



# A survey of water borne diseases in tamilnadu

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## Abstract

Water is an abundant natural resource as three fourth of the surface of the earth is covered with it. Total water resource on earth is estimated to be about 1,360 million cubic kilometres (mck) of which only 0.2 mck is fresh water consists of rivers, lakes, swamps and reservoirs and 23.4 mck is ground water which is mostly saline.<sup>2</sup> It is only this limited quantity of water which is available to meet the water demands of both human and livestock world over. With rapid growth of population and avaricious attitude of industrial producers, fresh water and ground water are becoming scarce. As water is getting polluted uncontrollably, health care becomes a task to the government [1-2]. The WHO has estimated that currently more than 800 million people are lacking access to safe water in rural areas alone. At the same time, the number of urban people who lack safe water supply in the developing countries due to rapid urbanization is also increasing, much of which is occurring in peri-urban and slum areas. Limited care taken by the government, industrialists and individuals are responsible for this pathetic situation.[3]

## Keywords

Global warming, Acid rain, Climatic changes, nutshell Water pollution

## AMS Subject Classification

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## 1. Introduction

The southeast part of India grapples with its worst drought in nearly a century, a problem worsened by polluted rivers, deforestation and population growth and the largest reservoir system serving is near depletion. They are witnessing an unprecedented water crisis in one of the world's great industrial cities. Due to environmental degradation apart from other factors, millions of people in India are wondering when the water will run out [ 5-7]. Many residents are already enduring sporadic water cut-offs, some going days without it. Officials say that drastic rationing may be needed, with water service provided only two days a week. Some residents have begun drilling their own wells around homes and apartment buildings, or hoarding water in buckets to wash clothes or flush toilets Public schools are prohibiting students from using water to brush their teeth, and changing their lunch menus to serve sandwiches instead of meals on plates that need to be washed.

### 1.1 Water pollution in tamil nadu

In Tamil Nadu, ground water contamination was reported in almost all the districts such as Coimbatore, Erode, Salem, Karur, Vellore, Kanchipuram and Chennai. Ravichandran [13], Bhavani shankar and Muthukrishnan [14] studied the ground water quality of Chennai. High level of contamination was recorded in Pudupet and Vallalar Nagar. The study revealed that the contamination of ground water was due to the seepage of river Cooum. Jacob [14] investigated the influence of river Cooum on the ground water quality of Nungambakkam and Anna Nagar. The study revealed that the level of many chemical particles and cadmium exceeds the permissible level of drinking water standards.

### 1.2 Statement of the problem

Industries contribute to the economy in more than one way; investment, output, employment, income, linkage both backward and forward with other sectors, all directly contribute to the growth of the economy. Employment generated especially by the small and medium scale industries is quite crucial to the people who could not enter the high quality employment. However, industries like textile, leather and others also lead to negative externalities with their effluents, which affect the quality of drinking water. Also, Governments are under tremendous pressure to attract producers and investors to raise the rate of investment and employment generation.

### 1.3 Significance of the problem

Kanchipuram is a popular town both for its silk industry and temples. The industrial development of this district has generated considerable amount of employment. In the total workforce of this district, around 60 per cent of the workers are engaged in sectors other than agricultural and household industry. The same industrial development process has resulted in severe pollution of surface and ground water in this district due to the discharge of untreated waste water, particularly by the dyeing units along with the tanneries and rice mills. Hence, it is imperative to study, especially the health status of the people living near the banks of Vegavathi river due to the surface and ground water pollution in Kanchipuram town, which is the consequence of the industrial development process that has taken place in this district. This will also help in bringing out the severity of impact on various segments of the society, since the degree of impact will differ among the different segments, though all have been affected.

### 1.4 Objectives of the study

The following are the objectives of this study:

1. To trace the level of water pollution in Kanchipuram town;
2. To examine the socio-economic characteristics of the sample households in the study area;
3. To evaluate the health hazards of water pollution by the dyeing units among the sample households in the study area;

4. To evaluate the health impact of water pollution on various segments of the sample households in the east zone by comparing them with the sample households in west zone in Kanchipuram town;
5. To measure the costs of water pollution in terms of time lost cost, medical cost and total cost among the sample households in the study area; and
6. To estimate the households' 'Willingness to Pay' (WTP) for the improved quality of ground water in Kanchipuram town.

### 1.5 Hypotheses of the study

The following are the hypotheses of this study:

1. There is no significant variation in the extent of ailments among the sample households in the study area;
2. There is no significant association between the monthly income level and the level of averting expenditure among the sample households in the study area;
3. The 'Willingness to Pay' for better quality water does not differ significantly among the sample households in the study area; and
4. Government's policies are not adequate to mitigate the evils of discharge of untreated effluents by the dyeing units.

### 1.6 Limitations of the study

The information for the analysis has been gathered through a field survey with the help of a pre-tested questionnaire. The information, which has been collected from the sample households are expected to be true and genuine. Information pertaining to the type and nature of diseases and ailments, medical expenditure including treatment cost are also expected to be accurate. Moreover, in this type of research, where the health impact of water pollution among the water users, it can be done only by comparing the ailments and expenditure of the study group vis-a-vis the control group, though such methodology is universally accepted. Also, it is assumed that the discrepancies, if any, in the degree of ailments among the sample households is directly related to the type of water used by them.

## 2. Methodology of the study

This study is based on both secondary and primary data. To analyse the pollution of ground water and surface water at both all-India and Tamil Nadu state levels, secondary data have been collected from the reports and publications of both the Governments of India and Tamil Nadu. At the micro level, to trace the growth trend of the dyeing units in Kanchipuram district, secondary data have been collected from the district authorities and other Government agencies which help in tracing the level of water pollution in this district. Primary



data have been collected from the sample households in the study area - Kanchipuram town. Initially, a pilot survey was conducted with a standard questionnaire. After necessary modifications to the questionnaire, all the required data regarding the socio-economic, health and other personal information about the sample households have been collected with the help of interview technique. These data have been collected during a four-month period, from March to June 2014, which is usually a dry period as far as monsoon activities are concerned in this district. During this period, the dyeing activities would be in full-swing. This period is specifically chosen to avoid any monsoon-related health impact on the sample households. Thus, it helps in netting in the health impact due to surface and ground water pollution.

### 3. Health impact of water pollution

This study examines the extent of health impact that has been caused by the discharge of untreated effluents by the dyeing units in Kanchipuram Town in the Vegavathi river. The discharge of the untreated effluents in to the river has polluted the water sources in Kanchipuram Town, which particularly affects the households that are located on the river bank, though water sources which are away from the river bank in the Town are also affected. Thus, this chapter examines the extent of water pollution in the study area, its health impact, cost of pollution in terms of medical expenditure, time lost cost, averting cost and others.

#### 3.1 Specification of water pollution by the respondents

The tests conducted in 1998 and 2014 too had indicated that pollution level was in fact increasing in the west zone. When the households' opinions were sought through the field survey in 2014, it is evident that pollution level now is high, and some of the households opine that the water is polluted. This is quite important which signifies the influx of pollutants in water sources, over the years.

The table 1 indicates that among the 367 respondents who report water pollution, 42 (11.4 per cent) indicate that municipal water is polluted, 273 (74.4 per cent) suggest that ground water is polluted, while 52 respondents (14.2 per cent) opine that both municipal and ground water is polluted.

Area-wise, in the case of the 247 respondents who report water pollution in the East zone, 18 (7.3 per cent) report only the pollution of municipal water, 187 (75.7 per cent) state ground water is polluted and 42 respondents (17 per cent) report the pollution of both sources; and out of the 120 respondents who report water pollution from the West zone, municipal water is polluted in the case of 24 respondents (20 per cent), ground water is polluted in the case of 86 respondents (71.7 per cent), while both sources are polluted as far as the 10 respondents (8.3 per cent) are concerned. Thus, the opinions of the respondents indicate that ground water is highly polluted, while some opine that even the water supplied by the municipality is also polluted, as it is also drawn from ground

**Table 1.** Water pollution by the respondents

Specification	Area		Total
	East Zone	West Zone	
Municipal Water	18	24	42
	(42.9)	(57.1)	(100.0)
	[7.3]	[20.0]	[11.4]
Ground Water	187	86	273
	(68.5)	(31.5)	(100.0)
	[75.7]	[71.7]	[74.4]
Both	42	10	52
	(80.8)	(19.2)	(100.0)
	[17.0]	[8.3]	[14.2]
Total	247	120	367
	(67.3)	(32.7)	(100.0)
	[100.0]	[100.0]	[100.0]

Note: Figures in round brackets are row percentages and those in square brackets are column percentages.

Source: Field survey.

water sources, while the proportion of respondents who opine that their ground water is polluted is 68.5 per cent in East zone and 31.5 per cent in the West zone.

### 4. Factors determining willingness to pay among the sample households

To estimate economic values for all kinds of eco-systems and environmental services the Contingent Valuation Method (CVM) is used. It involves directly asking respondents, how much they would be willing to pay for specific environmental services or commodities, rather than inferring them from observed behaviours in regular market places. It creates a hypothetical market place in which no actual transactions are made, though it is also possible to employ this method for commodities available for sale in regular market places. Many applications of the method deal with public goods such as improvements in air quality, water quality, etc. It is called contingent valuation, because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service.

The present study also applies CVM for getting the respondents' replies for the supply of pure drinking water by the municipality. The respondents feel that the water supplied by the municipality which is taken from the Vegavathiriver is either partially treated or not treated at all. Thus, the respondents were asked whether they are willing to pay for better quality water and if yes, how much they would be willing to pay. In the previous section, it has already established that the mean levels of WTP are not equal between the respondents of the two zones, and there are intra-zone differences as well. The low-income respondents are willing to pay more than their high-income counterparts in both zones, while the east zone respondents' level of WTP is higher than the West zone respondents. Clearly, this defied the economic logic of the 'capacity' factor and explained in terms of the 'impact'



factor in general. But, it needs to be analysed in some more detail, the factors influencing the level of WTP among the respondents. Hence, the level of WTP which has been collected through field survey using contingent valuation is modelled using the OLS method. The variables selected to be included and regression model are explained below. While the quantity of breakbone fever and fever cases has gone down, incidences of water borne diseases and infections as well as symptom, ENT (ear, nose and throat) infections, paratyphoid fever, pink-eye, ear infections, tineaped is and higher tract infections have spiked at government hospitals in metropolis once rains. Several cases of microorganism infections once the rains square measure in the main enhanced thanks to high prevalence of sickness carrying pathogens. Incidences of higher tract infections have doubled and hypersensitivity reaction problems troubles patients of respiratory disease and Chronic hindering pneumonic Diseases (COPD), say medicos. “Due to seasonal changes, patients of respiratory disease and COPD will have exacerbated symptoms as they get exposed to pollutants mixed with rain water. this may cause microorganism infections together with diarrhoea, pneumonia, and tract infections. The incidences may be relieved by daylight as allergens may be eliminated, however throughout rainy days matters worsens,” aforesaid Dr Ranjith Veeramani Thangavelu, senior assistant operating surgeon at Government hospital of medicine. Pulmonologists say incidences of higher and lower tract infections have increased manifold since monsoon set in thanks to the presence of allergens in air and water that infect individuals. “Patients grumbling of tract infections have up at the hospital chiefly as a result of individuals develop allergies like food allergies, allergic rubor, and different symptoms of hyper allergic state in time of year,” aforesaid Dr. Ponnambala Namasivayam, dean, Stanley Medical faculty. Cases of epidemic cholera, diarrhoea and respiratory disease have increased in past few days at Institute of kid Health as kids area unit simply exposed to rain whereas taking part in and on their thanks to college. However, hospital authorities say that cases can rise as rains stop. “Bacterial infections and water-borne diseases can spike once the rains stop as incubation of diseases takes time. Incidences of metastasis ailments typically go high throughout winter season, particularly within the month of Gregorian calendar month and Gregorian calendar month,” aforesaid Dr P Vasanthamani, dean, Kilpauk Medical faculty. The National Environmental Engineering analysis Institute, Nagpur in 2002 had dole out water quality checks in any respect the stages specifically supply, treatment level, service reservoir level and at the buyer level throughout the monsoon, summer and winter seasons. (See knowledge here). Water samples from sources viz. Poondi Lake, Cholavaram Lake,

#### 4.1 Source level

As for surface water supply, Dissolved chemical element (DO) and Chemical chemical element Demand (COD) are thought-about for the lakes. DO is a vital characteristic representational process the chemical element concentration gift in an

exceedingly water body needed for sustaining aquatic life. The permissible limit for DO is four milligrams per cubic decimetre (mg/l). On the opposite hand COD values indicate the quantity of chemical element needed to disintegrate all the organic female parent (carbaceous and non carbaceous) into greenhouse gas and water. because the water from the supply is treated and disinfected before being equipped as drinkable, it's comparable to category C water body (drinking water supply once standard treatment and disinfection). Thus, per World Health Organization (WHO) guideliness, the COD permissible level ought to be ten mg/l.

#### 4.2 Treatment level

The treated water samples square measure inside the fascinating vary of the BIS 10500 specification for drinkable apart from microorganism parameters. it's been discovered that three out four samples taken from the Red Hills plant square measure contaminated with microorganism however only one out of four water samples from the Kilpauk plant is contaminated. Figures seven and eight below show the amount of TC and TFC within the treated water for the 3 seasons. The permissible level of TC and TFC in drinkable sample ought to be zero mg/100 milliliter. Apart from microorganism contamination, 2 out of 3 outlet water samples from the Red Hills plant throughout the winter season have shown high TDS level of 570 mg/l and 505 mg/l against the fascinating limit of five hundred mg/l.

## 5. Discussion

From the concerning results the subsequent points are often analysed.

#### 5.1 At the supply level

DO level of all the lakes altogether the seasons square measure higher than 4mg/l (minimum DO level needed for a water body) therefore indicating that the lakes aren't too contaminated with organic matter. If there's unforeseen load of organic matter then there's many chemical element concentration for its decomposition. Summer and winter DO levels square measure of an equivalent vary as of every different (8-6 mg/l) and square measure satisfactory. COD of the lakes varies from twenty -50 mg/l against the fascinating limit of ten mg/l. This knowledge is not offered for the winter season. Within the monsoon the degree square measure a lot of on top of in summer. this might ensue flow of runoff with garbage into the lakes from close space. Reports of pollution in Porur and Poondi lakes are printed from time to time by each national and regional newspapers within the town. aside from the rubbish dumps at the lake aspect, spreading of aquatic plant within the lakes has been reported by The Hindu. Chembampakkam Lake receives effluents from close industrial space. Timely action by the municipal department ought to be taken to stop any pollution of the water sources.





## 5.2 Cleaning of surface water supply

Surface water sources ought to be cleansed from time to time to make sure DO levels square measure higher than four mg/l. additionally the municipal department ought to keep a check on the rubbish dumps round the lake and therefore the effluents getting into the lake.

### Proper medical care

Enough time ought to incline for the chemical element and water to combine so the medical care is complete. this may increase the contact time of residual chemical element with the water, which is able to facilitate to maximise the medical care of the water.

### Water Quality Checks

Frequent water quality checks in any respect the degree ( treatment, service reservoirs, client end) ought to be done to keep up the water quality. CMWWSB ought to do these checks as this may facilitate to upgrade their system and understand and check the supply of contamination.

### Sustainable Use of Rain Water

Rain water gather ought to be promoted at a home level. This initiative won't solely facilitate curb the problem of water shortage however also will stop contamination. As shoppers will store and make clean the water on their own this may stop diseases caused by microorganism contamination.

## 6. Conclusion

Industrialization is always necessary for the benefits it brings in: higher investment, output, employment generation, new technology, exports and so on. However, it also involves lot of social cost in the form of environmental and health impact. But, the degree of social cost, sadly is not paid its due attention particularly in the developing countries which are always in the pursuit of higher economic growth. This study brings out the extent of health impact due to the pollution of water sources, both ground water and surface water from the unmindful discharge of the untreated effluents by the textile dyeing units in Kanchipuram Town. The impact of such water pollution is quite enormous particularly on the marginalized sections of the society like MBC, SC and ST and also the female headed households who always lack educational and other endowments. They literally live on the margins of the society, which accentuates the burden of water pollution in a disproportionate manner. The extent of ailments from the polluted water, number of working days, time lost cost and medical cost are all higher among these sections of the population compared to others like the FC, BC and the male headed households.

The affected households, though earn less, are willing to pay more for a clean and safe drinking water from the municipality, while the better off have their own purification system in place.

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