

A STUDY ON DRINKING WATER QUALITY, ECONOMIC BENEFITS AND LOSS**Mathubalan .G****MBA, Department of Management Studies
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Bharath Institute of Higher Education and Research****ABSTRACT**

Water is the important source of livelihood and any impurity found in it will lead to a number of water borne diseases that could thwart the developmental process of our country and it would lead to so many health related issues. The water quality is of prime importance for all. Water supply and sanitation are to be accorded top importance in protecting the health of the people. Investment in water will prove to be economically rewarding and health-wise good one. The need of the hour is to create awareness on water quality. Any disease will affect the man days of quality work and the resultant loss of GDP on that account. A clear monitoring of the same is essential for the water management and the prevention of diseases.

Keywords: water quality, contamination, economic benefits, safe water

I. INTRODUCTION

‘Health is Wealth’ is the famous adage befits all the time. The healthy citizens are the real assets of a country. Water is the elixir of life and if it is contaminated it would turn into dangerous liquid. The important reason for insisting on drinking-water quality is the protection of public health. The World Health Organization (WHO) states that for managing the risk from hazards we should not compromise the safety of drinking-water. The recommendations should be considered in the context of managing the risk from other sources of exposure to these hazards, such as waste, air, food and consumer products.

Water management occupies a pivotal role in protecting the health of the people. Many water quality problems are caused due to communities being unaware of the different aspects of managing and maintaining the quality of water resources. Raising their awareness of appropriate practices will help them realize the grim realities of depleting water sources and at the same time help in engaging them in monitoring and maintenance.

The investment in the water sector makes good economic sense and that improved water supply and sanitation and water resource management are acknowledged as critical for economic growth and poverty eradication. so, water and related service must be a part of economic development activity.

WATER QUALITY: THE NEED FOR AWARENESS

The limits on roughly 90 chemicals or contaminants in community drinking water systems, While accessing drinking water continues to be a problem, assuring that it is safe is a challenge by itself. Water quality problems are caused by pollution and over-exploitation. The rapid pace of industrialization and greater emphasis on agricultural growth combined with financial and technological constraints and non-enforcement of laws have led to generation of large quantities of waste and pollution. Proper water management and rain water harvesting are essential for good water quality.

WATER CONTAMINATION DUE TO OVER-EXPLOITATION

In the 1980s and 1990s, groundwater tables buckled under increased extraction as water tables started to decline and bore wells ran dry. What was more disturbing was that by then, 80 per cent of drinking water sources were groundwater-dependent. As a result, habitations and villages that were 'covered' with a safe water supply by the government started 'slipping back'.

BEHAVIOURAL PRACTICES

Interventions for providing safe drinking water can become ineffective in the absence of improved sanitation. In order to provide access to sufficient quantities of safe water, the provision of facilities for a sanitary disposal of excreta, and introducing sound hygiene behavior are of utmost importance. The ways and means by which water is collected also has an impact on its quality. It is essential to have a clean surrounding around the source to prevent contamination. Open drains and disposal of solid waste near sources of water may lead to presence of ammonia and coliform bacteria in the drinking water source. Thus prevention of water contamination at source is necessary to ensure the potability of supplied water.

CULTURAL PRACTICES

There are various religious practices that revolve around sources of water. Immersion of idols in surface water bodies is a prime cause of deteriorating water quality. Water bodies have been used as dumping grounds for various offerings that have degraded the potability of surface water. Defecation on boundaries of water bodies results in bacteriological contamination.

TABLE 1
PARAMETERS AND HEALTH IMPACT OF CERTAIN PRODUCTS

Parameter	Maximum Permissible limit	Health impact	Affected states
Fluoride	1.5 mg/ l	Immediate symptoms include digestive disorders, skin diseases, dental fluorosis • Fluoride in larger quantities (20-80mg/day) taken over a period of 10-20 years results in crippling and skeletal fluorosis which is severe bone damage	Andhra Pradesh, Assam, Bihar, Chattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, TamilNadu, Tripura, Uttar Pradesh, West Bengal
Arsenic	0.05 mg/l	• Immediate symptoms of acute Poisoning typically include vomiting, esophageal and abdominal pain, and bloody 'rice water' diarrhoea. • Long-term exposure to arsenic causes cancer of the skin, lungs, urinary bladder, and kidney.	Assam, Bihar, Chattisgarh, Jharkhand, Tripura, West Bengal, Uttar Pradesh
Iron	1 mg/ l • A dose of 1500mg/l	has a poisoning effect on a child as it can damage blood tissues • Digestive disorders, skin diseases and dental problems	Arunachal Pradesh, Assam, Bihar, Chattisgarh, Jharkhand, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, M P, J & Maharashtra, Nagaland, T N, UP, W B, A&N Islands, Pondicherry
Nitrate	100mg/ l	• Causes Methemoglobinemia (Blue Baby disease) where the skin of infants becomes blue due to decreased efficiency of hemoglobin to combine with oxygen. It may also increase risk of cancer.	Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh
Salinity	2000 mg/l	• Objectionable taste to water. • May affect osmotic flow and movement of fluids	Andhra Pradesh, Chattisgarh, Gujarat, Haryana, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, T N, U P, W B, Pondicherry
Persistent Organic Pollutants	None	Persistent Organic Pollutants None High blood pressure, hormonal dysfunction, and growth retardation.	Delhi, Himachal Pradesh, Jharkhand, West Bengal,

Pesticides.	Absent	Pesticides Absent Weakened immunity, abnormal multiplication of cells leading to tumour formation They contain chlorides that cause reproductive and endocrinal damage.	
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Sources: BIS Standards: IS 10500: 2014

EFFECTS OF CONTAMINATED DRINKING WATER

Lack of water, sanitation, and hygiene results in the loss of 0.4 million lives while air pollution contributes to the death of 0.52 million people annually in India (WHO 2012). Environmental factors contribute to 60 years of ill-health per 1,000 population in India compared to 54 in Russia, 37 in Brazil, and 34 in China.

The socio-economic costs of water pollution are extremely high: 1.5 million children less than 5 years die each year due to water related diseases and the country loses about Rs 366 billion each year due to water related diseases.

SOCIO-ECONOMIC IMPACT

Waterborne diseases can have a significant impact on the economy, locally as well as internationally. The financial losses are mostly caused by e.g. costs for medical treatment and medication, costs for transport, special food, and by the loss of manpower. Many families must even sell their land to pay for treatment in a proper hospital. On average, a family spends about 10% of the monthly household's income per person infected.

WATER QUALITY MONITORING

In India, the financial and technical support for rural and urban water supplies are provided by the central government while the planning, designing, construction, operation and maintenance is undertaken by state government agencies. While larger cities have their own laboratories for testing water, institutional framework for water quality monitoring and data processing is inadequate in rural areas.

HEALTH AND ECONOMIC BURDEN OF THE SOCIETY

Poor water quality spreads disease, causes death and hampers socio-economic progress. Around five million people die due to waterborne diseases. In addition, these diseases affect education and result in loss of work days, estimated at 180 million person days annually. The annual economic loss is estimated at Rs.112 crores in India. Water-related diseases put an economic burden on both the household and the nation's economy.

At household levels, the economic loss includes cost of treatment and wage loss during sickness. Loss of working days affects national productivity. On the other hand, the government spends a lot of money and time on treatment of the sick and providing other supportive services.

EXPENDITURE ON HEALTH

According to Government of India estimates, expenditure on health adds up to Rs.6,700 crore annually (approximately Rs.60 per head per year). The WHO recommends that 5 per cent of a

nation's GDP be earmarked for investments in the health sector. However, public health expenditure in India has declined from 1.3 per cent of its GDP in 2000 to 0.9 per cent of its GDP in 2010. The National Rural Health Mission of the Government of India has set the target of rising public spending on health from 0.9 per cent of its GDP to 2-3 per cent of its GDP. In India, 60-80 per cent of the resources in the health system is spent on hospital care, leaving a much lower proportion for basic services. In addition, the focus is on urban-curative services, leaving rural areas more vulnerable. As per estimates, the average expenditure of rural households on health services amounts to 5.28 per cent of their average annual income this percentage can vary with population in different income groups but the important message that can be derived from these facts is that our rural households are forced to spend a significant amount of their earnings on health.

WATER QUALITY AND THE POOR

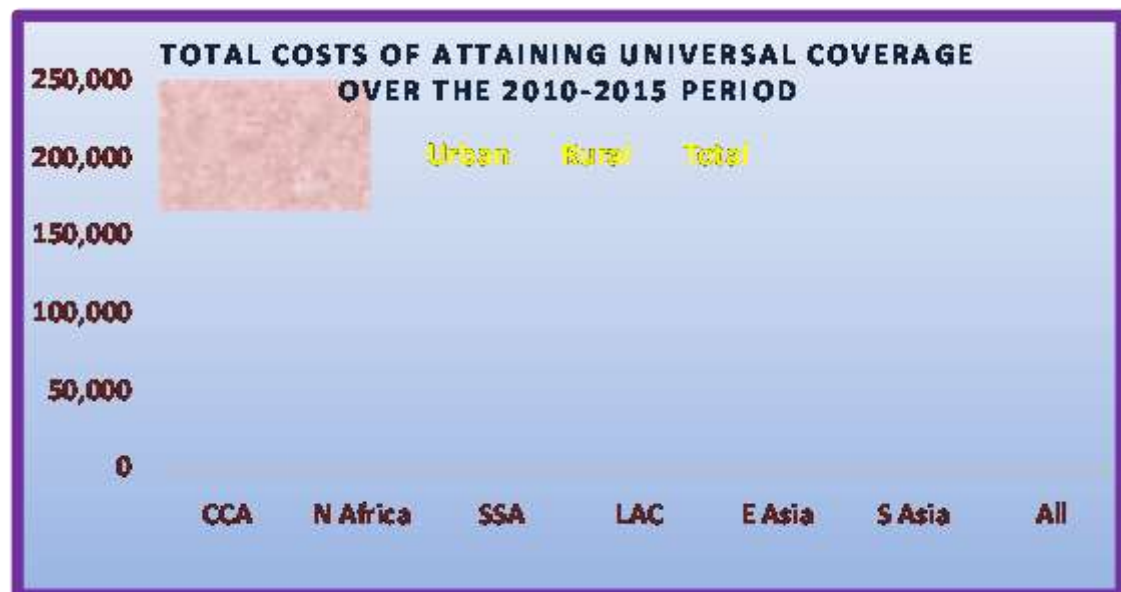
According to Down to Earth, rural people in India spend at least Rs.100 each year for the treatment of water/sanitation-related diseases. According to the Government of India, this adds up to Rs.6,700 crore annually, which is just Rs.52 crore less than the annual budget of the Union Health Ministry and more than the allocation for education. There are other poverty-related factors behind inequalities in child mortality, including poor nutrition and access to affordable healthcare. But increased exposure to the risk of water borne infections is a major causal link. Children who are malnourished are more likely to suffer from diarrhoea and sickness episodes last longer. Repeated incidences of diarrhoea result in weight loss, stunted growth and vitamin deficiency, with greater chances of dropping out from school, leading to reduced earning power and poverty. However supplying clean water alone would not solve health-related problems.

TABLE 2 **TOTAL COSTS OF ATTAINING UNIVERSAL COVERAGE OVER THE 2010-2015 PERIOD**

Region	Urban	Rural	Total
CCA	2,009	1,836	3,845
N Africa	8,842	3,057	11,898
SSA	13,620	16,010	29,629
LAC	24,745	4,364	29,109
E Asia	48,902	21,346	70,248
S Asia	4,187	3,644	7,831
All	141,049	62,293	203,341

Source: Global costs and benefits of drinking-water supply, WHO, 2012

FIG 1
COSTS OF ATTAINING UNIVERSAL COVERAGE OVER 2010-2020 PERIOD



BENEFIT OVERVIEW

A large range of economic and social benefits can result from improved water supply. Table below presents the main ones, indicating those that have been included in this study, and those excluded. As is evident from the table, more benefits have been excluded than included: for many, the lack of

evidence impedes a credible global assessment. However, a reduction in the diarrheal disease burden (as the main health impact) and time benefits (i.e. opportunity costs saved) are expected to account for a large share of total benefits.

BENEFITS OF IMPROVED DRINKING WATER SUPPLY

Benefits	Drinking Water
Included Benefits	
Health	Averted cases of diarrheal disease • Malnutrition-related diseases • Health-related quality of life impacts
Health economic	Costs related to diseases such as health care, productivity, mortality
Time value	Travel and waiting time averted for collecting water
Excluded Benefits	
Other health	Dehydration from lack of access to water • Less flood-related health impacts (better water management)
Education	Improved educational levels due to higher school enrolment and attendance rates • Impact of childhood malnutrition on education
Leisure and quality of life / intangibles	• Leisure and non-use values of water resources and reduced effort of averted water hauling and gender impacts
Property	• Rise in value of property
Income	Increased incomes due to more tourism income and business opportunities • Productive uses

Sources: Global costs and benefits of drinking-water supply, WHO, 2012

Economic benefits related to health impacts of improved Water Supply services include three main areas they are,

1. Savings related to seeking less health care. Health care savings are estimated as a function of treatment seeking rates, medical practices and unit costs of medical services. Medical practices include the types of treatment given for a disease and the rate of in-patient admission or referral. All these variables fluctuate by disease and country. In addition, patients and their careers incur treatment-seeking costs such as travel costs.

2. Savings related to productive time losses from disease. Productivity losses are estimated based on disease rates, the number of days absent from productive activities, and the unit value of productive time. Given the stringent data requirements to estimate specifically financial losses from lost productive time, an economic value is given instead to time based on the sick person's age. To promote gender equity, men's and women's time are given the same value

3. Savings related to reductions in premature mortality. Mortality is valued using human capital approach to estimate the value of a premature death averted.

II. CONCLUSION

There is still a paucity of research in the area of water and human health, particularly with respect to low level illnesses. Also, there is a dearth of records and statistics dealing with minor illnesses. In this literature review, the goal is to complement our research objective to measure the economic

costs to society in lost wages and medical expenses arising from low level illness associated with water quality. The inadequacy of background data is significant.

With the decentralisation of programmes for water supply it is essential that communities and institutions like panchayats are actively involved in the planning, implementation and execution of programmes for water supply. These institutions will also have to undertake the monitoring of water sources and be made aware so simple remedial measures. It is true that this will require training and capacity building at a large scale.

There can be little doubt that water is a basic necessity for the survival of humans. There is interplay of various factors that govern access and utilisation of water resources and in light of the increasing demand for water it becomes important to look for holistic and people-centred approaches for water management. When it comes to dealing with maintaining water quality, the users and in large the communities have to play a key role in maintaining hygiene near water sources. One has to improve the ways in which we collect and store water so as to avoid contamination while collection, storage and use. A lower proportion for basic services is accorded. In addition, the focus is on urban-curative services, leaving rural areas more vulnerable. However supplying clean water alone would not solve health-related problems. Only an integrated approach of water quality improvement with improvement in water availability combined with sanitation and hygiene education will help address this issue.

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