementing several measures to supply adequate amount of drinking water to the citizens, particularly those in rural areas.

Karuna Trust (KT) with funding from Arghyam has piloted an intervention in two districts viz. Chamarajanagar and Chickballapur *to improve water quality surveillance through enhanced awareness about issues relating to water quality and by bridging the gap in information sharing between different levels*. KT also entered into a Memorandum of Understanding with the Government of Karnataka (GoK) at the district level for management of the quality of drinking water supply. Gauribidanur taluk in Chickballapur district, Yelandur and Kollegal taluk in Chamarajanagar were selected for the intervention in the first year. KT initiated the intervention beginning from February 2012 which involved enhancing the cross-linkages between PRED and Health departments, building capacity at the GP, PHC, taluk and district levels in water quality testing and monitoring including increasing awareness at all levels. KT conducted convergence meetings/activities at various levels of stakeholders, viz. (health and engineering department), carried out capacity building exercises for Health and PRED, conducted IEC activities and attempted the cross linking of HMIS and IMIS for better water quality surveillance and monitoring.

The Centre for Budget and Policy Studies (CBPS), a third party responsible for the independent monitoring and evaluation has conducted the baseline survey in August 2012 and a midterm evaluation in December 2013 using the indicator framework developed in consultation with Arghyam and KT.

The results from the baseline survey showed that general awareness on water quality issues did exist at GP level i.e. awareness about the sources of contamination, causes of contamination and resulting diseases. Awareness regarding the issues of chemical contamination and bacteriological contamination was rather poor among personnel in the health department and PRED department respectively. The PRED and Health department did not share information about water quality testing. IEC activities were not conducted in either of the taluks. The VWSC was non-existent.

During the first year, activities were focused on conducting of PHC- GP convergence meetings, training and capacity building workshops for PRED and Health departments, convergence meetings at taluk and district level involving both elected representatives and officials and engaging community through IEC activities. The

intervention also focused on ensuring regular testing of water, reporting and sharing of results between departments and use of IMIS and HMIS for better water quality surveillance and monitoring. During the follow-up phase, the intervention was confined to PHC-GP convergence meetings, monitoring the water testing, chlorination and tracking of the diseases.

The results of the midterm evaluation showed that while there have been some positive changes owing to activities undertaken by KT, the overall impact has been poor. Some of the assumptions made about water quality issues such as the need for convergence between PRED and Health Department are seen to be misplaced. Data management issues such absence of uniform and common coding system and integration of HMIS and IMIS persist. The intervention has been more focused on individual activities without any synergy between them. Buy-in of water quality as a priority by the stakeholders was also seen to be poor given their focus on water supply management. An intense engagement with higher levels of government could have ensured better ownership and institutionalization of the changes. In the absence of both ownership and institutionalization, sustainability of the intervention beyond the project period seems doubtful.

Benefits of investment in improved water quality pay rich dividends

Management of Water Quality: A Karuna Trust – Arghyam Initiative

Midterm Evaluation Report

The most effective means of consistently ensuring the safety of a drinking-water supply is through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer.

World Health Organization (2011)

1. Introduction

The importance of adequate and quality water supply in ensuring and promoting human health is well recognized. The WHO vision document on water quality and health strategy for the period 2013-2020[1] indicates the need for focusing on the water quality issues. The WHO vision stresses the need for achieving the highest possible reduction in the water borne diseases by providing evidence based guidance and coordination; and support for water, sanitation and hygiene interventions.

Water quality important for human health and well being

Water contamination leads to diseases like diarrhea, cholera, dysentery, typhoid and guinea worm. A total of 5.89 lakh people (in 58 countries) were affected by cholera in 2011 representing 85percent increase over the previous year[2]. The strategies, policies and programmes to improve access to water and sanitation have potential to prevent and reduce illness and death from water borne diseases resulting in savings for the economy and benefits for individual families. The benefit-cost ratio for achieving

[1] The water quality and health strategy is a framework for action by the WHO Secretariat.

[2] WHO (2012). Cholera, 2011. Weekly Epidemiological Report http://www.who.int/wer/2012/wer873132/en/index.html

universal access to drinking water ranges from 0.6 to 3.7[3]. The return in developed countries (cost averted and productivity gained) is estimated at USD 2.786 for every USD 1 of expenditure, while in developing countries it is estimated to be USD 5.97.

Among the strategies discussed to address the water quality problems[4], important ones include:

Gram Panchayat focal point for supply of safe drinking water

a. improving the understanding of water quality and its impacts through data collection, monitoring and scenario building;

b. effective communication and advocacy; and

c. improved legal and institutional arrangements.

The strategic plan (2011-2022) by Ministry of Drinking Water and Sanitation, Government of India, has an ambitious target of covering 55 percent and 35 percent households with piped water supply and household connections respectively by year 2017 and to increase the target coverage to 90 percent and 80 percent by the year 2022 respectively. The 12th Plan (2012-2017) document details various norms in respect of water supply. The quantity of water to be available has been revised to 55 liters per capita daily (lpcd) (85 lpcd in desert areas) from 40 lpcd. The quality of water is defined as per BIS[5]: 10500 permissible limits. The access to water should be within 100 meter radius (10m in hilly areas) so that the time spent for collecting domestic water should be less than 30 minutes.

As per the 73rd Constitutional Amendment the responsibility of providing the safe drinking water rests with the gram panchayats (GPs) in rural areas. Supply of drinking water also involves the management of drinking water quality by conducting tests for chemical and bacteriological contamination. The village water and sanitation committee (VWSC) at the GP level is responsible for management of water supply in the village by ensuring the involvement of community members in monitoring the water supply including the monitoring of water quality. The monitoring involves ensuring periodical testing of water, monitoring cleanliness of surroundings near water sources and also to maintain hygiene at the community level. The village health

[3] The water quality and health strategy is a framework for action by the WHO Secretariat.

[4] UN water quality policy brief 2011

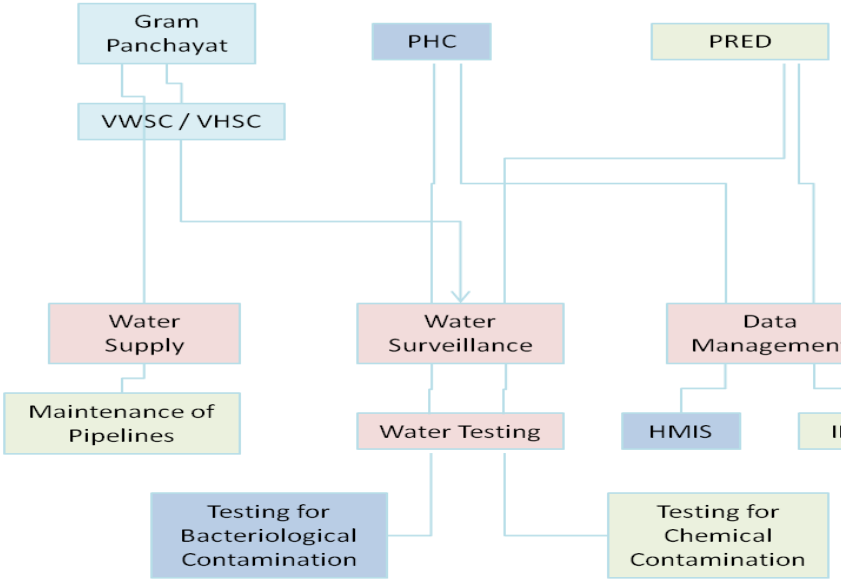
[5] Bureau of Indian Standards, IS-10500-2012, if it is bacteriologically contaminated (presence of indicator bacteria particularly E-coli, viruses etc.) or if chemical contamination exceeds maximum permissible limits (e.g. excess fluoride [>1.5mg/l], Total Dissolved Solids (TDS) [>2,000mg/l], iron [>0.3 mg/l], manganese[>0.3 mg/l], arsenic [>0.05mg/l], nitrates [>45mg/l] etc.)

and sanitation committee (VHSC) created under the National Rural Health Mission (NRHM) is also involved in ensuring hygienic sanitation practices at the village level.

The Department of Health and the Panchayat Raj Engineering Department (PRED) at the taluk and district levels are responsible for monitoring drinking water quality by supervising testing of water for bacteriological and chemical contamination. At the taluk level, a block resource coordinator (BRC) assisted by cluster resource coordinators (CRC) is responsible for conducting tests for chemical contamination. The CRCs intimate the GP the expected dates of their visits so that watermen can collect water samples from various sources for the tests. Tests are conducted for 6 parameters using field test kits provided to GPs. Sources found to be contaminated are re-confirmed by conducting confirmatory tests at the district laboratory under PRED. At the district level, the PRED is also responsible for uploading habitation-wise details of the status of chemical contamination (testing results) into the Integrated Management Information System (IMIS). The reports generated are sent to the district PRED office and taluk panchayat (TP); they are also shared with the GP.

Bacteriological contamination of drinking water sources is monitored by the Health Department. The Health Inspector (HI) at the primary health centre (PHC) is in charge of overseeing that bacteriological tests are done by the lab technician at the PHC using H_2S media. The health inspector takes the help of the male health worker or ASHA in the village to collect water samples (one sample each from a source and consumer point) on a date informed in advance to the GP.

PRED and Health Department responsible for testing chemical and bacteriological contaminations respectively



Water Quality Management – Functional Flow Chart

These water samples are tested for bacteriological contamination at PHC and test details are uploaded in the HMIS. Reports are also shared with the GP for taking up suitable

actions. The health inspector also supervises the working of the VHSC under the jurisdiction of the PHC. She / he remains in constant touch with the GP and advises them regularly on cleaning of water tanks, chlorination, etc. he undertakes inspection of schools and advises the community during the field visits to villages. The Medical Officer (MO) at the PHC monitors patients reporting sickness due to water borne diseases and assigns health inspector for further investigation if required.

This report is organized as follows. Sections 2 and 3 describe the initial problem, the rationale for intervention and the strategy adopted to address the identified issues. Section 4 provides details of project intervention area and Section 5 describes the role of Centre for Budget and Policy Studies. Baseline Survey methodology and findings are set out in Sections 6 and 7. Section 8 outlines the intervention during the main and follow up phase and the last section – Section 9 - describes the methodology and findings of midterm evaluation.

2. Problem identification and rationale for intervention

Disconnect between PRED and Health Department in sharing information

The PRED and Health Department monitor testing of drinking water for chemical and bacteriological contamination respectively. Health Department maintains the data on the diseases caused by water contamination which include the diseases caused by both bacteriological and chemical contamination. The chemical contamination information rests with the PRED which when shared with Health Department would help the doctor in anticipating the possible health effects in the region and also in treating the patients by enquiring about the water they consume. Similarly, repeated bacteriological contamination of a particular water source may be caused by a faulty design of the water supply network, which is maintained by PRED.

Regular sharing of results of water testing by both departments can help significantly in water quality surveillance as well as the monitoring of diseases in the region. However, there exists a communication gap between these two departments – they do not share results of tests on drinking water sources resulting in poor water quality management. Coding of water sources is one such example: neither department has or uses a common code for identifying a water source. Tthis makes it difficult to cross check whether a water source has been contaminated with both chemical and bacteriological contaminants. To ensure effective water quality management and surveillance both the departments need to work in close co-ordination to make water quality information available at a single point.

Awareness about water quality and testing of water quality is another aspect of water management that is deficient at the GP level. Awareness about the roles and responsibilities of GP, VWSC and VHSC members in water quality management are also deficient.

Memorandum of Understanding between Karuna Trust and Government of Karnataka

Karuna Trust (KT) with its vast experience in health and public health issues analysed the need for an intervention that would:

Lack of awareness about water quality and testing water for quality at the GP level

a. improve awareness at all levels regarding water quality management;
b. bridge gaps in information sharing at different levels viz. GP, taluk and district;
c. make the departments realize the need for sharing water testing reports; and
d. enhance capacities of people who are involved in water testing and water quality monitoring at different levels.

3. Intervention strategy

In order to address the above issues, KT, with funding from Arghyam, initiated an intervention for a period of three years beginning from February 2012 till January 2015 aimed at:

a. mapping the processes and reengineering them to enhance the cross-linkages between the governments departments involved in water quality management,
b. building capacity of the GP, PHC, taluk and district levels in water quality testing and monitoring and
c. increasing awareness at all levels

Arghyam, a public charitable foundation working in the water and sanitation sector in India since 2005, supports KT intervention

KT also entered into a Memorandum of Understanding with the Chikkaballapur Zilla Panchayat and Chamarajanagar Zilla Panchayat on 20 January 2013 and 24 January 2013 respectively for management of the quality of drinking water supply. KT's arrangement with the GoK was on the lines of a public private partnership initiative that allowed them to work within the system and re-engineer the processes required for better water quality management. KT's responsibilities included:

a. management of district lab

b. hiring personnel (BRC, CRCs and Hydro-geologist) at both taluk and district levels to ensure regularity in water quality testing and reporting conducting IEC activities,

c. capacity building exercises at various levels,

d. enabling convergence between health and PRED through facilitating meetings at various levels

e. promoting awareness through IEC activities

f. ensuring regular testing of water sources for chemical and bacteriological contamination

g. updating testing information in IMIS portal.

As can be seen from the above, KT's role with respect to its understanding with Arghyam and Government of Karnataka (through the Z.P.s) was similar.

4. Project Area and Period

The KT intervention is proposed to cover the districts of Chamarajanagar and Chickaballapur in a period of 3 years starting from February 2012 to January 2015. During the first year of intervention, one taluk in each of the districts was selected for the intervention. After one year of intervention, KT undertook only follow up activities in those taluks while moving on to another taluk.

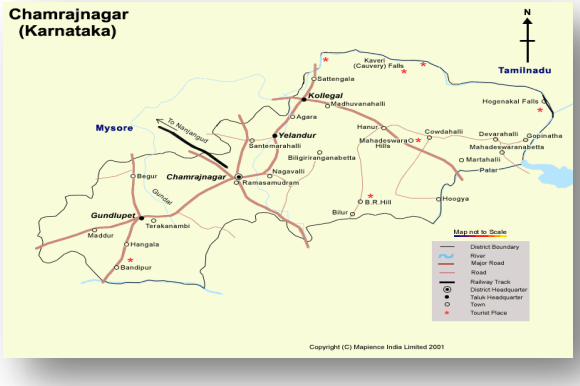
Accordingly, Gauribidanur taluk in Chickaballapur district and Yelandur taluk in Chamarajanagar were selected for the intervention in the first year. Since Yelandur was a small taluk with only 11GPs, it was decided to undertake intervention in another taluk i.e. Kollegal of Chamarajanagar district as well during the first year (Table 1). The project began in February 2012 in the taluks of Gauribidanur and Yelandur. Since Kollegal was added later, the intervention in Kollegal taluk began during May 2012.

District	Taluk	Hobli (Sub taluk)	PHCs	Sub centres	GPs	Villages
Chamarajanagar	Yelandur	2	4	23	11	40
Chamarajanagar	Kollegal	5	16	68	37	338
Chickaballapur	Gauribidanur	6	18	40	37	364

Table 1: Areas of KT intervention during the first year of project

Chamarajanagar is the southern-most district in Karnataka. It was carved out of larger Mysore district in the year 1998.Chamarajanagar town is the headquarters of this district. According to 2011 census Chamarajanagar district had a population of 10,20,962 with a population density of 200 persons/sq km. The district is divided into four taluks viz. Chamarajanagar, Gundlupet, Kollegal and Yelandur. It has a total of 446 habited villages and 120 GPs. (District Administration, Chamarajanagar)

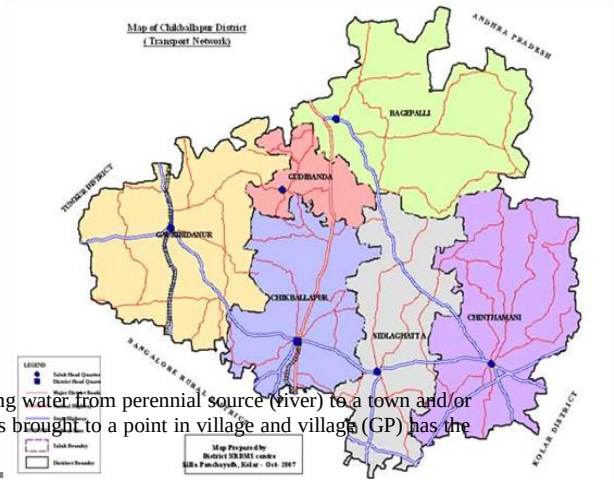
Kollegal taluk (with the 2 urban local bodies in the taluk Kollegal and Hanur) has the multi village schemes (MVS)[6] for water supply from the Cauvery river. About 8 villages are supplied with Cauvery water under this project. Yelandur taluk also has MVS which cater to 8 villages and the town panchayat of Yelandur.



According to the Central Ground Water Board (CGWB) report for Chamarajanagar district (2012), the average stage of ground water utilisation in the district is at 72 percent (of the potential) while that of the Kollegal taluk is at 46 percent. However, the ground water utilisation is not uniform across the taluk. The northern part of the taluk has 64 percent of the area which is under safe category while the southern part covering 36 percent of the area in the taluk is under over exploited category (over 100 percent). Nearly 50 percent of the area in the taluk is vulnerable to fluoride contamination. The northern part of the taluk is prone for contamination from pesticides and fertilizers which is also the command area in the taluk.

Yelandur taluk also has command area in the northern part which is prone for fertilizer and pesticide contamination, while the entire taluk is vulnerable for fluoride contamination.

Chickaballapur is a newly formed district, carved out of Kolar district in 2007. It has six taluks- Bagepalli, Chickaballapur, Chinthamani, Gauribidanur, Gudibanda and Shidlaghatta. There are 150 GPs, 1,321



Map of Chickballapur District

[6] Multi village Schemes is a water supply project/scheme which is bringing water from perennial source (river) to a town and/or group of villages along its way to town from the water source. Water is brought to a point in village and village (GP) has the responsibility to distribute it and pay for the same.

inhabited villages and 193 uninhabited villages in the district. The total population of the district is 11,49,007 with a population density of 308 persons/sq km.

Bagepalli taluk in Chickaballapur district has 95 percent of its sources identified as contaminated with fluoride. Around 200 villages in this taluk need to be supplied with water from alternate surface water sources. In Chickaballapur town about 65 percent of all sources are chemically contaminated. This level of contamination does not exist for Gauribidanur and other taluks in the district.

Gauribidanur taluk has 36 GPs, 219 inhabited villages and 20 uninhabited villages. The taluk has a total population of 2,71,119 (2011) with a population density of 305 persons/sq.km. (District Administration, Chikaballapur district).

According to the Central Ground Water Board (CGWB) report for Chickaballapur district 2012, all the taluks in the district except for Bagepalli taluk fall under over exploited category. The ground water utilisation in the district is at 140 percent while that of Bagepalli is at 55 percent. The fluoride contamination in the district is high in the Bagepalli taluk. The southern part of the Gauribidanur taluk adjacent to Doddaballapur taluk of Bangalore rural district has fluoride contamination while northern part of the taluk is prone to nitrate and fertilizer contamination.

Centre for Budget and Policy Studies – third party responsible to independently monitor and evaluate the project

5. Role of Centre for Budget and Policy Studies (CBPS)

The Centre for Budget and Policy Studies (CBPS) is a third party responsible for the independent monitoring and evaluation of the project. Accordingly CBPS developed an indicator framework, conducted the baseline survey and regularly monitored the project activity and progress; it is also responsible for the midterm evaluation of the project.

CBPS developed the indicator framework in consultation with Arghyam and KT as a prelude to baseline survey (and subsequent midterm evaluation). The baseline survey was conducted by CBPS in the two taluks and a report thereon was submitted to Arghyam and KT. CBPS also developed a monitoring format in consultation with Arghyam and KT. The monthly monitoring format (MMF) was designed on the basis of the indicator framework developed prior to the baseline survey. MMF filled by KT coordinators was sent to CBPS. CBPS participated at the quarterly project review meetings wherein KT provided project updates.

As a part of the project monitoring, CBPS team undertook monitoring visits to project areas in both the districts and discussed with field coordinators about the project

progress. Visits to villages, GPs and PHCs to understand different activities within the intervention and meetings at GPs - elected members, officials, watermen and villagers, and PHCs - doctors, pharmacists, and others - also formed a part of the monitoring exercise.

6. Baseline survey - Scope and Methodology

Baseline survey forms an important part of any monitoring and evaluation framework. The baseline survey gives a picture of the conditions prevailing prior to the intervention and, thus, facilitates measuring progress due to intervention.

Baseline survey measured the indicators that are likely to be positively influenced by the intervention so as to be able to measure the change subsequently

The indicator framework was prepared keeping in view the four dimensions of the intervention, viz.

- raising awareness through IEC activities;
- building capacity for water quality testing;
- bringing about convergence between various stakeholders; and
- proper database management leading to effective monitoring of water quality, spread across GP, taluk and district levels.

The indicators were essentially outcome, output or process indicators.

Area of Intervention	Indicator	Indicator Type
Awareness	Awareness on Water Contamination	Outcome
	Awareness about Incidence of Diseases	
	Awareness on Testing for Water Quality	
	Awareness about Remedial Measures	
Capacity	Training for Water Quality Testing	Output
	Frequency of Testing	Outcome
	Process Mapping	
	Parameters Measured	
Convergence	Meetings at GP Level	Process/ Output
	PHC/ taluk/ district Level	
	Information Sharing	Outcome
Water Quality Management and Surveillance	Role and Functions of VWSC/ VHSC	Outcome
	Role and Functions of DSO	
Information and Communication Activities (IEC)	IEC by GP/ PHC/ taluk/ district	Output
Data Management and Use	HMIS and IMIS	Outcome

Based on the pilot and considering the cost involved for primary household based survey, it was decided in consultation with Arghyam to follow a mix of researcher-administered questionnaires, structured interviews and Focus Group Discussions.

Three GPs and three PHCs were randomly selected from each of the intervention areas (i.e. from Kollegal and Gauribidanur taluk) for the baseline survey. The figure below shows the stakeholders who were interviewed at the district, taluk and GP level in both the districts.

	Stakeholders
Chamarajanagar District	District Health Officer, Executive Engineer, Hydro-geologist
Chikkaballapur District	
Kollegal Taluk	Taluk Health Officer, Junior Engineer (PRED), Senior Inspector (DSO)
Gauribidanur Taluk	
Bandahally, Cowdally and Mallur Gram Panchayats	PDO, Panchayat President members, Secretary, Junior Male Health

Baseline study was conducted in August 2012 while the intervention commenced in February 2012. The research team took care to ensure that all data gathered referred to the period before the intervention began. Towards this, all information provided by respondents was cross-checked with records and other members of the group to arrive at an accurate time frame of the occurrence.

7. Baseline Survey - Findings

The presentation of findings uses a 4-point Likert scale - Poor, Satisfactory, Good and Very Good - as a measure.

- '*Poor*' is indicative of an area that needs sustained intervention;
- '*Satisfactory'* is indicative of a minimum acceptable level (of capacity, awareness or convergence);
- '*Good*' indicates a desired level (of capacity, awareness or convergence)
- '*Very Good*' indicates a high level (of capacity, awareness or convergence).

The baseline survey showed that there were no significant differences between the two districts as far as their status with respect to various indicators was concerned. Therefore, the discussion below covers findings common to both the districts with any exceptions being highlighted separately.

Awareness

		At the Level of		
Dimension	Indicator	GP	PHC	Taluk/District
Awareness about	Water Contamination	Good to Satisfactory	Good	Very Good
	Incidence of diseases	Good	Good	Poor to Good
	Testing water quality	Poor	Good to Satisfactory	Good
	Remedial measures	Poor	Good	Good

At the GP level, interviews conducted with panchayat members, watermen and ASHAs revealed that they were aware of the causes for bacteriological and chemical contamination of water. Poor sanitation, lack of hygiene and improper maintenance of piped water supply system were identified as the main reasons for bacteriological contamination. Respondents were aware that digging deeper boreholes would result in water being contaminated with chemical compounds; however, due to acute water shortage deeper boreholes could not be avoided. Awareness about the diseases caused due to water contamination was good. However, awareness regarding the technical aspects (such as frequency of testing, process of testing and reporting mechanism) related to water quality testing for bacteriological and chemical contamination was poor.

At PHC level awareness about all aspects related to incidence of diseases due to water contamination, remedial measures to be implemented at the source of contamination and treatment required during an outbreak was good. Awareness on technical aspects related to bacteriological testing was very good. Results of bacteriological testing were shared with the GP only when a source was found to be contaminated or in the event of an outbreak. Awareness on all issues related to chemical contamination, including testing, remedial measures and reporting mechanisms was poor.

Health officials at the taluk and district levels had good knowledge about all issues related to bacteriological contamination of water i.e. the causes of contamination, diseases caused, treatment required, remedial measures at source, and home remedies. However, they had no knowledge about issues related to chemical contamination. The PRED officials, on the other hand, had sound knowledge of all information related to chemical contamination but had no knowledge about bacteriological contamination. The main issue as identified by PRED officials was shortage of water.

Capacity

		At the Level of		
Dimension	Indicator	GP	PHC	Taluk/District
Capacity **[Measured by knowledge about]**	Training received for water quality testing	Poor	Poor to Satisfactory	Good
	Frequency of testing	Satisfactory	Poor to Good	Satisfactory
	Processes involved in testing and reporting	Poor	Poor to Good	Poor to Very Good
	Parameters measured in testing	Poor	Poor	Poor to Good

Training had been imparted to watermen, ASHA and Junior Health Workers through different programs - ICDS, medical trainings, PRED workshops on sample collection and labeling. However, training was provided only at the time of recruitment and there were no further refresher programs. Watermen and ASHA had problems in correctly identifying and labeling the samples. There were also issues regarding their understanding of where to collect the sample from (guidelines state that for each source a sample must be collected from the origin and end user point). PHC and PRED functionaries were trained to conduct bacteriological and chemical testing respectively, but the testing was not done regularly; the follow-up mechanism was also non-existent.

The NRDWQM&S states that '…monitoring of public/ private water sources at the village level and catering to immediate and localized remedial needs, could be effectively undertaken only by empowering the community and building capacity at the grass root level through training and awareness campaigns.'

In general, at the PHC, taluk and district level, knowledge about the processes and reporting mechanisms for bacteriological and chemical contamination testing was good.

Convergence

		At the Level of		
Dimension	Indicator	GP	PHC	Taluk/District
Convergence & Information Sharing	Meetings at GP level	Poor		
	Meetings between PHC-Health and PRED		Poor	
	Attendance of Health and PRED members at GP meetings	Poor		
	Any other forum for exchange of information	Poor	Poor	Poor
	On occurrence of episodes	Satisfactory		

The information sharing was taking place between (i) the GP and PHC during outbreaks, and (ii) the GP and PRED whenever chemical contamination was identified. There was no regular or systematic mechanism under which information was exchanged between the GP-PHC-THO-DSO-PRED on all water quality related issues of a particular village. IEC activities were taken up only on need basis such as

during outbreak of a disease. The HMIS and IMIS are two separate systems that store information on water quality testing. HMIS was operated at the taluk level by the THO while the IMIS was operated by the PRED at the district office.

According to the NRWQM&S guidelines there should be free exchange of information between the VWSC and PHCs for the purpose of disease surveillance. However, these guidelines are not being followed.

Water Quality Management & Surveillance

Village Water & Sanitation Committee (VWSC) is required to be the nodal body at the village level on all issues related to water quality - surveillance, testing, reporting, remedial measures and regular monitoring. However, VWSCs were found to be non-existent. It is Village Health & Sanitation Committees (VHSCs) which were involved in creating awareness about water related issues whenever health camps are conducted, though they do not undertake any efforts specifically for Water Quality Management. VHSC/ ASHA worker were performing some of the functions of WQM such as sample collection for testing of water for bacteriological contamination, door-to-door awareness programs related to causes of water borne diseases and the need for maintenance of cleanliness around water sources. In some cases funds allocated to the VHSC under the NRHM (Rs.10000 per annum) have been used for purposes such as purchase of bleaching powder (to be used for chlorination) and cleaning of water tanks.

There was no systematic process for monitoring water quality - maintenance and repair of breakage/ damage/ leakages in pipes and valves is randomly done. Although it is the responsibility of the waterman to monitor the entire water distribution system but this was not being done properly due to low motivation levels and disinterest on the part of GP members. Lack of proper monitoring of the water transmission system was a major cause for bacteriological contamination.

Information & Communication Activities

		At the Level of		
Dimension	Indicator	GP	PHC	Taluk/District
Information & Communication Activities	IEC Activities by GP / VWSC	Poor		
	IEC Activities by VHSC & PHC	Poor		
	IEC Activities by THO and DSO			Poor
	IEC Activities by Taluk or Dirstrict			Poor

The quarterly plans as well as the quarterly progress reports were shared by KT with Arghyam and CBPS regularly and these were used in understanding the progress of the project during the review meetings.

IEC activities were not undertaken at any level except in cases of a disease outbreak. During such times PHC takes on the primary responsibility by mobilizing ASHA, ANM, health workers and panchayat members to conduct awareness camps. There were no IEC activities specifically focused on water quality related issues conducted on a regular basis.

Data Management & Use

The HMIS and IMIS are two separate systems that store information on water quality testing. The HMIS was operated at the taluk level by the THO while the IMIS was operated by the PRED at the district office. Both departments have dedicated persons who are responsible for data entry into the system. There was no mechanism for cross-checking or validation of the data entered into the system. All data entered in the HMIS and IMIS was available online, however usage of this data for analysis and/ or strategizing for long term action is very poor.

8. KT intervention in the project area

The KT intervention for the period February 2012 to November 2013 was in two phases

- Active phase/First year of intervention from February 2012 to January 2013
- Follow-up phase from February 2013 to October 2013

Active Phase (February 2012-January 2013)

KT hired three cluster coordinators for a taluk and one district coordinator to oversee the activities of the cluster coordinators in each project district. After their initial training and orientation, the intervention activities started at the taluk level with sharing of project details with both the Health Department and PRED and building rapport with them. The list of water sources were obtained from the PRED, details about chemical and bacteriological tests conducted on water sources were collected from respective departments. This was followed by understanding the causes for

water testing and reporting of the test results not being done on a regular basis. Simultaneously the networking for the conduct of convergence meetings at PHC-GP level and taluk level was initiated. All villages of the taluk were covered by KT team to understand the existing situation and to enumerate the water sources. Village-wise maps indicating the location of water sources were drawn with the help and co-operation of villagers. IEC activities formed an integral part of the KT intervention (Annexure 1).

8.1 Capacity Building

As a part of the capacity building activity, it was planned to create functional district labs in both districts. KT recruited a chemist in October, 2012 for the district laboratory in Chickaballapur for conducting confirmatory tests and procured necessary chemicals and equipments. The district lab began functioning from May 2013. However, the chemist resigned from the post due to some misunderstanding between geologist /executive engineer (PRED) and KT. The lab has not been functioning since beginning of October 2013. There was no laboratory at Chamarajnagar district and the situation remains the same.

The capacities of the officers of the Health department and PRED was to be built through training and workshops at the taluk level (one workshop per taluk). KT conducted workshops for medical officers and other Health department officials with focus on the need for testing for chemical contamination. Hydro-geologist and an epidemiologist were resource persons at this workshop. Similar training for officials from the health department and PRED was conducted at the taluk level which focused on sharing of reports/ results from water testing between the departments. The workshops for medical officers (one workshop per taluk) were planned for the third quarter (Aug-2012 to Oct-2012) and were completed in the following quarter.

8.2 Convergence meetings

Convergence meetings at the district, taluk and GP levels were initiated by KT to emphasize the importance of sharing of water testing reports in water quality surveillance between the PRED and Health departments as well as to initiate the sharing of reports between them.

The *GP-Sub Centre convergence* meetings, i.e. training cum awareness meetings, were planned during the third and fourth quarters of the project (Aug-2012 to Jan-2013). These were not conducted and they were merged with IEC activities at village level as informed by KT Coordinators.

Eight and five *PHC-GP convergence meetings* were planned in Gauribidanur and Kollegal respectively. All the convergence meetings took place during the third quarter (Sep-2012). PHC-GP convergence meetings were organized in the PHC premises and conducted at the PHC level (combining 2-3 PHCs and 4-6 GPs).

Various stakeholders such as the officials from the health department (Medical Officer, Health Inspector), concerned GP Panchayat Development Officers, elected representatives and watermen from GPs participated in the PHC-GP convergence meetings. Minutes of the meeting as well as the list of attendees was maintained by the KT team. Media people (local newspaper staff) were also invited to these meetings.

Taluk level convergence meetings were planned for the second quarter (May-July 2012) in both taluks. While this was completed in July 2012 in Gauribidanur, it was conducted in Nov-2012 in Kollegal. The taluk level convergence meeting at taluk panchayat involved the elected members of taluk panchayat, officers of PRED and Health department, presidents, vice-presidents and PDOs of GP. The convergence meetings focused on the need for regular testing of water sources and sharing of water testing reports by both the departments concerned leading to better water quality surveillance.

District level convergence meeting were planned to be held from Jul-2012. However, they were conducted only during the first quarter of the second year (i.e. Feb-2013) due to delay in signing of the MoUs with the zilla panchayats. The district level convergence meeting focused on the information sharing and use of HMIS and IMIS together for improved monitoring of water testing and water quality surveillance.

8.3 Testing for chemical and bacteriological contamination

Overseeing and ensuring that timely and regular testing of water for chemical and bacteriological contamination is one of the important objectives of the project. To achieve this objective, the availability of H_2S media (for testing bacteriological contamination) and FTKs (for testing chemical contamination) is critical.

The H_2S media was prepared by the KT Coordinator and was distributed to all PHCs to facilitate bacteriological testing during the month of Aug-2012 in Gauribidanur taluk. Of the 18 PHCs in Gauribidanur taluk it was reported that all 18 were conducting bacteriological testing every month since Aug-2012 (Annexe 2B). However, as per revised data shared by KT (Annexe 8), H_2S test have not been conducted since January 2013 in four PHCs. The number of PHCs conducting the H_2S

test varied from one (October 2013) to 11(June 2013) against a total of 18 PHCs in the taluk

In Kollegal taluk, the water testing resumed in all PHCs only by Nov-2012. In Kollegal taluk only 11 of the 16 PHCs were reportedly testing water for bacteriological contamination from Jul-2012 till December 2012. The number of PHCs that conducted the H_2S test varied from 9 to 17 for the period between January 2013 and October 2013. (Annexure 2A and 2B)

KT ensured the supply of FTKs with the required chemicals to GPs from the taluk panchayats in both the districts. From Aug-2012, the testing for chemical contamination of water was followed up by regular contact by the Block Resource Coordinators and Cluster Resource Coordinators in both the taluks. Testing for chemical contamination was completed in Oct-2012 in Gauribidanur taluk, whereas exact date of completion in Kollegal was not clear (Annexure 3). The chemical testing during April and May 2013 (post monsoon 2012) was followed up in Gauribidanur while in Kollegal KT team could not do the same.

8.4 Awareness improvement through IEC activities

IEC activities were held between Dec-2012 and Feb-2013 (for a period of 2 months) and included the following: (i) making wall paintings at 2-3 places; (ii) organizing a rally by school children using placards and slogans; and (iii) staging a street play at the centre of the village to sensitize people on following hygienic practices, keeping water sources clean and regularly chlorinating water sources to avoid water borne diseases.

The IEC activities were undertaken exclusively at the village level in both taluks. The actual IEC activities began only during the last quarter (Dec-2012 to Feb-2013). KT covered 360 of the 364 villages in Gauribidanur taluk and 290 villages of the 338 villages in Kollegal taluk under IEC activities.

Sharing and providing information on various aspects of water quality management were intertwined during the convergence meetings and training workshops as well.

8.5 Data management

The District Coordinator of KT was in-charge of data management and regular uploading of results from water testing for chemical contamination (both pre monsoon and post monsoon for all water sources) on the IMIS portal. Data was also maintained in MS Excel format by the district coordinator in Gauribidanur as a back-up to mitigate the problem of slow/ incomplete uploads. KT could not track chemical

testing of water as well as the uploading of results into IMIS in Kollegal taluk owing to non co-operation from GREEN NGO.

8.6 Tracking of water borne diseases

The tracking of water borne diseases due to bacteriological and chemical contamination of water was also done as a part of the project activity to understand the impact of testing of water and subsequent remedial actions taken up (by GP or PRED).

In Gauribidanur, there was no water borne diseases reported due to chemical contamination for the period July 2012 to October2013 (the groundwater utilisation is 180 percent and the taluk has both fluoride and nitrate contamination as well[7]) while 1100 cases were reported due to bacteriological contamination till December 2012. The water borne diseases reported in Gauribidanur taluk due to bacteriological contamination for the period January 2013 till October 2013 was 2880 in number.

In Kollegal, only 57 cases of water borne diseases were reported due chemical contamination of water, while the number of cases due to bacteriological contamination was found to be 20 in number till January 2013(the ground water utilisation is 46 percent and half the taluk's area is prone for fluoride contamination[8]) while there is no information from January to October 2013. There were sudden drops or spikes in the number of cases of bacteriological contamination in Gauribidanur (Annexure 4). The reporting of water borne diseases in both the taluks needed validation by KT which did not happen.

Follow-up phase from February 2013 to October 2013

Follow-up phase was largely confined to conducting of PHC-GP convergence meetings, follow-up of testing and chlorination at GPs and sharing of reports between PHC and GP. The follow-up activity was done with one KT coordinator per taluk. No IEC activity was done during the follow-up period.

In both Gauribidanur and Kollegal, eight convergence meetings each were conducted as planned. While testing and chlorination was followed up in Gauribidanur, these

[7] CGWB Chickballapur district brochure 2012 pdf

[8] CGWB Chamarajanagar district brochure 2012 pdf

could not be carried out in Kollegal due to frequent absence / change of KT coordinator. Strained relationship with the GREEN NGO also contributed to this.

Apart from these major activities, KT cluster coordinators also visited GPs, attended GP meetings to sensitize people and provided information on water quality management especially relating to maintenance of cleanliness around water sources, periodical cleaning of tanks, regular chlorination, and regular maintenance of water supply system.

9. Mid-term evaluation

Methodology

The mid-term evaluation was conducted in November 2013 in consultation with KT and Arghyam. In both Chamrajnagar and Chikkaballapur an additional GP and PHC were included in addition to 3 GPs and 3 PHCs that were covered during the baseline survey. Thus midterm evaluation included GP and PHC at Manchenahalli in Gauribidanur taluk and Amble GP and PHC at Yelandur in Chamarajanagar district

Mid-term evaluation focused on the change from the baseline on indicators of the project intervention. The indicator framework which was formulated before the baseline survey covering all the dimensions of KT intervention was used to assess the progress/change from the baseline point.

Methodology followed for midterm evaluation was the same as the one for baseline survey. At GPs, structured interviews were held with President/Vice President and PDO/secretary while FGDs were held with GP members and watermen. At PHCs, the structured interviews were held with medical doctor, health inspector and lab technician. At taluk level, Assistant Executive Engineer (AEE), Junior Engineer, THO were interviewed. At the district, Executive engineer and geologist from PRED were interviewed while DHO, DSO, Epidemiologist were interviewed from Health department

The KT district coordinator, block and cluster coordinators were also interviewed for understanding their role, responsibilities, and challenges faced and field changes seen over the period of KT intervention.

The records such as minutes of convergence meetings, workshops, water testing as collected and monitored by district coordinator were also inspected. The persons interviewed during the mid-term evaluation are listed in Annexure 6 and 7 for Gauribidanur and Kollegal taluks respectively

Change vis-à-vis baseline

At GP level awareness about water contamination, types of contamination, diseases caused due to contamination as well as the action required by GP and community at large *has improved significantly* over the baseline assessment. The knowledge about diseases caused due to chemical contamination *has improved*. Awareness about the importance of maintaining cleanliness and hygiene around the water source *has also improved.*

Awareness

Midterm evaluation Results - Awareness

		At the Level of					
Dimension	Indicator	GP		PHC		Taluk/District	
		BL	MT	BL	MT	BL	MT
Awareness about	Water Contamination	Satisfactory - Good	Good	Good	Good	Very Good	Very Good
	Incidence of diseases	Poor	Satisfactory - Good	Good	Good	Poor to Good	Satisfactory - Good
	Testing water quality	Poor	Satisfactory - Good	Satisfac-tory - Good	Satisfac-tory - Good	Good	Good
	Remedial measures	Poor	Satisfactory - Good	Good	Good	Good	Good

BL- Baseline MT – Medium Term

Awareness regarding technical aspects of testing such as sample collection and labeling, responsibility for conducting tests, etc. has also improved over the baseline.

Awareness has on the whole improved over the base line

As found in baseline survey, awareness on all issues related to bacteriological contamination and testing was already good at the PHC level. On the whole, there has been no significant change in awareness at the PHC level.

Awareness about bacteriological and chemical contamination at the taluk and district levels of the Health department and PRED has improved.

At the GP level, knowledge about water testing, frequency, process and parameters of testing has improved over baseline. While watermen collected water samples and gave these to CRCs and BRCs and they have not been trained on testing of water.

		At the Level of					
Dimension	Indicator	GP		PHC			
		BL	MT	BL	MT		
Capacity [Measured by knowledge about]	Training received for water quality testing	Poor	Poor-Satisfactory	Poor to Satisfactory	Poor to Satisfacto		
	Frequency of testing	Satisfactory	Satisfactory-Good	Poor to Good	Poor to Good	Satisfactory	Satisfactory - Good
	Processes involved in testing and reporting	Poor	Poor-Satisfactory	Poor to Good	Satisfactory - Good	Poor - Very Good	Good – Very Good
	Parameters measured in testing	Poor	Poor-Satisfactory	Poor	Satisfactory	Poor to Good	Satisfactory - Good

Capacity and Testing

The knowledge at both taluk and district level about frequency of testing and reporting for bacteriological contamination improved over the baseline. PRED department is also more aware of the testing for bacteriological contamination by PHCs and confirmatory tests at DSO office. With regard to testing of water for chemical contamination, the taluk and district level offices of health department still do not have clear idea of conducting the confirmatory tests.

The parameters measured in chemical contamination is not clear at the GP level except for the fluoride contamination while the knowledge about the parameters tested for chemical contamination has improved among the health department officials at the taluk and district level as a result of the convergence meetings done by KT.

While there is improvement in capacity with respect to water testing, there are some areas that still need improvement

There is improvement since the baseline assessment in the awareness regarding the confirmatory tests done at DSO office district level. The PRED is also aware of the confirmatory tests done the DSO office.

Although the district lab at Chickaballapur is well equipped with instruments and chemical reagents and the post of Chemist was also filled in May 2013 by KT, due to some misunderstandings between the KT and the PRED, the confirmatory tests have not been done. Whereas, the district lab in Chamarajanagar yet to become functional.

Generally, a few convergence meetings have been held facilitated by the BRCs / CRCs engaged by KT. This has not been institutionalized as expected. Convergence meetings were more in the nature of workshops and they have been helpful in raising awareness levels about water quality among the participants.

Although convergence meetings have helped raise awareness, there has been little by way of institutionalizing them

As for sharing of information of test results, this remains quite arbitrary with no specific compliance mechanisms

Convergence and Information Sharing

		At the Level of			
Dimension	Indicator	GP		PHC	
		BL	MT	BL	MT
Convergence & Information Sharing	Meetings at GP level	Poor	Satisfactory		
	Meetings between PHC-Health and PRED			Poor	Satisfactor
	Attendance of Health and PRED members at GP meetings	Poor	Satisfactory		
	Any other forum for exchange of information	Poor	Satisfactory	Poor	Poor
	On occurrence of episodes	Satisfactory to Good			

The sharing of information between GP and PHC continues to takes place only if the results of water testing indicate the source to be non-potable, and during outbreaks. As for chemical contamination, the agency to which the testing has been outsourced (GREEN NGO) in Chamarajanagar does not share it with GP and it shares it with only the TP executive officer.

There is no sharing of information between the Health department and PRED. However, there was evidence indicating sharing of information by the PRED department with the GP in one out of eight GPs. But neither the GP PDO nor the president / members were able to interpret the values of contamination given in the report.

The chemical test result reports were available with the geologist at the district. GPs do not have a copy of the same. Only few GPs which have enquired about the testing results were given a copy of report of chemical testing of water by the CRCs. The

awareness about reporting of chemical contamination to GP has shown little improvement in GPs, PHCs and taluk health office over the baseline.

VWSC which is the recommended mechanism for water surveillance is still not in place. There is room for convergence between VWSC and VHSC but this needs redefining the role of VHSC and empowering it suitably.

The VWSC is required to be the nodal body at the village level on all issues related to water quality - surveillance, testing, reporting, remedial measures and regular monitoring. In all three GPs surveyed, VWSCs were non-existent which meant a status quo since baseline. There is still low awareness at all levels, namely, GP, PHC, taluk and district, regarding VWSCs – their roles and responsibilities, their mandate under NRDWP and other aspects of governance related to water quality.

At present the VHSC is performing some of the functions of WQM such as sample collection, door-to-door awareness programs, providing information at the PHC and so on. In some cases funds allocated to the VHSC under the NRHM (Rs10000 per annum) have been used for purposes such as purchase of bleaching powder (to be used for chlorination) and for cleaning the OHTs, MWS and near water sources. There are issues regarding payment of honorarium to watermen by the panchayat resulting in low motivational levels and disinterest in performing tasks such as regular chlorination, maintaining hygiene at public posts, hand pumps and other areas of water storage. The awareness regarding the functioning of DSO and its role is confined only to PHC at the local level as found during baseline. GP does not have any information on the working of DSO office.

Information, Education and Communication Activities

Water Surveillance and Management

The district epidemiologist in the DSO office is tracking the water testing and health department is aware of the process and the sending of form W to DSO office. While GP is unaware of this process, the PRED is aware because of the convergence meetings done by KT.

IEC activities are taken up only on a need basis - health department and PRED conduct IEC activities only during an outbreak. Other than this, WQM issues are discussed at the anganwadi when

women meet for other health programs. ASHA workers carry out door-to-door information of health issues related to cleanliness and hygiene in the village. They are carrying out a 'dry day' once a week intended to clean up the water sources thereby reducing the breeding space for various hosts that transmit diseases. Though health department does IEC activities on various health related issues, there are no IEC activities conducted specially for water quality issues.

IEC activities have been limited to those undertaken by KT. While they have helped raise awareness about water quality issues, they need to be more institutionalized in the long run

The IEC activities conducted by KT in every village of the taluk were considered to be very helpful by both Health department and the GP. The increase in the awareness levels among the citizens and GP in particular regarding the causes of water contamination, importance of hygiene around water sources indicates the KT effort. People at GP and PHCs spoke about the usefulness of such activities. However, they felt the need for such activities at regular intervals so that the awareness translates into water quality management activities. The interaction of GP with the PHC has scope to improve further. The VHSC activities can also become more effective.

Data management and use

The IMIS and HMIS are two separate systems that store information on water quality testing by PRED and Health departments respectively. The information entered into both IMIS and HMIS can be viewed online.[9]

The HMIS is operated at the taluk level by the THO while the IMIS is operated by the PRED at the district office. Both departments have dedicated persons who are responsible for data entry into the system. The HMIS apart from the health related data also contains the data on water borne diseases and testing of water for bacteriological contamination done at PHCs. The testing of water is reported in 'Form W' and is entered into HMIS.

The IMIS has provision for entering data on sources, those tested for chemical and bacteriological contamination as also the sources which indicated positive for the

[9] http://indiawater.gov.in/imisreports/nrdwpmain.aspx and http://indiawater.gov.in/imisreports/Reports/WaterQuality/rptWQMGPwiseTesting_P.aspx?Rep=0

chemical and/or bacteriological contamination. However, only data on testing of water for chemical contamination is being presently entered into the IMIS.

Issues with correctly identifying sources and delivery points and having common code for both PRED and Health department affect utility of the HMIS and IMIS databases

The collection of water sample for chemical and bacteriological contamination differs with respect to point of collection. For testing of water for chemical contamination, the water sample is collected at the closest point of the source (first outlet of a bore well) while the sample for bacteriological contamination is to be collected twice one from close to the source and at another at consumer point of the same source. So, two samples are to be collected for testing of one water source for bacteriological contamination. However in practice, collection of water sample is restricted to one point, generally, the consumer point or public taps. Further, water samples collected for testing for bacteriological contamination are to be identified by their location and they should be also related – public tap related to a source (OHT, Cistern, etc). It is observed that the sources are not being related and identified correctly. Most GPs do not have or have incomplete data on the number of sources (total, working, non working, abandoned, etc.) and for each source identified delivery points. A few GPs have listed sources along with their power connection number (RR Number). In the absence of proper identification of the samples, it is possible that water samples collected from 2 or 3 consumer points of a single source may be referred to as 2 or 3 sources by PHC.

The water samples collected for chemical contamination should always be equal to the number of sources (in working condition) in the GP since there is a stipulation for testing of all water sources twice a year. The water sources are identified by the location and source id[10] (landmark) and not necessarily the same way as done by PHC. To illustrate, if a water source is near a temple as well as bus stop, PRED may refer to it as source near bus stop while the PHC may refer to it as source near the temple. Not having a common identifier for a source makes it difficult to find out if the same source is affected by both chemical and bacteriological contamination.

The number of sources in GP as per IMIS is more than that of the actual number[11] identified by GP and PRED. This may be because of the changes in number of

10 *http://indiawater.gov.in/imisreports/Reports/WaterQuality/rpt_WQM_GPwise Testing_List.aspx?Rep=0&Ty=P*

11 *A print from the website was checked with the Geologist at Chickaballapur and he agreed with the errors in the number of sources. This data is also different from the data collected by KT which was raised in a meeting with them.*

sources due to availability of water (some may get dried up or abandoned due to various reasons). As a result, anybody looking at the IMIS data would find that the number of sources checked is much less than that of the existing sources.

Assessment of Impact

The intervention was intended to map the processes and enhance the cross-linkages between the PRED and Health departments along with building capacities for water quality testing and monitoring. It also included efforts to improve awareness about the need for water quality testing and monitoring at GP, PHC, taluk and district level.

The activities undertaken as part of the intervention have definitely resulted in improvement in awareness and capacity as also in the monitoring of water quality. Convergence meetings brought officials from different departments and levels together and they became aware of importance of water testing and sharing the results thereof. However, it did not result in them actually collating the results of chemical and bacteriological tests and relating them to data on actual water borne diseases - for better monitoring of water quality.

Similarly, IEC activities did bring about awareness about hygiene around drinking water sources, but the timing of IEC (2 villages per day) missed the population who go out for daily work. Use of other mass media e.g. audio visual aids (slide show) during evenings could have enhanced the coverage. The IEC activities were also combined with the generation of village maps indicating water sources. However, these were not shared with the GP later.

HMIS - IMIS integration and its utilization for better planning and water quality management as a concept has not taken roots. The first step of identifying water sources by a common code by both the department is yet to happen. The data is also not free from errors and there has been no effort at validation.

The intervention has been essentially a set of activities that were planned and implemented in the given time period. There has been little buy-in by the panchayats or government authorities as engagement with them was minimal. While it was partly due to the way project was managed, it is necessary at this stage to also revisit the project design to see if there were any issues in its conception. Both these aspects are examined in the following paragraphs.

The intervention is based on the assumption that the problem with water quality arose because there was no convergence between the two agencies responsible for water quality testing viz. the Health Department and the PRED. It was argued that water quality management would improve if these two departments met periodically and exchanged information regarding chemical and bacteriological test results.

This argument misses the critical differences between bacteriological and chemical contaminations (please see table below).

Bacteriological contamination demands immediate attention and it is possible to deal with both the cause of contamination and also the disease at a relatively low cost. Chemical contamination, on the other hand, occurs due to over exploitation of underground water and its effects are visible over a long period. There is no way to eliminate chemical contamination other than through fresh recharge of ground water. Finding an alternate site where the water is not contaminated or sourcing supply from elsewhere are the only other solutions.

Bacteriological Contamination	Chemical Contamination
▪ Preventable (by adopting hygienic practices, regular testing and keeping water sources clean) ▪ Remediable at low cost (by boiling water) ▪ Effect immediately detected through reported cases of illness – particularly among children ▪ It can also (in isolated cases) be due to poor hygienic practices	▪ Preventable but in the long term at high cost (improving surface water, recharging ground water) ▪ No alternative source in the short term either ▪ Remediable also at high cost (RO plants) ▪ Effects seen over longer period and not always reported or recorded

Convergence was not really the issue

Testing for bacteriological contamination, taking remedial measures in case of contamination and treating persons afflicted with bacteriological contamination all fall within the remit of PHC-GP. As long as a PHC-GP have necessary material (H_2S medium for testing and medicines for treating the disease) and human resources i.e. watermen and ASHA workers, this kind of water contamination is taken care. There is

no role for PRED in this as the maintenance of water supply systems is GP's responsibility.

As for chemical contamination is concerned – it requires decisions at much higher levels (CEO, ZP and EE, PRED) as dealing with it through RO treatment plants, finding alternate sources, etc. requires budgetary resources which are beyond the capacity of Taluk and Gram Panchayats. There is also an inherent tendency to keep the information about chemical contamination from the people because it would raise the demand for alternate safe drinking water which the administration may not be in a position to provide.

Water Supply Vs Water Quality

The midterm evaluation confirms the above as a) the convergence meetings facilitated by KT were more like workshops which definitely helped improve awareness but were otherwise not useful in improving water quality management; and b) district level PRED officials expressed the view that having information about bacteriological test results was of no use to them.

The other design issue was fundamental disconnect between priorities of GP and the intervention. While the intervention focused on water quality, GP was focused on water supply. (this is supported by findings from the baseline survey and from field visits). The water quality management was not a felt need. This made it difficult for the KT to engage with GPs and making them realize the importance of water quality management.

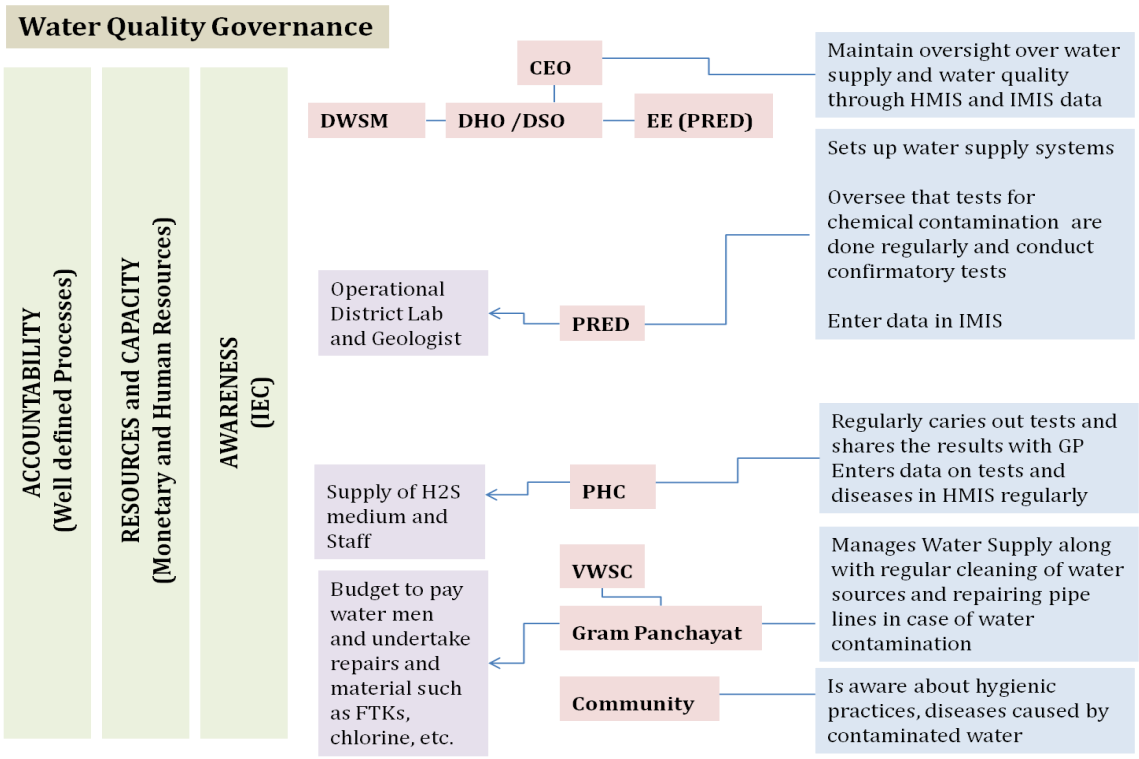
GP members were focused on the water supply - quantity and frequency. They were concerned about efficient motors for pumping along with the separate transformer to ensure the voltage stability. Filling up of an OHT requires 10-16 hours across GPs and the 3 phase power in rural area is available for only 4 hours a day.

GP members were worried about issues of deduction of electricity bills from their grants and resultant shortage of funds for maintenance. GP representatives (both officials and elected members) were more bothered about issues of non-availability of funds for new bore wells, and lack of personnel rather than water quality. Deduction of the electricity charges and arrears from the grants resulted in shortage of funds for water supply management such as payment of salaries to watermen. People were not willing to pay for water supply that was poor in quantity and quality further tightening the already difficult financial position. GP's poor financial position also adversely impacted the water quality management.

Thus, given GPs' overriding preoccupation with managing water supply, their involvement in the project did not go beyond extending cooperation to the convergence meetings and IEC activities. However, there were GPs in pilot taluks viz, D Palya in Gauribidanur and Mullur in Kollegal where water supply was not an issue. It was observed that in these GPs there was greater eagerness to learn about the water quality issues. However, the intervention did not differentiate between these GPs and others in terms of intensity and quality of engagement.

No efforts to institutionalize the changes

The activities under the intervention can be divided into three types – a) activities like the IEC and facilitating convergence meetings; b) providing material and human support from outside; and c) processes (water quality testing, data management) requiring accountability from within the government system.



The intervention was successful in the first two types of activities, which could be supported from outside. However, important requirement for any intervention to sustain beyond the project activities is that there is a buy-in at higher levels. The PRED at taluk and district level was very clear that for any process reengineering in water quality management to be in place, the directions from the state level through orders was imperative. For obtaining greater ownership, it was required that the

reengineered processes were reinforced by instructions from higher authorities through government orders and guidelines with suitable built-in monitoring mechanism. A significant gap in the intervention was that it was driven by the district and cluster coordinators whose capacity to engage the district administration was rather limited. The intervention lacked leadership that could engage with the important stakeholders – particularly at the higher levels of the government.

Problems with Project Management

There has been no institutionalization of the changes. To illustrate, there was little focus on the processes and steps of exchanging the results of water testing between the PRED and Health departments. There is no clarity as to where and who in taluk/district would collate the test results (chemical and bacteriological), use it along with the information on water borne diseases from HMIS and interpret the water quality scenario of the taluk/district which would feed into planning and policy making as well. Absence of District Water and Sanitation Mission (DWSM) to coordinate the water quality management with PRED and Health department at the district level and VWSC at village level in GP has not been compensated by other suitable institutional mechanisms.

That there has been compliance with the letter and not so much with spirit is evident in another instance. While sharing of information was the first step, the GP needed to follow it up with interpreting and discussing them as the crucial next step in water quality management, which has been missed. It was seen in one of the sample GP which had received the results of water testing (both bacteriological and chemical) but did not discuss it in its meeting; and these reports have not made any change in the approach of GP towards water quality management.

The intervention also suffered due to deficiencies in project management. Ensuring the proper project team in place particularly considering frequent transfers of government officials was important for ensuring the proper execution of envisaged activities.

KT faced frequent changes in the field team especially in Kollegal taluk. Considering the difficulty in finding persons with right qualification and motivation to take up the positions of District Coordinators and Cluster Coordinators, there was a need for proper mechanism to be put in place to ensure project continuity in case of changes in the field team. The contact numbers of officials, the results of water testing (bacteriological and chemical) and the field insights including problems encountered

were not passed on from person who moved out of the project to the person who came in (in Kollegal). This affected the project implementation severely.

Transition of changes in the field team and field coordinators was also not adequately supervised and they were often left without proper guidance and supervision. The new members of the team were put on job without adequate orientation, and understanding of the intervention and the intended outputs and outcomes. The focus of district coordinator was limited to supervision of cluster coordinators for the conduct of convergence meetings and the data collection from the PRED and health department.

Recommendations

The project management also involved the maintenance of data regarding the water tests conducted (chemical and bacteriological), convergence meetings done, water borne diseases(both chemical and bacteriological) and uploading of test results into IMIS. This information was to be shared through filled MMFs. The MMFs had several inconsistencies with respect to number of tests conducted, number of PHCs conducting the bacteriological tests, number of water borne diseases and number of GPs in which the testing of water for chemical contamination are conducted. This data was not free from inconsistencies even after its revision. This reflects upon the poor project supervision and management.

The sustainability of the intervention beyond the project period is doubtful in the absence of ownership by the stakeholders and institutionalization of the changes.

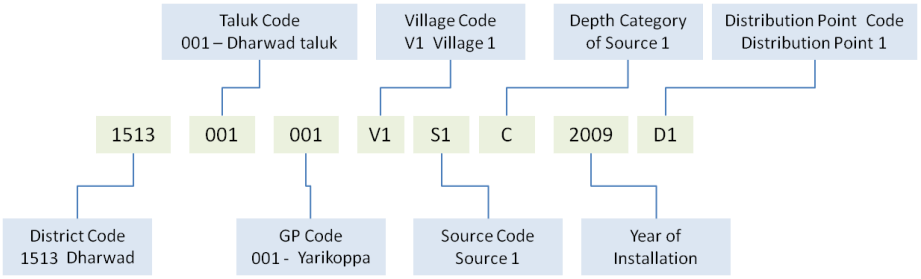
a. As convergence is really not the issue, the intervention should focus on processes of water testing and data management that require to be strengthened. This must be done with complete involvement of the district administration so that they issue necessary orders and institute suitable monitoring mechanisms. In other words, it must be ensured that the processes and procedures are institutionalized so that they are sustained beyond the project period. If a template of processes and supporting government orders are developed, it would be easy to replicate them in other districts.

b. It is strongly recommended that, going forward, intervention must be undertaken in such districts and taluks which do not have water supply issues. This would help gather strong evidence in support of recommended water quality management processes.

c. Preparation of village wise maps indicating the water sources and delivery points and sharing them with GPs should be an important element of intervention. These maps are very useful for encouraging the GPs to focus on water quality

management. These maps showing the sources and delivery points should be used along with the test results of bacteriological testing of water for effective advocacy.

d. It is important that sources and delivery points should be uniformly and scientifically coded so that GPs could understand and make use of it in monitoring the water quality. Coding can be done using District-Taluk-GP code[12] provided by RDPR to which village code followed by Source Number and Delivery point Number can be added. It could also include the year of installation and depth category[13].(A= <250 ft B = 251to 500ft, C= 501-750ft and D = 751 to 1000, E => 1000ft). A typical code would be something like the one given below:



These source and delivery point list should be used by GP to track the testing and test results so that suitable actions are taken. This can also be used for monitoring the works (cleaning and chlorination) for water quality management. KT can demonstrate the use of this database in few GPs.

Testing of water for bacteriological contamination

Code	Date of testing	Result of the testing (positive/negative)	Action Taken		
			Pipe repair (date)	Cleaning tanks (date)	Chlorination (date)
V1S1					
S1D1					
S2D2					

Testing for Chemical contamination

Code	(Date)	Parameters checked for chemical contamination					
		1	2	3	4	5	6
V1S1		+ve	-ve				

[12] These are provided to GPs from RDPR vide order dated 25-03-2013 also available on RDPR website.

[13] The depth category should be provided only for sources

V1S2							

The GP wise source wise results of testing of water for chemical contamination data should be made available on the ZP Website as well periodically so that the decision makers are aware of the scenario.

List of major intervention activities of KT in the with timelines

SL. No.	Level	Activities of the project (completed)	Gauribidanur (Chickballapur District)	Kollegal (Chamarajanagar district)
1.	**GP**	PHC-GP Convergence meeting-2012-13	8 (completed by September 2012)	5 (completed by September 2012)
2		IEC Activity	3rd Dec 2012 to 2nd Feb 2013	11th Dec 2012 to 10th Feb 2013
3		Follow up regarding the chlorination and water testing	Since March 2013	Since March 2013
4		PHC-GP convergence meetings 2013-14	8 (June 2013 to August 2013)	8 (June to October 2013)
5	**Taluk**	Convergence meeting (Taluk level elected body, GP presidents vice presidents, PDOs, Health and PRED officials)	25th July 2012	9-11-2012
6		Workshop/Training for PRED and Health Department (regarding the importance of water testing for both chemical and bacteriological contamination as well as sharing reports of the same)	22nd Nov 2012	29-11-2012
7		Workshop for medical officers on Chemical contamination of water	5th January 2013	1st January 2013
8	**District**	Convergence meeting cum training of PRED and Health department officials about sharing of reports of water testing (chemical and bacteriological) and cross-linking of IMIS and HMIS data for better water quality surveillance.	22nd February 2013	22nd February 2013
9		Functioning of District lab	Functional from May	
10		Training Module /material development	Completed	

Annexure 2A

Testing of water for bacteriological contamination

Frequency of Testing	Chickaballapur district					Chamarajanagar district				
	Gowribidanur Taluk					Kollegala taluk				
	Total number of H2S tests conducted in the taluk (as per DSO records)									
Month	Cumula-tive up to previous month	Planned for current month	Actual achieved during the month	Planned but not achieved	Cumula-tive till end of the month	Cumula-tive up to previous month	Planned for current month	Actual achieved during the month	Planned but not achieved	Cumula te-ive till end of the month
July -2012	0	50	25	25	25	60	250	119	131	179
August	25	360	246	114	271	179	250	119	131	298
September	271	200	246	-46	517	298	144	105	39	403
October	517	360	246	114	763	403	180	132	48	535
November	763	225	225	0	988	535	135	128	7	663
December	988	360	163	197	1151	663	450	287	163	950
Jan -2013	0	0	18	0	18	0	0	60	0	60
February	18	0	20	0	38	60	0	107	0	167
March	38	0	22	0	60	167	0	137	0	304
April	60	0	102	0	162	304	0	118	0	422
May	162	0	102	0	264	422	0	118	0	540
June	264	0	73	0	337	540	0	138	0	678
July	337	0	50	0	387	678	0	101	0	779
August	387	0	61	0	448	779	0	92	0	871
September	448	0	48	0	496	871	0	160	0	1031
October	496	0	23	0	519	1031	0	80	0	1111

Testing of water for bacteriological contamination

Frequency of Testing	Chickaballapur district				Chamarajanagar district			
	Gowribidanur Taluk				Kollegala taluk			
	Number of PHCs where H2S tests were conducted							
Month	Cumulative up to previous month	Planned for current month	Actual achieved during the month	Planned but not achieved	Cumulative up to previous month	Planned for current month	Actual achieved during the month	Planned but not achieved
July - 2012	0	18	12	6	0	11	11	0
August	12	6	6	0	0	11	11	0
September	18	0	18	0	0	11	11	0
October	18	0	18	0	0	11	11	0
November	18	0	18	0	0	11	11	0
December	18	0	18	0	0	11	11	0
Jan- 2013	0	18	**3**	15	0	17	**15**	2
February	3	18	**2**	16	15	17	**13**	4
March	3	18	**3**	15	28	17	**17**	0
April	6	18	**7**	11	45	17	**9**	8
May	13	18	**10**	8	54	17	**9**	8
June	23	18	**11**	7	63	17	**16**	1
July	34	18	**7**	11	79	17	**17**	0
August	41	18	**6**	12	96	17	**10**	7
September	47	18	**6**	12	106	17	**12**	5
October	47	18	**1**	17	118	17	**9**	8

Testing of water for chemical contamination

Frequency of Testing	Number of FTK (chemical) tests conducted at the taluk level									
	Chickaballapur district					Chamarajanagar district				
	Gowribidanur Taluk					Kollegala taluk				
Month	Cumulati-ve up to previous month	Planned for current month	Actual achiev-ed during the month	Planned but not achiev-ed	Cumu-lative till end of the month	Cumulati-ve up to previous month	Planned for current month	Actual achiev-ed during the month	Planned but not achiev-ed	Cumulati-ve till end of the month
July 2012	0	0	0	0	0	40	90	37	53	77
August	0	193	193	0	**193**	77	65	37	28	**114**
September	193	202	202	0	**395**	114	132	96	36	**210**
October	395	81	81	0	**476**	210	254	203	51	**413**
November	476	0	0	0	**476**	413	135	64	71	**477**
December	476	0	0	0	**476**	477	254	87	167	**564**
Jan 2013	476	0	0	0	**476**	564	354	256	98	**820**
February	476	0	0	0	**476**	564	354	256	98	**820**
Number of GPs where FTK (chemical) tests were conducted										
July 2012	0	0	0	0	0	0	37	37	0	37
August	0	16	16	0	16	0	37	37	0	37
September	16	15	15	0	31	0	37	37	0	37
October	31	6	6	0	37	0	37	37	0	37
November	37	0	0	0	37	0	37	37	0	37
December	37	0	0	0	37	0	37	37	0	37
Jan 2013	37	0	0	0	37	0	37	37	0	37
February	37	0	0	0	37	0	37	37	0	37

Tracking of water borne diseases

INCIDENCE OF DISEASES		Chickaballapur district			Chamarajanagar district		
		Gowribidanur Taluk			Kollegala taluk		
Indicator	**Month**	**Previous**	**Current**	**Cumulative**	**Previous**	**Current**	**Cumulative**
Number of water borne diseases in the GP due to chemical causes	July	0	0	0	8	4	12
	August	0	0	0	12	23	35
	September	0	0	0	35	6	41
	October	0	0	0	41	5	46
	November	0	0	0	46	4	50
	December	0	0	0	50	3	53
	January	0	0	0	53	4	57
	February	0	0	0	53	4	57
Number of water borne diseases in the PHC due to bacteriological causes	July	20	151	171	7	5	12
	August	171	188	359	7	3	10
	September	359	31	390	10	3	13
	October	390	159	549	13	0	13
	November	549	329	878	13	2	15
	December	878	250	1128	0	0	0
	January	0	454	0	0	0	0
	February	454	424	454	0	0	0
	March	878	477	878	0	0	0
	April	1355	508	1355	0	0	0
	May	1863	599	1863	0	0	0
	June	2462	200	2462	0	0	0
	July	2662	56	2662	0	0	0
	August	2718	88	2718	0	0	0
	September	2806	76	2806	0	0	0
	October	2882	0	2882	0	0	0

Recent Government Orders related to management of water supply in GPs

The O& M grants for maintenance of water supply in villages is revised with effect from 2013-14. The annual O&M grants for handpumps , Miniwater supply and piped water supply were revised to Rs 1000, Rs 5000 and Rs. 10000 respectively. The monthly charges for water supply have been revised. For individual house connections Water charges is fixed at Rs.30 per month per household who has 3or less members in the house. If the number of members is above three, then the water charges would be at the rate of Rs. 10 per member per month. The charges for water through public taps are fixed at Rs. 20 per month per household. ESCOMS are to provide 25 percent subsidy in electric charges for water supply in GPs (G.O. dated 12/3/2013).

The information on the number of working and defunct hand pumps, MWS and PWS at the GP level has been sought by the State level for the same (G.O. dated 25/3/2013).

An incentive to promote individual water supply connection has been proposed. ASHA workers have been entrusted with this work of promoting the individual water supply connections. For every connection promoted by ASHA worker, she gets Rs.75 paid (G.O. dated 28/3/2013)

Steps for constituting VWSC have been initiated across the state. (G.O. dated 29/8/2013). The constitution and first meetings of the VWSC to be completed by end of October 2013.

Persons met during the mid-term evaluation in Gauribidanur Taluk

Place	Persons met	Designation/Post	Method
Allipura GP	Bobju Hussain	President	Interview
	Bakar Ali	Husband of vice president Shakira Banu	Interview
	Hameed	to be president and member	Interview
	Gopalakrishnappa	PDO	Interview
	Bakar Raja	bill collector	
	Hassan	Waterman	
	Nagaraj	Waterman	
	Gangaram	Waterman	
	Jafar	Waterman	FGD
	Radhika	ASHA	
	Ashwattamma	ASHA	FGD
Allipura PHC	Dr. Sankrithi	Medical officer	Interview
	Mahesh	Sr. Health Inspector	Interview
Hosuru GP	Jayaram	President	Interview
	Mohammed Mazar	Vice president	Interview
	Siddaramaiah	PDO	Interview
	Mohamoob pasha	Bill collector	Interview
	Krishnappa	Waterman	
	Ramesha	Waterman	
	Rangappa	Waterman	FGD
Hosuru PHC	Dr. RaviKumar	Medical Officer	Interview
	Ganesha	Lab technician	Interview
	Rathnamma	Jr. Health Assistant	Interview
	Bramarambika	ASHA	
	Gowramma	ASHA	
	Vijaya	ASHA	FGD
D.Palya GP	Narasimha reddy	Member	Interview
	Shashidhar	Member	Interview
	Fasil	waterman	Interview
	Rashid	Peon	Interview
D Palya PHC	Dr. Bharati	Medical Officer	Interview
	Lakshmi narasamma	ASHA	
	Ganga devi	ASHA	
	shantamma	ASHA	
	Annapurna	ASHA	FGD

Place	Persons met	Designation/Post	Method
Manchenahalli GP	Srirangappa M.P	President	Interview
	Subrahmanya	Member	
	Narasimha reddy	Member	
	Ravindra	PDO	
	Adinarayanappa	Secretary	FGD
Manchenahalli PHC	Dr. Chandramohan	Medical Officer	Interview
	Ramesh	Health Inspector	Interview
		Lab technician	Interview
	Jayalakshmi	ASHA	
	Balamma	ASHA	
	Sumitra	ASHA	
	Kamalamma	ASHA	
	Anjenamma	ASHA	
	shakila banu	ASHA	
	Anita	ASHA	
	Geetha	ASHA	FGD
Namagodlu GP	Venkatesh	Bill collector	Interview
Minakanagurki GP	Ashwathnarayan swamy	PDO	Interview
	Chikkappaiah	Bill collector	Interview
DSO office	Madhusudhan	Data Manager	Interview
Chickkaballapura	Vinod	District epidemologist	Interview
	Dr. Rangaswamy	District Health officer	Interview
		Dist surviellance officer	Interview
EE office	Srinivas shastry	Geologist and lab incharge	Interview
Chickkaballapura	Chaya	Junior Engineer (water supply)	Interview
AEE office Gauribidanur	Adinaryanappa	incharge AEE	Interview
THO office Gauribidanur	Krishnoji Rao	Health inspector	Interview
Gauribidanur	Venkatesh babu & others	KT coordinators	
	Anand	KT Block Resource coordinator	FGD
Bagepalli Office	Nagesh	KT District coordinator	Interview
	Narayanaswamy	cordinator (GBD and gudibanda)	Interview

Persons met during the mid-term evaluation in Kollegal and Yelandur Taluk

Place	Persons met	Designation/Post	Method
Cowdally GP		President	Interview
	Muthuraj	vice president	Interview
	Rajkumar	secretary	Interview
	Venkatachala	waterman	
	Nachimuttu	waterman	
	shaffiulla	waterman	
	muzeer	waterman	FGD
Cowdally PHC	Dr Ganesh	Medical officer	Interview
Bandahalli GP	Khalid	GP member	
	Nagaiah	GP member	
	Nagaraju	GP member	FGD
	Kamappa	waterman	
	Mahadevaswamy	waterman	
		waterman	FGD
Bandalli PHC	Deepa	Lab technician	Interview
		ASHA	Interview
Mullur GP	Ramesh	PDO	Interview
		President	Interview
		ASHA	Interview
		Bill Collector	Interview
Chilakvadi PHC	Geetha	Staff nurse	Interview
Ambale GP	Rajamma	President	Interview
	Gangadhar	PDO	Interview
	Yashoda	ASHA	
	Sunanda	ASHA	
	Prema	ASHA	
	Savitri	ASHA	FGD
	Nagappa	Waterman	
	Rajendra	Waterman	
	Kumaraswamy	Waterman	FGD
District level	Venkatachaliah	Executive engineer	Interview
	Ghore	Geologist	Interview
	Kumar naik	lab technologist	Interview
Taluk level	Naga sunder	Engineer	Interview
	Satish	case worker	Interview
	thimmegowda	sr health assistant	Interview

Details of H2S tests conducted in the PHCs and water borne diseases reported in Gauribidanur Taluk

Sl. No.	Name of the PHC	Jan-13		Feb-13		Mar-13		Apr-13		May-13		Jun-13		Jul-13		Aug-13		Sep-13		Oct-13		PHC Total	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
1	Tondebavi	0	0	0	0	0	0	10	0	37	0	0	0	6	0	0	0	4	3	0	0	**57**	**3**
2	Gedare	10	15	10	17	10	15	10	19	10	19	10	25	14	0	0	0	0	0	0	0	**74**	**110**
3	Alipura	0	13	0	8	0	11	37	10	2	9	2	9	8	7	16	9	31	15	23	0	**119**	**91**
4	D Palya	0	25	0	38	0	25	0	42	0	38	0	42	0	0	0	0	0	0	0	0	**0**	**210**
5	Namagondlu	0	28	0	42	0	36	0	44	0	43	0	46	6	0	9	30	3	0	0	0	**18**	**269**
6	Manchenahalli	0	10	0	15	0	31	0	43	8	50	5	47	0	0	16	0	6	0	0	0	**35**	**196**
7	Hosur	0	117	0	25	0	89	0	56	10	98	4	0	0	0	9	0	0	8	0	0	**23**	**393**
8	Kallinayakanahalli	0	7	0	4	0	11	0	16	0	16	0	0	0	0	0	0	0	0	0	0	**0**	**54**
9	Alkapura	1	1	0	5	0	14	0	9	2	9	3	0	0	0	0	4	0	6	0	0	**6**	**48**
10	Hudugur	0	19	0	16	0	16	0	16	17	22	2	15	0	13	0	10	2	13	0	0	**21**	**140**
11	Nakalahalli	0	0	0	0	0	1	0	0	0	1	0	0	0	36	0	34	2	31	0	0	**2**	**103**
12	Vidurashwatta	0	13	0	32	0	26	0	32	0	43	0	0	0	0	0	0	0	0	0	0	**0**	**146**
13	Jagareddahalli	0	28	0	18	0	29	22	22	8	22	15	0	0	0	0	0	0	0	0	0	**45**	**119**
14	Nagaragere	0	10	0	19	0	19	0	23	0	30	0	0	0	0	0	0	0	0	0	0	**0**	**101**
15	Idaguru	7	69	10	76	10	62	2	85	4	86	6	0	9	0	9	0	0	0	0	0	**57**	**378**
16	Vatadahosalli	0	30	0	36	0	38	0	32	0	42	20	16	4	0	0	1	0	0	0	0	**24**	**195**
17	Kurudi	0	65	0	68	2	40	8	53	0	63	2	0	0	0	0	0	0	0	0	0	**12**	**289**
18	Ramapura	0	4	0	5	0	14	13	6	4	8	4	0	3	0	2	0	0	0	0	0	**26**	**37**
Taluk Total for the month		**18**	**454**	**20**	**424**	**22**	**477**	**102**	**508**	**102**	**599**	**73**	**200**	**50**	**56**	**61**	**88**	**48**	**76**	**23**	**0**		
Total of PHCs where H2S conducted		**3**		**2**		**3**		**7**		**10**		**11**		**7**		**6**		**6**		**1**		**519**	**2882**

A Total No. of H2S Tests conducted
B Total No. of Water Borne Diseases