Tribal Life and impact of safe drinking water in safe guarding the family health and hygiene: A case study of Koraput Odisha

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In Koraput there is no doubt that the availability/accessibility of drinking water to the households has increased over the past couple of decades, partly due to concerted efforts by the state government, Central government and some extend rise in income of the people of this region. Public provisioning of drinking water is primarily done through tap, Tube well whereas privately tube well and open well majority of the community. In this district majority of rural area covered by tube well than other sources because it is more reliable and easy to install even within the village by mechaniary or hand pump where is no road communication. In urban area most of the supply water comes from the surface water body but in rural depends upon only on groundwater. Therefore ground water has created problems of deteriorating water quality apart from those added by seepage of chemicals and bad sanitation near the tube well create a question mark on quality of drinking water. As a result, the groundwater needs to be tested water quality with some important parameter and treated accordingly before provide to the community. In these areas, about 02 percent of households reported to have filtered their drinking water but very few of them have boiled it before drinking in rainy season in general and health problem in particularly.

In this region MSSRF implemented a project on **"Ensuring safe drinking water to the tribal households in Koraput Regions of Odisha" the project was sanction by D**epartment of Science and Technology govt. of India. As a result of the study finds a highly significant positive correlation between overall deficiency index and poverty ratio, which indicates that the poorest of the poor suffer the most. A significantly negative relation between the literacy rate and the percentage of people used safe clean water for drink. In some case entire community collect the unhygienic water from stream/open source/Chuaha for drinking purpose during non function of tube well or in hot summer. Further, percentage of households with drinking water at the premises is found to have a significantly positive relation with the percentage of wealth status as well as well as literature ratio. The survey data revealed that there are tube wells (97.05%) and (open well, private tube well) other sources of water amounts to 2.95%. In the tribal community found 100 percent population depends public water that is community tube well provide by government or open well from the government. All the above analysis indicates that there is a greater need to improve the uninterrupted water supply including quantity, quality and accessibility to the community of rural tribal population in general and Koraput in particular. An integrated water management approach has to be adopted so as to improve and build upon the existing structures that are highly decentralized. The drinking water may have important on poverty reduction, environmental sustainability and sustainable household economic development of this region.

Keywords: accessibility, rural Community, Koraput, drinking water

Introduction:

The primary purpose of the supply of safe *Drinking-water is* the protection of public health. Water is essential to sustain life, and a satisfactory (adequate, safe and accessible) supply must be available to all. Improving access to safe drinking-water can result in tangible benefits to health. Every effort should be made to achieve a drinking-water quality as safe as practicable. Safe drinking-water, as defined by the Guidelines, does not represent any significant risk to health sensitivities that may occur between life stages. Those at greatest risk of waterborne disease are infants and young children, people who are debilitated or living under unsanitary conditions and the elderly. Safe drinking-water is suitable for all usual domestic purposes, including personal hygiene.

The Guidelines developed for safe drinking water are intended to support the development and implementation of risk management strategies that will ensure the safety of drinking-water supplies through the control of hazardous constituents of water. These strategies may include national or regional standards developed from the scientific basis. In order to define mandatory limits, it is preferable to consider the guidelines in the context of local or national environmental, social, economic and cultural conditions. The main reason for not promoting the adoption of international standards for drinking-water quality is the advantage provided by the use of a risk–benefit approach (qualitative or quantitative) in the establishment of national standards and regulations. Further, the Guidelines are best implemented through an integrated preventive management framework for safety applied from catchment to consumer.

The nature and form of drinking-water standards may vary among countries and regions. There is no single approach that is universally applicable. It is essential in the development and implementation of standards that the current and planned legislation relating to water, health and local government are taken into account and that the capacity to develop and implement regulations is assessed. Approaches that may work in one country or region will not necessarily transfer to other countries or regions. It is essential that each country review its needs and capacities in developing a regulatory framework. The judgment of safety or what is an acceptable level of risk in particular circumstances is a matter in which society as a whole has a role to play. The basic and essential requirements to ensure the safety of drinking-water are a “framework” for safe drinking-water, comprising health-based targets established by a competent health authority; adequate and properly managed systems (adequate infrastructure, proper monitoring and effective planning and management); and a system of independent surveillance.

1.1 Microbial aspects

Securing the microbial safety of drinking-water supplies is based on the use of multiple barriers, from catchment to consumer, to prevent the contamination of drinking-water or to reduce contamination to levels not injurious to health. Safety is increased if multiple barriers are in place, including protection of water resources, proper selection and operation of a series of treatment steps and management of distribution systems (piped or otherwise) to maintain and protect treated water quality.

1.2. Disinfection

Disinfection is of unquestionable importance in the supply of safe drinking-water. The destruction of microbial pathogens is essential and very commonly involves the use of reactive chemical agents such as chlorine. Disinfection is an effective barrier to many pathogens (especially bacteria) during drinking-water treatment and should be used for surface waters and for groundwater subject to faecal contamination. Residual disinfection is used to provide a partial safeguard against low-level contamination and growth within the distribution system. Chemical disinfection of a drinking-water supply that is fecal contaminated will the overall risk of disease but may not necessarily render the supply safe.

1.3. Chemical aspects

The health concerns associated with chemical constituents of drinking-water differ from those associated with microbial contamination and arise primarily from the ability of chemical constituents to cause adverse health effects after prolonged periods of exposure. There are few chemical constituents of water that can lead to health problems resulting from a single exposure, except through massive accidental contamination of a drinking-water supply. Moreover, experience shows that in many, but not all, such incidents, the water becomes undrinkable owing to unacceptable taste, odour and appearance.

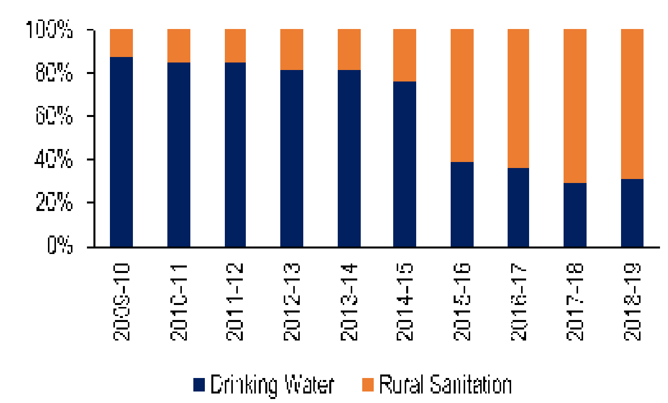
1.4. Radio-logical aspects

The health risk associated with the presence of naturally occurring radio-nuclides in drinking-water should also be taken into consideration, although the contribution of drinking-water to total exposure to radio-nuclides is very small under normal circumstances.

1.5. Acceptability aspects

Water should be free of tastes and odours that would be objectionable to the majority of consumers. In assessing the quality of drinking-water, consumers rely principally upon their senses. Microbial, chemical and physical water constituents may affect the appearance, odour or taste of the water, and the consumer will evaluate the quality and acceptability of the water on the basis of these criteria but financial and spending priorities change over time by the Union budget 2018-19, the Ministry has been allocated Rs 22,357 crore. This is a decrease of Rs 1,654 crore (7%) over the revised expenditure of 2017-18. In 2015-16, the Ministry over-shot its budget by 178%. Consequently, the allocation in 2016-17 was more than doubled (124%) to Rs 14,009 crore. In recent years shows the priorities of the Ministry have seen a shift (see Figure 1). The focus has been on providing sanitation facilities in rural areas, mobilizing behavioral change to increase usage of toilets, and consequently eliminating open defecation. However, this has translated into a decrease in the share of allocation towards drinking water (from 87% in 2009-10 to 31% in 2018-19). In the same period, the share of allocation to rural sanitation has increased from 13% to 69%.

Figure 1: Share in budget allocation over the years (Rs crore)



Note: Values for 2017-18 are revised estimates and 2018-19 are budget estimates.
Sources: Union Budgets 2009-10 to 2018-19; PRS.

2. Methodology

Protecting drinking water is a shared responsibility of community. Various village level community agencies are participants in comprehensive **tube to tap** assessments, with roles and responsibilities. The comprehensive drinking water source-to-tap assessment is a technical exercise, so it is not appropriate to formally involve water users or stakeholders in the process. Input from water users and the public will be most valuable during the subsequent development of the Assessment Response Plan or some other risk management plan. In view of the constraint identified in assessing water quality and to sustain the intervention MSSRF the project implementing agency, involving Govt. agency like RWSS (Rural water and sanitary system in assessing the drinking water quality on regular basis after completion of the project.

The project implemented after a careful survey of the region regarding problems to find out a perennial water sources or quality of water used by the community of this Koraput region in general and focuses on the valuation of Drinking Water services in Survey area. During the study, special attempts given towards specific focus group discussion, field visits and discussions with, at local survey villages and guided interactions with various stakeholders /service providers to assess the impact of rural drinking water programme in the region. For collecting data we develop simple questioner for the interview

2.1. Evaluation Tools Used:

a. Question & answer method through a set of structured questionnaire
b. Participatory Focus group discussion (FDG) with Villagers & SHG.
c. Observation and physical verification of assets on its actual site
d. Dialogue with different service providers from district to villagers.
e. Photographs / Observations etc. were used to conduct the study

2. 2 Evaluation Criteria for new Drinking Ground Water Sources Guidelines

The intent of the source assessment process is to provide the information necessary to evaluate potential health risks, support source protection planning, and facilitate proper System design. The information provided should include the following elements:
1. Source assessment (e.g. well site selection)
2. Identification of potential sources of contamination that may impact water quality
3. Identification of wellhead protection measures to be considered or implemented.

2.3 Quality assessment of drinking water supply

The drinking water source assessment process and comprehensive report prepared that clearly identifies and evaluates existing or potential drinking water hazards, risk characterization of all hazards, assesses the existing multi barrier system and proposes a risk management strategy for improving drinking water safety and supply.
Specific reporting requirements are given in the guideline. The final assessment report contain a summary that is a suitable for decision makers and the public. In addition to providing a set of directions, this guideline offers information tools to aid in assessing the

various factors affecting risk. Supporting documentation on water analysis compiled throughout the assessment period and included in the final report. This may include minutes, notes and observations from key meetings, discussions and field inspections. Information in the final report presented in a clear and succinct manner to facilitate decision making about drinking water protection and safety. Resolutions passed in the villages that water supply committee will communicate to the public on the quality aspects of drinking water assessments from time to time through various means for public reporting system exist in the village; May be through community meeting or through community schools, farmers schools, or meetings of women self help groups.

A public meeting (Grama Sabha) may also be held as an opportunity to present assessment finding and seeking input on the assessment response plan or source protection planning.

2.4 Multiple Barrier System

Principles of the multiple barrier approach to drinking water source protection are embodied in this framework for comprehensive drinking water "TUBE to TAP " assessments. "The multi-barrier approach is an integrated system of procedures, processes, and tools that collectively prevent or reduce the contamination of drinking water from "TUBE to TAP" in order to reduce risks to public health.

The purpose of this approach to drinking water protection is to employ a series of preventative measures to ensure that safe drinking water is provided even if one of the barriers fails. Barriers protect drinking water quality by preventing contaminants from entering the water anywhere in the system from tube to tap, removing particles from the water, destroying microbes, and/or by maintaining water quality during distribution. Barriers reduce the likelihood and degree of impact of risks. They can be effective against both known and unidentified threats. Six barriers for drinking water protection are applied in this guideline

1. Source protection.
2. Treatment.
3. Water system maintenance.
4. Water quality monitoring.
5. Operator training.
6. Emergency response planning.

Underpinning the multiple barrier system are three supporting mechanisms essential to the safe and reliable supply of drinking water to consumers: (1) Sound water-system management (2) Affordability.

2.5 Smaller Water Supply Systems

Small water supply systems can realistically complete a comprehensive tube to tap assessment using this guideline because in many cases the scope and scale of the assessment will adjust automatically to the size of the system. Small systems tend to

be simpler in composition; therefore, the volume of information generated from an assessment will be smaller, reducing the time and other resources required to conduct an assessment. One exception is that water sources can be large and complex even for small water supply systems.

3. Results

The sample size was taken based on minimum size of the sample required and its amiability for statistical analysis. A total 2612 households were interviewed during the survey in 28 project villages of Kundra and Boipariguad blocks of Koraput district.

The survey data revealed that there are a total of 28 Tube wells (97.05%) and chua (small life saving ponds) other sources of water amounts to 2.95%. If tube well is defunct due to any reason or power failure the villagers use other sources of water like open wells, streams till hand pumps. Usually the repair of hand pump will take couple of weeks, the villagers are exposed to risky drinking water from other sources.

Generally all the tube wells developed by Government department- Rural Water and Sanitation system (RWSS) and there are no tube well was owned by the family in the project area. All the population in the 28 villages depends on tube well water supply.

The government quality control department (RWSS) Koraput takes the water samples from the developed tube wells periodically from all the villages and test for drinking water qualities. A total of 106 samples tested for drinking water quality parameters (Annexure 1). Methodology, assessment and guiding principles of drinking water mentioned else ware in the report It was found that only 20 (19.55%) water sample were found suitable for drinking purpose and 86 (80.45%) samples were found not suitable for drinking but can be used for other household uses. However, people are still using all tube well water for drinking in spite of their unsuitability for drinking.

Generally the people collect drinking water from tube wells and stored in vessels for further use. It was found from the data that (53.44%) households store drinking water vessels with cover and (46.56%) households do not cover the drinking water vessels.

Cleaning of drinking water storage vessels is routinely done by majority (95%) of households of the villages. Only 2% clean once in a week and 3% clean twice and thrice in a week.

Drawing of drinking water from the vessels is another parameter for avoiding contamination. It was found from the data 36.20% households draws by slating the vessel and 63.33% dipping and only 3.47% household use decanter for drawing the drinking water.

Majority (98.88%) of households in the project villages practice hand washing after toilet use. But 93 % used soil for hand washing and only 6 % used toilet soap.

Regarding water using for various house hold activities like washing kitchen utensil, cloths, bath, hand cleaning etc. It was found from the data 1.07% discharge water to soak pit, 17.18% diverted to kitchen garden, where as majority 81.75% of water use in wasted. i,e used water gone waste.

4. Discussion

The state of Odisha is still confined from healthy drinking water. There are still end number of villages and rural areas which are untouched from the basic needs of water, food, communication, health and education. The state governments are doing their best to revive the condition and bring normal and a developed life to the rural parts of the State.

As per the state government record, out of 6235 gram panchayats (GPs) of the State 845 are still out of reach of pipe water supply to the Rural Development Department to ensure that these GPs are provided safe drinking water by the end of this fiscal.

The engineers of the rural drinking water supply department, advised the engineers of the Department to adopt new technology for pipe water supply that will be cost effective and sustainable. Based on the sustainability the state government department plan and programmes, for 10,137 pipe water projects have been operationalized and about 4000 of these projects have been handed over to panchayats for operation and maintenance. As pipe water supply to 285 GP headquarters is not feasible, the Department has taken steps to provide safe drinking water under the solar energy-based dual pump scheme. M S Swaminathan Research Foundation in the pilot mode with the financial support of Department of Science and Technology initiated in the 13 villages with the support of DST, Govt. of India in 2012 to 2015 now 16 by DST SEED division for replication of this model in these blocks Boipariguda and Kundra and Koraput block. The drinking water infrastructure created through project now operated by the community successfully.

The other tribal area also demanding for such facility in their villages as the model work as a model.

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Tribal community of this region particularly donated the land for construction of pump house and establishment of solar system.

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Annexure – I: Analysis of Drinking water supply collected from 10 project villages of Kundra and Boipariguda block.

Sl.no. of Bore well	Colour	PH	Electrical contuctivity US/CM (micro siemens /cm)	TDS mg/lit	Turbidity NTU (Nephelometric Turbidity Unit)	Flouride mg/lit	Iron mg/lit	Nitrate mg/lit	Chloride mg/lit	Alkalinity mg/lit	Hardness	Coliform(BYH2S VIAL)
1	clear	6.5	180	117	2.8	0.21	0.2	8.4	16	36	64	Negative
2	clear	6.8	380	247	2.3	0.1	0.1	28	56	96	124	Negative
3	clear	6.7	230	110	3.2	0.3	0.28	2.3	12	82	105	Negative
4	clear	7.7	200	130	3.7	0.4	0.3	2.3	8	80	100	Negative
5	clear	7.8	285	218	2.1	0.2	0.2	13.8	22	89	97	Negative
6	clear	7.3	350	228	1.6	0.2	0.1	12.8	32	88	92	Negative
7	clear	6.9	100	65	4.7	0.1	0.1	1.7	8	40	48	Negative
8	clear	6.4	310	210	3.2	0.1	0.1	12.5	32	64	116	Negative
9	clear	7	670	435	2.1	0.2	0.2	42.8	96	96	220	Negative
10	clear	6.7	200	130	7.2	0.1	0.3	3.8	8	72	76	Negative
Desirable limit		6.5		500	1	1	0.3	45	150	200	200	DST supported bore well having the water quality within permissible limit
Permissible limit		8.5		2000	5	1.5	0.3	45	1000	600	600	