

## Health Status Issues and Strategies of Portable Water in Indian Villages: A Review Report

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### Abstract

India's rural population is around 905 million people, who live in over 1.42 million habitations scattered throughout 15 geographical zones. It is true that delivering safe drinking water to such a huge population is a monumental task. Our country is also distinguished by differences in consciousness, socioeconomic development, education, poverty, habits and rituals, all of which contribute to the complexity of delivering water. Poor water quality has a massive health impact. Infections caused by water affects around 37.7 million Indians each year, 1.5 million children are predicted to die from diarrhea alone and 73 million working days are lost owing to waterborne disease each year. Chemical pollution is also an issue in India, with poor water quality affecting 0.2 million habitants. Fluoride and Arsenic are the two most concerning chemical characteristics. Iron is also becoming a big issue, with numerous habitations exhibiting excess iron in water testing. According to the most recent figures, 94% of the rural population and 91% of the urban population have access to clean drinking water. According to data from the department of drinking water supply, 1.5 and 1.4 million of the country's urban and rural habitations are Fully Covered (FC), 0.13 million are Partially Covered (PC) and 15,917 are Not Covered (NC). Coverage, on the other hand, relates to build capacity rather than average actual delivery over a prolonged time or the quality of water given, which is the most important aspect.

**Keywords:** Rural population; Water quality; Health; Economic burden; Lpcd

### Introduction

Rural India has around 905 million people living in over 1.42 million habitations scattered across 15 geographic areas. It might be difficult to meet the drinking water demands of such a big population. The endeavor is made more difficult by differences in consciousness, socioeconomic development, education, poverty, habits, rituals and water availability. Despite an estimated total expenditure of Rs. 1200 billion on providing clean drinking water since the commencement of the first five year plan in 1951, a shortage of safe and secure drinking water remains a major impediment and a national economic burden [1].

Every year, around 37.7 million Indians are afflicted by waterborne illnesses, 1.5 million children are predicted to die from diarrhea alone and 73 million working days are lost owing to waterborne sickness. The annual economic cost is expected to be \$900 million [2]. While 'traditional illnesses' like diarrhea continue to exact a heavy toll, 66 million Indians are at danger from high fluoride in groundwater and 10 million from excess arsenic in groundwater. Poor water quality affects 0.2 million habitations across the country. Large investments have failed to produce commensurate gains in health and other socioeconomic indices.

### Literature Review

#### Water supply in rural areas

The supply of safe drinking water is prioritized in the Indian constitution, with article 47 imposing on the state the obligation of providing safe drinking water and promoting public health standards. In India, Rural Water Supply (RWS) programs are separated into several distinct phases [3].

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### **Early self-sufficiency (1947-1969)**

- **1949:** The environment hygiene committee (1949) advises providing clean water supplies to 90% of India's population within 40 years.
- **1950:** The Indian constitution grants the government ownership of all water resources, naming it a state issue and granting residents the right to drinkable water.
- **1969:** The national rural drinking water delivery programme is initiated with technical assistance from UNICEF. During this phase, Rs.254.90 crore is spent, with 1.2 million bore wells drilled and 17,000 piped water supply systems given.

### **Technology to policy transition (1969-1989)**

- **1972-1973:** The government of India launches the Accelerated Rural Water delivery Programme (ARWSP) to help states and union territories expedite the pace of drinking water supply coverage.
- **1981:** India, as a signatory to the international drinking water supply and sanitation decade (1981-1990), establishes a national level apex committee to create policies to meet the aim of supplying clean drinking water to all communities.
- The National Drinking Water Mission (NDWM) is established in 1986.
- The ministry of water resources drafts the first national water policy in 1987.

### **Phase of restructuring (1989-1999)**

- The national drinking water mission is renamed the Rajiv Gandhi National Drinking Water Mission in 1991. (RGNDWM).
- The 73<sup>rd</sup> constitutional amendment of 1994 delegated the obligation for supplying drinking water to Panchayati Raj Institutions (PRIs).
- **1999:** Steps are taken to institutionalize community participation in the execution of rural drinking water delivery projects through sector reform to ensure system sustainability. Sector reform ushers in a paradigm change from the government centered supply driven strategy to the people oriented demand responsive approach. The government's role is expected to shift from service supplier to facilitator. Under the reform, the government will pay 90% of the infrastructure, with the community contributing 10% of the remaining capital expenses and 100% of operation and maintenance costs. Sector reform initiatives have been piloted in 67 districts across the nation.
- **1999:** The Total Sanitary Campaign (TSC) was launched in 1999 as part of the reform principles to provide sanitation facilities in rural regions, with the overarching objective of eliminating the practice of open defecation. A minimal subsidy in the form of an incentive is provided to rural poor households as part of the program for the building of toilets. With the participation of PRIs, CBOs and NGOs, TSC places a major focus on information, education and communication, capacity building and hygiene education for successful behavior change.

### **Phase of consolidation (2000 onwards)**

- **2002:** Swajaldhara, a nationwide scale-up of sector reform, is implemented.
- **2002:** The national water policy is amended to prioritize servicing communities without adequate clean water sources and to increase the quality of service for villages categorized as only partially covered.
- **2002:** India pledges to the millennium development goals of halving the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015, compared to 1990 levels.
- **2004:** All drinking water programmes are placed under the aegis of the RGNDWM.
- **2005:** The government of India announces the Bharat Nirman programme to improve rural infrastructure such as homes, roads, power, telephone, irrigation and drinking water. Within five years, the goal is to offer drinking water to 55,069 uncovered habitations; those afflicted by poor water quality and slid back habitations based on a 2003 study.
- **2007:** The Swajaldhara scheme financing pattern shifts from a 90:10 central community split to a 50:50 center state share. Contribution to the community is now optional.

The strategy document for the 11<sup>th</sup> five year plan calls for a holistic approach that includes individual health care, public health, sanitation, safe drinking water, food access and hygiene and feeding practice knowledge. It also emphasizes the necessity to scale up additional community water management systems to reduce the state's maintenance load and duty. It is planned to supply safe drinking water to everybody by 2009, with no setbacks by the conclusion of the 11<sup>th</sup> plan [4-6].

**2017:** It is targeted that at least 50 percent of rural population in the country as against 35 percent today will have access to 40 Lpcd piped water supply within their household premises or within 100 metres radius and within 10 metres elevation in hilly

areas from their households without barriers of social or financial discrimination. Individual states can adopt higher quantity norms [7].

### **Concerns about water quality**

Pollution from both point and non-point sources has an impact on water quality. These include sewage discharge, industrial discharge, agricultural run-off and urban run-off. Water quality is also influenced by floods and droughts, as well as a lack of user knowledge and education. The necessity for user participation in preserving water quality, as well as consideration of other factors such as hygiene, environmental sanitation, storage and disposal are key considerations in maintaining the quality of water resources [8-10].

### **Contamination by bacteria**

Bacterial pollution of water is a pervasive problem across the country and a major source of illness and death, with 37.7 million people afflicted annually by waterborne illnesses. Bacteria (*E. Coli*, *Shigella*, *V. cholera*), viruses (Hepatitis A, Polio virus, *Rotavirus*) and parasites are the most common pathogenic organisms responsible for water-borne disorders in India (*E. histolytica*, *Giardia*, Hook worm).

The central pollution control board monitoring results obtained during 2005 indicate that organic pollution continues to be predominant in aquatic resources. Organic pollution measured in terms of Biochemical Oxygen Demand (BOD) and coliform count gives an indication of the extent of water quality degradation in different parts of the country. It was discovered that approximately 66% of the samples had BOD values below than permissible levels and 44% of the samples showed the presence of coliform, even though the Bureau of Indian Standards (BIS) states that there should be no coliform in drinking water tests.

### **Industrial waste and effluent**

Another important source of worry is ground, and surface water contamination caused by increased fertilizer and pesticide usage in agriculture and from industrial sources. Fertilizer usage increased from 7.7 million tonnes in 1984-85 to 13.9 million tonnes in 1994-1995, while pesticide consumption increased from 24,305 tonnes in 1974 to 85,030 tonnes in 1994-1995.

The increased use of such substances has harmed the quality of surface water supplies by contaminating them with nitrates. According to the World Bank, the entire cost of environmental degradation in India is \$9.7 billion per year or 4.5 percent of the country's GDP. 59% of this is due to the health effects of water contamination.

### **Behavioral patterns**

In the absence of better sanitation, interventions to provide safe drinking water may become useless. The provision of infrastructure for sanitary excreta disposal and the introduction of basic hygiene behavior are critical in order to offer enough quantities of clean water. Water quality is also affected by the methods and manner by which it is collected. To prevent contamination, it is critical to maintain a clean environment around the source. Open drains and solid waste disposal near water sources may result in the presence of ammonia and coliform bacteria in the drinking water source. To ensure the mobility of provided water, water pollution must be avoided at the source.

### **Cultural customs**

There are several religious activities that concentrate around water sources. The immersion of idols in surface water bodies is a major source of water quality degradation. Water bodies have been utilized as dumping places for different items, reducing surface water portability. Defecation on water body boundaries causes bacterial pollution.

### **The economic and health burden**

Poor water quality promotes illness, kills people and stifles socioeconomic growth. Waterborne infections claim the lives of around five million individuals. Furthermore, these disorders have an impact on schooling and result in lost workdays, which are projected to be 180 million each year. The anticipated yearly economic loss is Rs.112 crores.

Water borne illnesses impose a financial strain on both households and the national economy. The economic loss at the household level covers the expense of treatment as well as salary loss during illness. Working day losses have an impact on

national productivity. On the other hand, the government spends a lot of money and effort on sick people and other supportive services.

### **Health care costs**

According to government estimates, yearly health spending totals Rs.6,700 crore approximately Rs.60 per head per year. The WHO advises that 5% of a country's GDP be set aside for health-care investments. However, public health expenditure in India has decreased from 1.3% of GDP in 1990 to 0.9% of GDP in 1999. The government of India's national rural health mission has set the goal of increasing public spending on health from 0.9 percent of GDP to 2-3 percent of GDP. In India, hospital treatment consumes 60%-80% of health care expenditures, leaving a substantially smaller share for basic services. Furthermore, the emphasis is on urban curative services, leaving rural regions vulnerable.

According to estimates, the average expenditure of rural households on health services amounts to 5.28% of their average annual income. While this percentage varies depending on population and income group, the important message that can be derived from these facts is that our rural households are forced to spend a significant portion of their earnings on health.

### **The low water quality**

Each year, rural Indians spend at least Rs.100 on the treatment of water/sanitation related ailments. According to the government of India, this amounts to Rs.6,700 crore each year, which is just Rs.52 crore less than the union health ministry's annual budget and more than the allocation for education.

Other poverty related variables that contribute to inequities in child mortality include inadequate nutrition and access to inexpensive healthcare. However, increasing exposure to the danger of aquatic illnesses indicates a significant causative relationship. Malnourished children are more prone to have diarrhoea and illness bouts linger longer. Repeated bouts of diarrhoea cause weight loss, stunted development and vitamin insufficiency, as well as an increased risk of dropping out of school, resulting in lower earning potential and poverty.

However, simply providing clean water will not alleviate health related issues. Only an integrated strategy combining water quality improvement with increased water availability, as well as sanitation and hygiene education, would assist to solve this issue.

### **Moving toward cleaner water**

It is difficult to provide safe drinking water to everyone in rural India. Given the country's and its people's variety, solutions must be diverse as well. One must consider a strategy that seeks user engagement through interventions that engage communities in different government initiatives and policies. Citizens should be made aware of their entitlement to safe drinking water. An integrated strategy of this type would involve the combined efforts of many sectors, including the government, civil society and the people.

### **Discussion**

**The government's involvement:** There is also a need to educate people about the environment. People have been drinking water from polluted surface sources despite being given with potable water by the government. The government must assist civil society and organizations working to raise awareness. An integrated campaign can result in extensive public awareness of the techniques and means of mitigating water source pollution.

**Testing and corrective action:** There is an urgent need to improve the monitoring network by installing monitoring stations in all regions and conducting seasonal evaluations of all water sources. If contamination is discovered, an action plan for dealing with the source should be supplied. The difficulty is in developing well-equipped laboratories with well-trained personnel. This also necessitates employee training and infrastructural improvement. Although field testing kits are widely used, they frequently produce misleading or semi quantitative findings. Field testing kits can provide a larger view, but laboratory tests are required for precise findings. The created data should be made available in the public domain. Data generation, interpretation and communication are critical for effective water management and the use of Geographical Information System (GIS) may aid in mapping, modeling and decision making.

**Community capacity building:** The functions of panchayats are becoming increasingly essential and a greater emphasis is being

placed on community based ways to dealing with water related challenges. Training of community members so that they can make educated decisions is a requirement for expanding community engagement. The government's role in executing capacity building programs is critical.

**Inter-agency coordination:** One main impediment in an effective policy development and execution has been the present institutional set up involving several government departments. At the state and federal levels, there is a fragmented approach to water supply and management, with multiple entities involved. Improved coordination across ministries and departments would guarantee more effective implementation. As is the situation in nations such as Australia, the option of a single nodal ministry with total monitoring and management of water resources may be examined.

**Holding the service provider accountable:** Article 21 of the Indian constitution deals with the protection of life and personal liberty and the right to clean water is guaranteed by this clause. The user has the right to know if the water supplied at the source is free of pollution, as represented by authorities. Financial expenditure on water delivery projects and water quality tests should be made public.

**Water quality standards and water provision under the food law bill:** Currently, the quality of drinking water supplies in India is controlled by Bureau of Indian Standards (BIS) requirements IS: 10500-1991. Standards such as IS: 2488 for sample techniques and IS: 3025 for testing procedures should be followed when monitoring drinking water. Prior to developing guidelines, it is critical to determine the precise dose response mechanism through proper epidemiological research conducted in both rural and urban regions. However, the World Health Organization (WHO) has its own criteria and in certain circumstances, the allowable levels differ between the two. The finest example is arsenic, which has a WHO limit of 10 ppb (parts per billion) and a BIS limit of 50 ppb. National conversations have taken place to reconsider and change the present requirements.

**School water supply program:** With around 6.3 lakh rural schools, India has one of the highest numbers of school age children in the world. According to the national family health survey, 75 percent of children aged 6 to 14 attend school in rural regions. A source of worry is that just 44% of these 6.3 lakh rural schools have access to water. According to the report, half of all Indian children are malnourished and half of all adult women have anemia. At the time of the study, 30% of all children under the age of three had fever, 20% had diarrhoea and 20% showed signs of an acute respiratory illness. These data paint a bleak picture, with over half of our country's youngsters suffering from some type of illness. The government of India has launched a school water Supply, Sanitation and Hygiene Education (SSHE) program through the ministry of rural development's accelerated rural water supply and Swajaldhara programs, as well as the ministry of human resource development's Sarva Shiksha Abhiyaan, which includes provisions for establishing schools with effective water supply and sanitation. By focusing on children now and teaching them about preserving water quality and good sanitation practices, we can protect the next generation from the dangers of water and sanitation related diseases. This will not only offer a sanitary environment in schools, but the youngsters will also relay the message to their parents.

**Environmental sanitation and hygiene:** Water, sanitation, health, nutrition and human well-being all have a direct link. The principal causes of sickness in our nation have been polluted drinking water, poor disposal of human excreta, a lack of personal and food hygiene and incorrect disposal of solid and liquid waste.

Various government programs, such as the total sanitation campaign, have made it a priority to convey the message of preserving personal hygiene in order to reduce water contamination. Better collaboration between ministries of health and rural development will be beneficial in designing programs to address drinking water and health issues.

### **The function of civil society and communities**

- **Education:** The user should be made aware of the need of preventing water pollution and of maintaining clean and healthy surroundings around water sources. Effective civil society Information, Education and Communication (IEC) initiatives will be critical in raising awareness. It is important to remember that such efforts should be focused on local needs and challenges and should employ tactics that are easily understood by the public.
- **Accountability:** Users must recognize their personal responsibility for sustaining the quality of the water given to them. Cultural and behavioral habits such as open defecation and cow bathing pollute water supplies. The users are also responsible for ensuring the safety of the water delivered. The users are responsible for factors like as contamination at the source and storage in clean containers.
- **Community based water quality monitoring:** Many water quality issues arise as a result of communities' lack of

understanding of the various facets of managing and preserving the quality of water resources. Raising their understanding of proper practices can assist them in realizing the dismal reality of decreasing water sources while also including them in monitoring and upkeep. There have been initiatives for community driven water monitoring programs, such as the socio economic unit foundation's community managed water quality surveillance programme in Kerala's Alappuzha district, where the responsibility of management and operation of the water quality surveillance system has been entrusted to women's groups called Water Quality Surveillance Groups (WQSG), as a self-employment program.

- **Upkeep:** A source of worry is the lack of maintenance of rural water supplies and infrastructure. This might be due to a lack of finance capability, disinterest or a community's unwillingness to manage operation and upkeep. This necessitates a paradigm shift among users, with the people and communities bearing the burden of sustaining a water source because they are the owners of the system and are more likely to be harmed if the water supply system degrades. Panchayats and communities must work together to execute this.

## Conclusion

From the first to the tenth plans in India, investments in community water supply and sanitation projects have continuously grown. However, the health advantages of reduced waterborne illness have not been proportionating to the investments made.

Even though the health sector bears the cost of water and sanitation related infectious illnesses, the government currently lacks the institutions and competence for monitoring and surveillance of community water supply programs.

With increased coverage of areas and a vast volume of financial resources made available, India has seen tremendous improvement in rural water provision. Several programs are being implemented to improve the supply of drinking water in rural areas, as well as to monitor and ensure quality. In recent years, there has been an increased emphasis on water quality monitoring and surveillance, with allocations provided through central grants. There has been a strong emphasis on establishing and improving laboratories at the state and district levels, as well as on water monitoring using field testing kits.

There is little dispute that water is essential for human life. There is an interaction of numerous elements that influence water resource availability and utilization and with the rising demand for water, it is critical to seek holistic and people centered methods to water management.

Clearly, drinking water is too important and severe an issue to be entrusted to a single organization. If we are serious about socioeconomic growth, we must all take the initiative and act together. Safe drinking water may be secured if we set our minds to it.

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