

## EFFECT OF WATER BORNE DISEASES ON INDIAN ECONOMY: A COST- BENEFIT ANALYSIS

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**Abstract:** This paper expressed the effect of water borne diseases, risk assessment and potential consequences on Indian economy. In Indian sub-continent higher burden of waterborne diseases due to a deteriorating public drinking water distribution system, increasing numbers of unregulated private water systems, and a limited, passive waterborne disease surveillance system. This shows that degraded water quality can contribute to water scarcity as it limits its availability for both human use and for the ecosystem. It isn't cheap to treat water so that it is safe to drink. But it also isn't cheap to treat everyone who becomes ill during a waterborne illness outbreak. As the level of protection becomes more effective, the cost of water treatment generally rises, as well. Unfortunately, government agencies generally attempt to minimize costs while the health effects have not been properly assessed.

**Key words:** Water borne diseases, risk assessment, Indian economy

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### INTRODUCTION

Water is life, but sadly more than a billion people in India do not have access to safe Water. Lack of safe water results in untold suffering, diseases, infant mortality, stunted growth and economic loss. In India 70 per cent of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities. The UN reported that India's water quality is poor - it ranks 120th among the 122 nations in terms of quality of water available to its citizens.

Waterborne diseases expresses infections that predominantly are transmitted through contact with or consumption of infected water, are caused by pathogenic microorganisms that most commonly are transmitted in contaminated fresh water. Infection commonly results during bathing, washing, drinking, in the preparation of food, or the consumption of food thus infected. Various forms of waterborne diarrheal disease probably are the most prominent examples, and affect mainly children in developing countries; according to the World Health Organization, such diseases account for an estimated 4.1% of the total daly global burden of disease, and cause about 1.8 million human deaths annually. The World Health Organization estimates that 88% of that burden is attributable to unsafe water supply, sanitation and hygiene.

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A recent report by the United Nations says that, In India, over one lakh people die of water-borne diseases annually. It is reported that groundwater in one-third of India's 600 districts is not fit for drinking purpose. A World Resources Report says about 70 per cent of India's water supply, is seriously polluted with sewage effluents.

Water-borne diseases like cholera, gastroenteritis, diarrhea erupt every year during summer and rainy seasons in India due to poor quality drinking water supply and sanitation. Towns and cities with an abundance of water struggle to manage the water efficiently, often leading to water collecting in potholes and or in the surrounding areas and going un-used. This can have severe consequences as water-borne diseases, such as cholera, malaria and diarrhea can spread as a result of improper management of the water supply as well as discharge. These diseases are a common cause of death. Ganga river provides water to over 500 million Indians, contamination of just one source of water could affect millions of lives in one go. Water contamination often occurs due to inadequate and incompetent management of resources as well as inflow of sewage into the source.

It is estimated that around 37.7 million Indians are affected by waterborne diseases annually; 1.5 million children are estimated to die of diarrhea alone and 73 million working days are lost due to waterborne disease each year. The resulting economic burden is estimated at \$600 million a year. The problem of chemical contamination is also prevalent in India with 1, 95,813 habitations in the country are affected by poor water quality.

As of 2000 it was estimated that one-sixth of humanity (1.1 billion people) lacked access to any form of improved water supply within 1 kilometer of their home (WHO and UNICEF, 2000). Without water, life cannot be sustained beyond a few days and the lack of access to adequate water supplies leads to the spread of disease.

#### **EXTENT OF WATERBORNE DISEASES AND MONITORING IN INDIA**

The level of water pollution in the country can be gauged by the status of water quality around India. The water quality monitoring results carried out by CPCB particularly with respect to the indicator of oxygen consuming substances (biochemical oxygen demand, BOD) and the indicator of pathogenic bacteria (total coliform and faecal coliform) show that there is gradual degradation in water quality (CPCB, 2009).

Another aspect of water pollution in India is inadequate infrastructure, comprising of monitoring stations and frequency of monitoring for monitoring pollution. Monitoring is conducted by CPCB at 1,700 stations under a global environment monitoring system (GEMS) and Monitoring of Indian National Aquatic Resources (MINARS) programmes (CPCB, 2009). There is an urgent need to increase the number of monitoring stations from their current number, which translate as one station per 1,935 km<sup>2</sup> to levels found in developed nations for effective monitoring. The water quality monitoring results obtained by CPCB during 1995 to 2009 indicate that organic and bacterial contamination was critical in the water bodies. The main cause for such contamination is discharge of domestic and industrial wastewater in water bodies mostly in an untreated form from urban centres.

#### **EFFECTS OF WATERBORNE DISEASES IN INDIA**

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. Lack of water, sanitation, and hygiene results in the loss of 0.4 million lives annually in India (WHO 2007).

The socio-economic costs of water pollution are extremely high: 1.5 million children under 5 years die each year due to water related diseases, 200 million person days of work are lost each year, and the country loses about Rs 366 billion each year due to water related diseases.

McKenzie and Ray (2004) also observe similar effects of water pollution; however, the magnitude of the effect was modest. The study shows that India loses 90 million days a year due to water borne diseases with production losses and treatment costs worth Rs 6 billion. Poor water quality, sanitation, and hygiene result in the loss of 30.5 million disabilities adjusted life years in India.

Murty and Kumar (2004) estimated the cost of industrial water pollution abatement and found that these costs account for about 2.5 per cent of industrial GDP in India. Parikh (2004) shows that the cost of avoidance is much lower than damage costs. According to one estimate (Parikh, 2004), India lost about Rs 366 billions, which account for about 3.95 per cent of the GDP, due to ill effects of water pollution and poor sanitation facilities in 1995. If India had made efforts for mitigating these affects in terms of providing better sanitation facilities and doing abatement of water pollution the required resources had ranged between 1.73 to 2.2 per cent of GDP. It may however, be emphasized that these damage costs do not fully reflect the loss in social welfare. These estimates only suggest that the abatement of pollution is socially desirable and economically justified.

### RISK ASSESSMENT AND COST- BENEFIT ANALYSIS

Waterborne diseases can have a significant impact on the economy, locally as well as internationally. People who are infected by a waterborne disease are usually confronted with related costs and seldom with a huge financial burden. This is especially the case in less developed countries. 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.

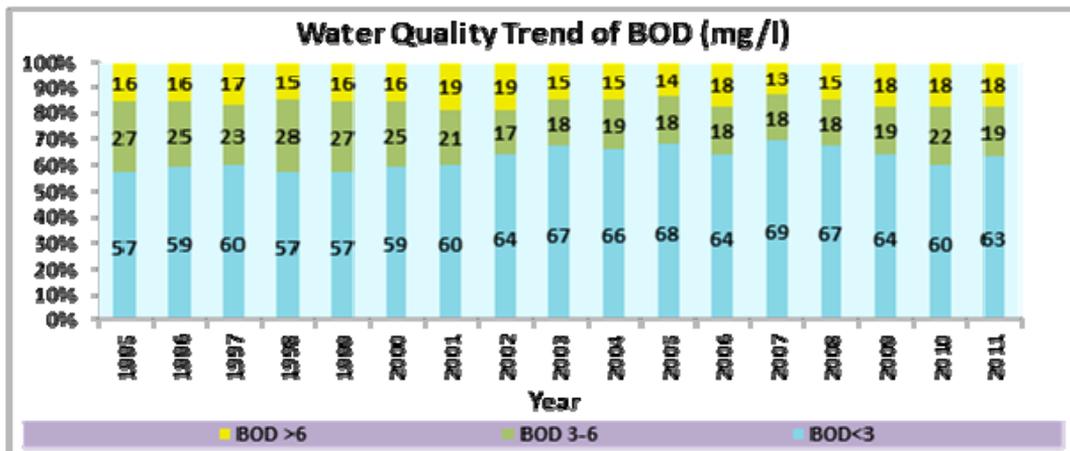


Figure 1. Trend of Biochemical Oxygen Demand (BOD), 1995–2011

Source: CPCB

In context the findings of key studies concern to waterborne diseases and relationship from health, climate, and water quality following point to be considerable.

- Relationships between extreme weather events and outbreaks of water-borne disease;
- Associated changes in fecal bacteria concentrations in water and climate factors; and
- Quantitative assessments of the relationship between various environmental factors (e.g., infrastructure and climate) and transmission risk for specific waterborne pathogens.

Conflicting results in replicate studies indicate a flawed research design, inconsistent variables, or some other confounding effect.

There are various types costs associated with waterborne diseases. A great number of illnesses, and associated costs, can be avoided with effective water treatment. The WHO divides the benefits (or avoided or minimized costs) into the following three categories:

1. Direct economic benefits of avoiding waterborne illnesses. This simply refers to the amount of money that is saved from healthcare expenses.

2. Indirect economic benefits, which includes a decrease in work days lost to illness and a longer lifespan, because these benefits enable people to work more.

3. Non-health benefits include a decrease in time spent collecting water (especially for people who have long distances to walk to get water), an increase in property prices around water sources, and increased time spent in leisure activities.

Although there has been substantial efforts to improve human health quality but less emphasis has been placed on the relevance of clean environment, particularly in developing countries like India. In India most public health policies and human development index have failed due to contaminated water supply.

Clean healthy water will not only promote economic development but also ensure a healthy labour force. The economic growth and water quality interaction model make basis GDP of any nation. This model also expressed poverty in society; the optimal strategy for promoting economic growth would be healthy humankind. Diverse infectious and non-infectious water-related diseases have direct impact on economy.

The Health expenditure; total (% of GDP) in India was last reported at 4.05 in 2010, according to a World Bank report published in 2012.



**Figure 2.** Health expenditure

## RESULTS AND CONCLUSION

In India, Places with adequate water supply struggle to sustainably manage the use of it while others struggle with the reality of scarce clean drinking water. Underlying this imbalance in water availability is the issue of water-borne diseases.

Municipalities have the treatment capacity only for about 30 per cent of the wastewater generated in urban areas. This evidently indicates a gloomy picture of sewage treatment, which is the main source of pollution of rivers and lakes. To improve the water quality of rivers and lakes, there is an urgent need to increase the sewage treatment capacity and its optimum utilization. Moreover, as recognized by CPCB (2008), operations and maintenance of existing plants and sewage pumping stations is also very poor. Municipalities lack financial resources and skilled manpower capacity and as a result the existing treatment capacity remains underutilized in a number of cities. Municipal authorities should realize the problem of pollution of water bodies and pay attention to their liability to set up sewage treatment plants in cities and towns to prevent this pollution.

The provision of clean drinking water has been given priority in the Constitution of India, with Article 47 conferring the duty of providing clean drinking water and improving public health standards to the State. The government has undertaken various programmes since independence to

provide safe drinking water to the rural masses. Till the 10th plan, an estimated total of Rs.1, 105 billion spent on providing safe drinking water.

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.

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 1990 to 0.9 per cent of its GDP in 1999.

The cost benefit analysis in respect of India could saved billions, if drinking water and sanitation services were improved. This total doesn't even take into consideration the human right to water, and the immeasurable cost of losing a friend or family member to a waterborne illness. 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.

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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