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THE FUTURE OF WATER, SANITATION AND HYGIENE:
INNOVATION, ADAPTATION AND ENGAGEMENT IN A CHANGING WORLD

Household level assessment, participatory learning for rural water safety and security planning

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Household water safety & security planning approaches as outlined in national rural drinking water programme guidelines were piloted using participatory methodologies in one block of West Bengal State in India. The assessment of water quality was done by collecting water samples from existing drinking water sources including from point of use and were analyzed for critical water quality parameters. The household survey was done through purposive random sampling method (10,094 households) in the study area. The result of the study indicates that the present water supply in the block is inadequate vis-a-vis the perceived demand of the consumer. More than two-thirds of the water sources are unsafe on one or multiple accounts. Very low level water safety awareness and poor hygienic practices are the realities. The study attempted to correlate the poor sanitation, water quality both at source and user end with disease burden.

Introduction

The pilot project of Village Water Safety and Security Action Plan is linked to the modified guideline for Rural Drinking Water Program (DDWS, 2010) and the national goal to provide adequate water for drinking, cooking and other domestic purposes to every rural person on a sustainable basis. As per the revised guideline community should develop its own village water safety and security plan taking into consideration of present water availability, reliability and its different usage.

The specific purpose of the pilot project is to:

- Understand the nature of problem associated with quality and quantity of supplied water, users' perceptions, sustainability of sources, knowledge and practices of the community, waterborne disease burden and identification of the problems for plan-making purpose.
- Understand time required for preparation of village action plan, resources involved, expertise required, inter-departmental coordination, data processing and feasibility of this process for up scaling.

The Village Water Safety and Security Action Plan under the pilot project, has been prepared in a participatory manner with full involvement of various stakeholders, line departments, agencies and Non-Governmental Organization (NGO) partners.

Study area

The study area is Haroa block (sub –district), North 24 Pgs district, West Bengal, India. It consist of 8 Gram Panchayats (lowest development unit) and 89 villages. Total population of block is 182,522 representing 94,270 males and 88,252 females (GOI, 2001) thereby signifying female- male ratio to be 0.93. According to Census 2001, literacy rate of the block is 56.9 percent (104,037 literates). In accordance with above, 59% (61,381) are male and 41% (42,656) are female. Of 42,227 total households, 20,228 (47.9 %) belong to Below Poverty Line (BPL) category.

Sample size

For household survey, purposive random sampling method has been followed covering 25% (10,094) of the households of each village. For source level water sampling, all the public drinking water sources (1,066) and for private sources, 5% (585) of the surveyed households have been covered. For end users' water sampling purpose, 5% of total households (2,213) and all drinking water sources from institutions (294) were collected and tested as per standard methods by involving seven sub-district level decentralized water quality laboratories in North 24 Pgs district, West Bengal, India.

Planning process

Recognizing the value and the importance of peoples' participation in an important plan making process like Village Water Safety and Security Action Plan, it has been prepared with full involvement of various stakeholders of the plan such as villagers, members of Panchayat Raj Institutions (PRIs), members of Village Development Committee (*Gram Unnayan Samity*), NGOs, Task Force, functionaries of the relevant departments such as Public Health Engineering Department (PHED), and other line departments such as Department of Health & Family Welfare (DH&FW), Panchayats & Rural Development Department (P&RDD). In other words, it is a plan prepared by using the wisdom of various stakeholders of it in a participatory manner.

Data base building: In order to achieve a right outcome at the end of the village action plan making exercise, stock taking of the village situation has been considered as very important from the very beginning of framing this research design. In this regard, both the primary and secondary data sources have been utilized. Keeping in mind about the need of wider range of data parameters from pure scientific information such as water quality data, information on hydro-geological parameters of the area, rainfall data and manifestation of water borne diseases, etc. to socio-economical data like knowledge level and practices related to drinking water of the village population, institutional information, morbidity pattern, etc. both qualitative and quantitative techniques of data collection has been applied.

Primary data base: For primary data collection, the experts in the relevant fields developed the required questionnaires capturing all the necessary parameters for this plan making, The well designed questionnaires were again tested at field level by the well trained field investigators and minor modifications/corrections were done based on the feedback from field level before finalizing it for actual base line primary survey.

All the completed questionnaires were then systematically codified and output was generated through the developed software. Such computerized database was the most essential part of the planning process as it could be subsequently utilized for any statistical calculation and data analysis as per the requirement of planners.

For qualitative database building, Participatory Rural Appraisal (PRA) technique was applied to capture the issues, identifications of the problems, opinion generation, developing a proper strategy for problem solution related to operation and maintenance of the planned project. Such exercises were carried out in all the 89 villages under the pilot project area with spontaneous participation of the villagers and other stakeholders. Further the PRA maps were digitized using Autocad software.

Secondary data base: In a planning process secondary data such as different parameters of demographic information, institutional data, socio-econometric data play a vital role, particularly in calculation of the project design and estimation of the projected future need. However, such data need to be collected from well-recognized and reliable data sources. As a part of building a secondary database for the required village water safety and security action planning process, various parameters of census reports, government departmental data such geo-hydrological data, meteorological data, etc. were collected and collated for relevant analysis in the subsequent planning process.

Results and discussions

Demographic profile

Of the 10,094 surveyed households (population 61,819), 25,668 were male, 23,669 were female and 12,484 were children. Among the surveyed population, 65% of respondent households were under General category, 4% were Other Backward Classes (OBC) category and 31% households were Scheduled Castes (SC) and Schedule Tribes (ST).

The occupational levels for their livelihood revealed that 60.91% of households were daily labourers; 23.91% were farming family; 13.46% were involved in small trade or business and 2.44% were engaged in services.

Distribution of sources

The respondents indicated that nearly 52% (5,185) households were using public water sources, 34% (3,391) households were using private water sources and 18% (1,770) household were using both private and public drinking water sources.

Water availability and accessibility

The household survey analysis indicates that 8,758 households (87%) were getting the water round the year. Nearly 4,184 families (42%) were having the access to public water sources within 100-200 m, 1,463 families (14%) within 200 m- 500 m and 4,446 families (44%) >500m distance. The uneven distribution of water supply indicates the depth of water table, nature of the lithology including the aquifer condition, technology used to abstract water from ground and surface, pump type and the drawdown on pumping for round the year are not sufficient.

Despite the availability of water, accessibility remains an issue for the households, i.e they have to travel more than 500m to fetch the water.

Frequency of water collection

The results revealed that more than 6,091 families (60%) were collecting water more than twice a day for drinking and cooking purposes. Around 1,829 families (18%) informed that they have to wait more than 30 minutes to fetch water for drinking purposes. Nearly 1,026 families (10%) informed that they have to travel more than 30 minutes to carry the water from source to house.

Household water management

The survey revealed that nearly 97% of female population were bringing water from public drinking water sources. The vessels being used to bring water from the sources were as follows:

- 2,482 households (25%) using buckets;
- 1,932 households (19%) using pitchers,
- 318 households (3%) using bottles;
- 5,350 households (53%) by any combination of the above.

Of the surveyed households 7,148 families (71%) were bringing water without closing the container and 8,957 (89%) households had storing facility in their houses.

Awareness on water safety

Among the surveyed families, 355 households had domestic water filter and 7,230 (72%) families were interested to procure a filter. Nearly 6,098 families (60%) were not aware about the place of availability of filters.

Of the surveyed households 13.04% reported to be taking out water from vessel by tilting method, 35.35% using mugs, 13.89% using glass and 35.92% by multiple combinations of these methods.

Only 1.22% of them were found to be using long handle ladle and a negligible percentage of 0.58% using the most appropriate method of tap at the bottom of the storing vessel for taking out water. Thus, it is evident that there is an ample scope of contamination at household level just because of following inappropriate methods of taking out of drinking water from the vessel.

The water handling practices may be a potential risk for water contamination at point of use as nearly 49% households were directly dipping their hands using mugs and glass to use water.

Water quality status

The summary highlights of the public, private, end users and institutional water test results were as follows:

- Of 1,066 public drinking water sources tested (1,057 spot sources & 9 SSP sources) only 31.14% of the sources were safe and 8.54% were arsenic contaminated; 60.98% were iron contaminated; 15.10% were fecally contaminated and for 44.47% the sanitary risk score >=5. The graph (Figure 1) indicates that Q-5

(drainage channel faulty), Q-3 (other source of pollution) and Q-4 (ponding of stagnant water within 2m of cement floor) are contributing more for the unsanitary condition in around hand pumps.

- Of 585 private drinking water sources tested only 35.9% of the sources were safe and 13.33% were arsenic contaminated; 56.24% were iron contaminated; 8.72% were fecally contaminated and for 41.7% sanitary risk score >=5. The above graph (Figure 2) indicates that Q-2 (nearest latrine on higher ground than the handpump) and Q-5 (drainage channel faulty) are contributing more for the unsanitary condition in around private hand pumps.
- Of 2,213 end users' drinking water sources tested, 66.2% were safe and 33.8% were fecally contaminated.
- Of 294 sources tested from institutions (primary school, high school, SSK, MSK, ICDS and health centres), 23 % were safe and remaining sources were contaminated either due to arsenic, iron, faecal contamination or its combination.
- Of the surveyed households 6.95% do not cover their drinking water sources and 9.52% do not keep their water storage area clean.

The regular procedure for declaration of a region/area free from arsenic or any other type of contamination is currently based on the test result of the public drinking water sources alone. Whereas ***the test results reveals that arsenic contamination is comparatively higher in case of private water sources*** *and also as per the primary survey,* ***34% of the surveyed households solely depend on private water sources*** *for their drinking water and 48% depend on both private and public sources, implying that a significant portion of the population is at risk of consuming arsenic contaminated water.*

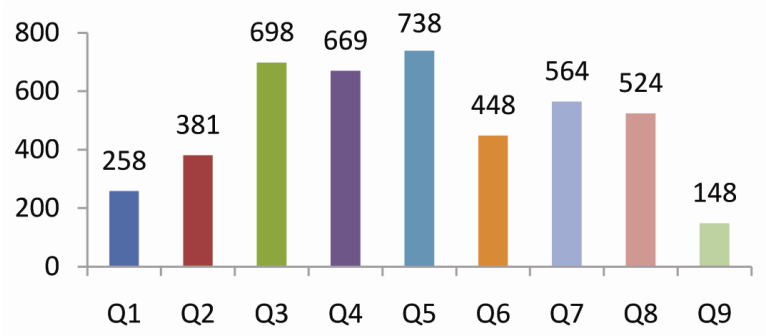

Figure 1.

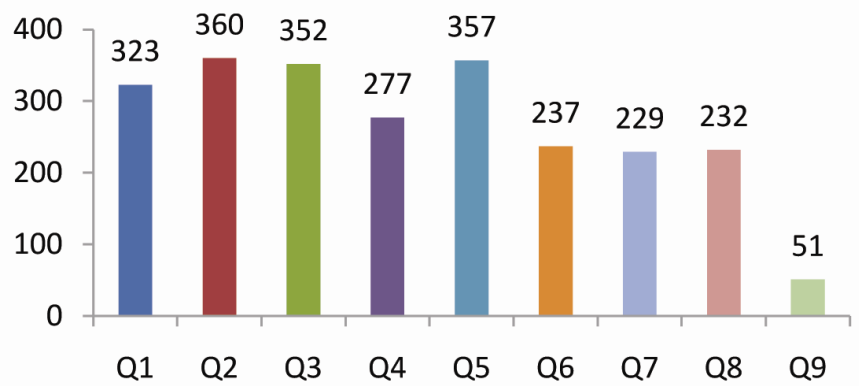

Figure 2.

Burden of disease

The household survey informed that majority of the population i.e. 70% do not have the desired knowledge regarding correlation between water quality and waterborne diseases.

A current estimate shows that 3.15**%** of the surveyed population gives history of **diarrhoea** in the **last 3 months** followed by malaria (1.24%) and 19.92% of respondents visited hospital at least once and 2.95% of respondents visited hospital at least twice.

Of the 89 village's samples, 31 villages test results and household survey indicated that there was less than 50 % correlation between the bacteriological contamination and incidence of diarrheal cases. Hence re-sampling was done in the 505 households of 31 villages. The survey revealed that 4.07 % of the surveyed population gives history of **diarrhoea** in the last 2 weeks.

Sanitation and home hygiene

Despite the achievement of Nirmal Gram Puraskar (NGP) (i.e. 100% households/Institutions having access to toilet facilities) awards in 6 out of 8 Gram Panchayats, the household survey indicates that nearly 8.42% population were still practicing open defecation and contribute to faecal matter in the environment leading to contamination and WASH related diseases.

The survey results revealed that majority of the households, i.e. nearly 75% do not wash hands with soap before taking food and 37% households do not wash hands with soap after defecation, which is a potential risk for oral faecal transmission and water borne diseases.

Water demand-supply situation

- The Block shows a shortfall in supply regarding the demand of the users is concerned. The present usage of water for the drinking, cooking & other purposes for the whole Block for the year **2010** has been worked out as 7,546 KL/day and the additional demand is 478 KL/day, thus the total requirement is 8,023 KL/day. Whereas the current availability is 3,975 KL/day (1,599 KLD through spot sources & 2376 KLD through PWS).Hence, the existing gap between demand and supply is 4,048 KL/day.
- For the year **2035**, the projected demand has been worked out as 11,246 KL/day (based on 2% decadal growth of population) whereas the availability of the same (considering the existing set up and conditions) has been worked out as 3,975 KL/day (1599 KLD through spot sources & 2,376 KLD through PWS). Unless the new plans are taken up the gap in the year 2035 will be 7,271 KL/day.
- The surveyed respondents informed that their present perceived usage of water drinking, cooking & other purposes were 35 LPCD and their additional demand were 9 LPCD for drinking, cooking & other purposes. With the time, change in life style, the improvement in quality of life and education status will have a corresponding increase in the household requirement/consumption of water.

Community perception

Out of a total number of 89 villages in the Block, 5 had opted for handpumps, showing the reason of minimum operation and maintenance cost, and one village opted for pond water based supply system. The villagers of remaining 83 villages (93%) had shown interest towards piped water supply system.

It is encouraging to note that 86.23% respondents had expressed their willingness to pay for operation and maintenance towards piped water supply schemes and also for the individual household connections.

However, it seems that village institutional mechanism is yet to come up for the same, which is further corroborated with the fact that only 27.70% of the respondents mentioned that they were aware of existence of *Gram Unnayan Samiti* (Village Development Council).

Resource requirement for plan making

In the entire process, officials from Public Health Engineering Department (PHED), Panchayat & Rural Development Department (P&RDD), Department of Health and Family Welfare (DH&FW), Water Quality Task Force and UNICEF were involved. In addition, services of the local NGOs and professional agencies were also utilized at different stages of the project implementation.

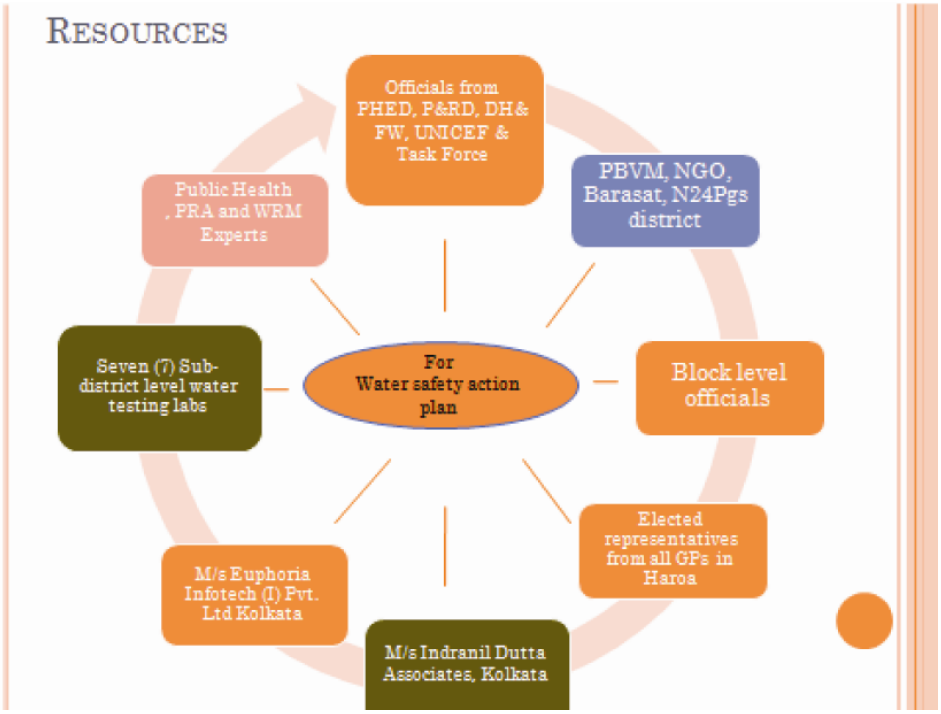

Figure 3.

Conclusion

In conclusion, the key findings of the participatory learning and assessment survey are summarized below:

- The overall present water supply in the block is inadequate vis-a-vis the demand of the consumers.
- The present perceived usage of water for drinking, cooking & other purposes is 35 LPCD and the additional demand is 9 LPCD. With the time, improvement in quality of life and the education status will have a corresponding increase in the household requirement/consumption of water.
- Over two-thirds of the water sources are unsafe on one or multiple accounts. Of nine street stand posts (SSP) sources form two Piped Water Supply Scheme (PWSS) tested, all are chemically safe and one source was bacteriologically contaminated.
- More private drinking water sources were found to be contaminated with arsenic compared to public water sources.
- Despite water quality at source found safe, the quality at point of use found fecally contaminated.
- Community awareness level was low on water safety and towards sanitation and hygiene
- The prevalence of diarrhoea was 3.15% (3 months recall period).
- Community preferred piped water supply as the first option.
- Community participation is critical for sustainable water supply and sanitation systems in rural areas, however it is yet to find its space.

Key learning and actions

The key learnings from the pilot are summarized for action to guide the implementation of household level water safety and security projects:

- ***Expanding the partnership:*** Development of mechanism and appreciation for the formal partnership with NGO network to play an active link between community and departments in community mobilization, awareness generation and related IEC activities under the National Rural Drinking Water Quality Monitoring & Surveillance Programme (NRDWQMSP).

- ***Regular monitoring of private drinking water sources*** under the National Rural Drinking Water Quality Monitoring and Surveillance Program.
- ***Greater inter-departmental coordination bringing:*** if the water supply and better health quality goals are to be achieved, then the glaring contribution gap need to be filled by hydrologist, geologist, geo-morphologist, epidemiologist and socio-economist, which will be ensured by greater inter-departmental coordination among the concerned departments.
- ***Participatory planning approach:*** Consultation with community in planning, implementation and monitoring of the water resources based on their demand through NGO partners and their *empowerment* through capacity building eventually leading to community management of water resources.
- ***Hydro-geological and climatological approach:*** Undertaking 3D study through lithological logs for ground water and season wise water quality monitoring to ensue water safety and security.
- ***Concurrent monitoring system for water born diseases and health:*** clinical assessment for arsenical dermatosis and a regular monitoring for other waterborne diseases especially diarrhoea through community monitoring health approach.
- ***Capacity building of Medical Officers on Arsenicosis case detection and management:*** Orient/Reorient the medical officers in the arsenic affected blocks about the arsenicosis case detection and management.
- ***Using existing data base:*** The deeper aquifer, which is mostly arsenic free and confined by nature would be considered as a future preservation storage of ground water for drinking and other purposes. The existing water quality data can be used as a guiding tool for the future water quality monitoring & surveillance.

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