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AN IMPACT ON HUMAN HEALTH OF SCHEDULED CASTE GROUP HOUSEHOLD: A STUDY OF NOYYAL RIVER BASIN TAMILNADU.

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Abstract
With a view to identifying the impact of industrial effluent on human health. First hand information has been obtained. Three health camps were conducted at 3 centers on different dates. Around 1120 villagers attended all the three medical camps. 19 Villages have been covered in the camp. The villagers were given due publicity about the camp. 11 doctors from Indian Medical Association Tiruppur and adjoining places conducted the camp. It is evident from the medical camp that was conducted to assess the health status of people as resulted in giving the firsthand information .The secondary information are number of hospitals, hospitals distance, No of staff, doctors in the hospital, frequency water bound disease in the village, major help problem reason for the health problem , frequent death primary information collected from help problem, day of sick , medical expenditure, number of man days lost, wage loss, loss.

Keywords: Water pollution, Industrial effluent, Noyyal River Basin, Human health impact, Scheduled Caste households, Skin allergy, Respiratory infection, Gastritis, Medical camps, Economic loss, Wage loss, Tamil Nadu, Health status assessment, Rural households

Introduction

Human health is one of the most important factors in economic development. A healthy workforce is essential for the development of an economy. A healthy workforce requires a healthy environment that is clean air water , recreation and ambiences . Pearce and war ford (1993) argued that the most important and immediate consequences of environmental degradation in the development world take the form of damage to human health. Further, they argued that diarrhoea is a common occurrence in many developing countries with three millions to five million to five million cases recorded every year. Each case is estimated to involve a loss of 3-5 working days, amounting to nine billion working days lost in a single year. According to them, water pollution have a define the impacts on morbidity and mortality. And ultimately it has a serious negative impact on economic activities in the form of loss of working days. death of trained workers, expenditures on hospitalization , and so on.Under these circumstances, the impact of industrial effluent on human health has been assessed in the study area. For this purpose three health camps were conducted covering 21 villages. A part from this , a household survey has also been conducted among 612 household, In the medical camp and household survey the following information were collected to assess the health status of the villagers.

Review of Literature

1. Pearce and Warford (1993) Pearce and Warford established a macroeconomic framework that connects environmental degradation to human welfare and sustainable development. Drawing on global case studies from developing countries, they highlighted how polluted water sources contribute to diarrhoeal diseases, skin infections, and premature mortality. The writers thought that millions of sick days each year cause huge losses in productive work time and higher medical costs for families. They stressed that damage to the environment hits poor and socially marginalized groups the hardest because they rely on local natural resources and don't have access to good health care. Their conceptualization of pollution-induced productivity loss, healthcare spending, and poverty traps forms a theoretical base for evaluating the economic costs of water pollution in rural India. The present study adopts this perspective in assessing wage loss, man-days lost, and medical expenses among Scheduled Caste households.

2. Govindarajalu (2003) Govindarajalu undertook an empirical investigation of water pollution in the Noyyal River Basin using field sampling and health surveys in villages downstream of textile dyeing clusters. The research assessed physical and chemical parameters, including salinity, total dissolved solids, and color, and correlated these with reported health issues among residents. The results showed that people who bathed, washed, and raised cattle with river and well water often had skin irritation, stomach problems, breathing problems, and eye problems. The author determined that prolonged exposure to untreated industrial effluent had rendered the river a public health hazard and diminished the quality of life for agricultural workers. This study directly informs the current research by demonstrating the historical continuity of pollution and its association with household health.

3. Govindarajalu and Kumar (2003) In a complementary study, the researcher extended the analysis to socio-economic consequences by incorporating household expenditure data and healthcare access indicators. They talked to families who were affected to find out how often people got sick, how far away health facilities were, how much treatment cost, and how villagers dealt with the situation. They said that families who relied on contaminated groundwater had to pay for medical care and lost productivity over and over again, which made poverty worse for landless workers and other groups who were already in a bad situation. The study stressed the absence of effective effluent treatment systems and regulatory enforcement in the textile sector. Their emphasis on the economic burden of health issues aligns with the goals of the current study, which calculates annual household losses due to illness and lost wages.

4. Mohanraj, Somasundram, and Nishadh (2016) Mohanraj and his team did tests on the water quality in a lab along different parts of the Noyyal River. We looked at things like pH, electrical conductivity, hardness, chlorides, and dissolved

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Vol. 35 Issue 2, 2025, Pages: 2433-2439

solids and compared them to drinking water standards. The researchers documented alarming pollution levels in downstream zones close to dyeing units, rendering the water unsuitable for domestic consumption and irrigation. They warned that long-term exposure could cause skin problems, stomach problems, and kidney problems. The study bolstered scientific evidence of environmental contamination that supports the medical findings identified in the current investigation.

5. Karunanidhi, Aravinthasamy, and others (2020) Karunanidhi and his co-authors looked at how heavy metals like chromium, lead, cadmium, and nickel got into the surface water and sediments of the Noyyal River. The U.S. suggested using seasonal sampling and health-risk-assessment models. They figured out both the carcinogenic and non-carcinogenic risks to people living nearby with the help of the Environmental Protection Agency. Results showed that both kids and adults who lived near industrial areas were at higher risk of health problems from eating or touching things. The authors cautioned that prolonged accumulation may elevate the risks of organ damage and cancer. Their quantitative risk assessment adds to the disease-prevalence approach of this study and backs up worries about long-term exposure among Scheduled Caste communities.

6. Rajamanickam and Santhanam (2015) This study evaluated the influence of textile dyeing and bleaching units on water quality in Tiruppur by comparing upstream and downstream river samples. Indicators such as colour intensity, chemical oxygen demand, total dissolved solids, and chloride content were found to be significantly higher near industrial discharge points. The authors concluded that the river had lost its self-purifying capacity and had become ecologically stressed, affecting fisheries, livestock use, and domestic water supply. They also talked about how water shortages and pollution can cause social problems. These environmental effects set the stage for the current study's focus on health and income losses in households.

7. Chitradevi and Sridhar (2011) Chitradevi and Sridhar investigated alterations in groundwater quality within the Noyyal Basin by utilizing long-term monitoring data and conducting chemical analyses of wells situated in rural settlements. Their research connected the increase in salinity, fluoride, and industrial chemicals to polluted surface waters leaking into the ground and trash being thrown away without rules. The study found that rural households, especially poorer ones that didn't have piped water, had to use contaminated wells, which made them more likely to get sick from water-borne diseases. Their findings emphasize the mechanisms by which industrial pollution impacts domestic water sources—an issue pivotal to the current household-level health assessment.

8. Sundar et al. (2022) Sundar and his team used numerical groundwater-flow models (MODFLOW) to predict how pollutants would move through the Noyyal River Basin near Coimbatore city. Their research showed that pollutants from river channels, industrial estates, and open drains could move sideways and up and down into aquifers over time. The authors cautioned that even villages situated at a considerable distance from the river might experience prolonged groundwater degradation, hindering efforts to ensure safe drinking water. The modeling approach emphasizes the enduring nature of contamination, elucidating the ongoing health issues recorded in the current study.

9. Abirami et al. (2024) Abirami and co-authors conducted eco-toxicological and human health risk assessments based on trace-metal concentrations in river water and sediments. They used pollution indices, hazard quotients, and cancer-risk calculations to figure out how dangerous things were for people of different ages. The study found that several sampling sites had moderate to severe ecological stress and higher risks to human health, especially for people who come into contact with water often, like fishermen, washerwomen, and farm workers. Their emphasis on occupational exposure and social vulnerability closely aligns with the present study's focus on daily wage earners in Scheduled Caste households.

10. Vivek et al. (2024) Vivek and his team used remote sensing, GIS mapping, and household health surveys to look at how groundwater pollution and disease spread in semi-urban industrial areas of South India. Spatial analysis showed that there were groups of polluted wells with high levels of salt and metals that were near settlements where people were complaining of skin diseases, stomach problems, and breathing problems. The authors suggested that interventions be targeted to specific areas, that monitoring be improved, and that alternative water sources be made available. Their interdisciplinary approach bolsters the current study's integration of medical camps and household surveys to assess both environmental exposure and health outcomes.

Objectives of the study

- The Evaluate economic impact of water pollution on drinking water, human health of the rural households in the study area.
- To assess the impact of industrial water pollution on the human health and economic conditions of Scheduled Caste households in the Noyyal River Basin, Tamil Nadu.

Hypotheses of the study

- There is no significance difference in the human health effect between the periods before and after pollution.

Details collected through medical camp

1. Name of the village
2. Name of the age sex and village
3. symptoms of any disease
4. Major reasons for the disease
5. Is the disease due to pollution water or not
6. Heath problem – tenure
7. Medical expenditure Per Annum
8. working day loss due to ill health.

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
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Vol. 35 Issue 2, 2025, Pages: 2433-2439

On the basis of the information collected the details of the health status of the villagers are presented of the the analysis.

Assessment of health status

The health status of the villagers of the study area has been assessed through health camp exclusively conducted for the present study area . In the first medical camp conducted at Arugampalayam centre around 250 villagers attended. In the second camp, around 445 villagers attended. It is observed from all the three camps that there were symptoms of skin allergy, gastritis and respiratory problems among the details are given below

Health status – Villagers and percentages of Patients (1st Camp)

Name of the Village	Villagers Attended the camp	Normal health	Identified Diseases	percentage
Arugampalayam	105	82	23	21.90
Anaipalayam	61	40	21	34.40
Suppanoor	23	14	9	39.00
Pallapalyam	25	18	7	28.00
Edakkadu	13	10	3	23.07
Kullayoor	23	17	6	26.08
Total	**250**	**181**	**69**	**27.60**

Source: First Medical camp, Computed From Field Survey (2008).

The first medical camp covering Six villages from which 250 people attended was held on 3/3/2008 and this camp**.** The diseases identified were skin allergy gastritis hypertension ,joint pain, and respiratory problem. The second camp covering 7 villages from which 445 people attended was held on 12/3/2008. In this camp diseases identified were the same as in the first camp. In the camp which was held on 2.4 .2008. 425 people from 8 villages attend and same diseases along with ulcer were identified. The highest numbers of patient or found in Arugampalayam and the lowest in Edakkadu.

Health status – Villagers and percentages of Patients (2nd Camp)

Name of the Village	Villagers Attended the camp	Normal health	Identified Diseases	percentage
Kathankanni	143	109	34	23.78
Reddipalayam	167	129	43	25.75
Kannimarkovilpudur	10	7	3	30.00
Vayakattupudur	31	23	8	25.81
Karaipudur	37	21	11	29.73
Pallanaikenpalayam	27	21	6	22.22
Thottipalayam	30	22	8	26.67
Total	**445**	**332**	**113**	**26.28**

Source: Second Medical camp, Computed From Field Survey (2008).

The same details are presented in the table for the second medical camp conducted at Kathankanni centre. There were 23.78% of villages identified with one of the diseases earlier from Kathankanni village There were 25.75% villagers from Reddipalayam 30% from kannimarpudur , 25.8% per cent from Pallanaikenpalayam and 26.67% from Thotipalayam. Reddipalyam has the highest number of patients and kannimarkovil the lowest , There were one –fourth of the villagers were identified with any one of the diseases mentioned earlier.

Health status – Villagers and percentages of Patients (3rd Camp)

Name of the Village	Villagers Attended the camp	Normal health	Identified Diseases	percentage
Orathupalayam	66	47	19	28.79
Ramalingapuram	122	91	31	23.41
Kodumanel	54	37	17	31.48
Siviarpalayam	32	23	9	28.17
Pallakkatupudur	35	25	10	28.57
Sokkanathapalayam	46	33	13	28.26
Ellaikumarapalayam	32	24	8	25.00
Annaipalayam	38	30	8	21.05
Total	**425**	**310**	**115**	**27.05**

Source: Third Medical camp, Computed From Field Survey (2008).

The detail regarding the third medical camp conducted at Ramalingapuram centre is presented. In this center also, on an average, one- fourth of the villagers were suffering from any one of the water- brone ailments. Out of the 425 villages who attended the camp, 115 where identified with some diseases. Ramalingapuram is identified is having the highest number (31) of patient and Ellaikumarapalyam and Annaipalyam as having the lower number (8) of disease.

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
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Vol. 35 Issue 2, 2025, Pages: 2433-2439

Percentage of Person Affected From Different Diseases

The percentage of persons affected from each category of diseases identified in the medical camps are presented in the Table out of the total patients identified most of them agricultural labourers and daily wage earners. 31.65% of the patients were suffering from skin allergy problem. 22.56% of the patients had respiratory infection. There was general allergy in the cases of 13.13% gastritis for 9.43% of per cent of patients. 10.44% had joint pain ,7.07% had ulcer problem and 5.72 % per cent had other general ailment .. The Significant observation made in the study was that most of the villagers were avoiding the use of polluted water in the system tank and wells. Otherwise the percentage could have been at higher.

Percentage of Person Affected From Different Diseases

S.No	Category	No. of person affected	Percentage
1	Skin allergy	94	31.65
2	Respiratory infection	67	22.56
3	Allergy	39	13.13
4	Gastritis	28	9.43
5	Joint Pain	31	10.44
6	Ulcer	21	7.07
7	Others	17	5.72
	Total	**297**	**100.00**

Source: Computed from Field Survey (2008)

The number of villagers affecting the skin allergy has the highest percentage (31.65%) and those with are the lowest(7.07%)

Impact on Health and Economic Loss

In this part of analysis the approximate economic losses is estimated using the basic of primary information collected through survey in the medical camps. It was evident that there were wage loss and medical expenditure and on the part of the villagers due to usage of polluted water. The details are presented in the table for this purpose data related to average number of days sick per annum, average medical expenditure before and after pollutions were collected. By computing these data the total economic loss has been estimated as ₹ 5250 of Arugapalaym Center, ₹ 6390 for Kathakanni center and ₹ 6615 for Ramalingapuram center.

Impact on Human Health in sample Villages

S.NO	No.of people Affected	Arugampalyam center	Kathankanni center	Ramalingapuram center
1	Total	69	113	115
2	Male	28	49	53
3	Female	41	64	62
4	Average no.of day sick HHs/Pa	43	52	57
5	Average no.of days unable to work / year	51	63	68
6	Wage losses/ HHs/year (In ₹)	4080	5040	5440
7	Average no of visit to Doctor (before pollution) (1989)	-	-	-
8	No.of visit- At present	-	14	13
9	Average medical Expenditure (before pollution)	-	-	-
10	Average medical Expenditure (After pollution)	1200	1350	1175
	Total losses per HH/per annum in (₹)	**5250**	**6390**	**6615**

Source: Computed from Field Survey,(2008).

Health problem

A household survey was conducted using questionnaire II at the village level in 31 villages. Here simple random Sampling Techniques is used. From this survey the major health problem of the people. number of days of sickness medical expenses ,man days' loss and total loss were found out.

Health problem Due to Water Pollution

Diseases	Frequency	Percent
Skin Allergy	333	54.40
Respiratory infection	80	16.00
Gastritis	69	11.60
Allergy	66	10.80
Joint pain	38	4.60
Ulcer	05	0.80
Others	21	1.80
Total	**612**	**100.00**

It can be seen in the table that the major problems are skin allergy and the next in order are respiratory infection and allergy . The diseases that least affects is Ulcers.

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 35 Issue 2, 2025, Pages: 2433-2439

Water Pollution – Day of Sickness- Household Information

Day in a year	Frequency	Percent
00.00	336	54.9
1.00	45	7.4
2.00	83	13.6
3.00	31	5.1
4.00	37	6.0
5.00	54	7.8
6.00	10	1.6
7.00	8	1.3
8.00	5	1.0
9.00	2	1.0
10.00	1	0.3
Total	**612**	**100.00**

Source: Computed from Field Survey (2008).

The Table shows that 276 people in the study area being unaware of the water pollution, have been subjected to some sickness or other and have abstained from work for 1 to 10 days . 83 of them have absented themselves for 2 days in a year , 54 for 5 days and 45 of them for one day.

Medical Expenses	Frequency	Percent
00	336	54.9
1-100	35	5.8
101-200	37	6.1
201-300	21	3.4
301-400	00	0.0
401-500	115	18.6
501-600	00	0.0
601-700	21	3.4
701-800	22	3.6
801-900	00	0.0
901-1000	12	2.0
1001-1500	12	2.0
1501-5000	01	0.2
Total	**612**	**100.00**

Source: Computed From Field Survey (2008).

The expenditure incurred for medical treatment are given in table .127 out of 612 people spend ₹ 401 to ₹ 500 for medical treatment and 37 people spend ₹ 101 to 200.people spending ₹ 01to 100 are 35 numbers. Nearly 64 people spend ₹ 201 to ₹ 800 on medical treatment in year. More than one third of the people have to spend rupees ₹ 101 to 800 every year on health problems. This is because of the water pollution.

Man Days' Loss

Man days loss in a year	Frequency	Percent
00	339	55.33
1.00-5.00	207	33.9
6.00-10.00	28	4.6
11.00-15.00	06	1.0
15.00-20.00	14	2.3
20.00-25.00	18	2.9
Total	**612**	**100.00**

Source: Computed from Field Survey (2008).

The table indicates that 44.7% of the man days have led to loss of income and additional, expenditure for medical treatment, all due to water pollution.

Wage Loss

Wage Loss	Frequency	Percent
00	338	55.2
1-150	33	5.4
75-200	17	2.7
300-500	100	16.3
600-800	55	8.9
900-1000	37	6.1
1200-1500	17	2.8
1600-2500	14	2.4
2500-10000	01	0.2
Total	**612**	**100**

Source : Computed From Field Survey (2008).

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
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From the table 5.22 it can be inferred that 274 people, because of their sickness have lost 49.8% of their wages in a year. It can be seen that 100 people have incurred loss of ₹ 600 to ₹ 800 all due to water pollution .

Total Loss After Pollution (Household Information)

Total loss in a year	Frequency	percent
00	331	54.1
1-100	02	0.4
101-300	16	2.6
301-500	45	7.3
501-800	45	7.3
801-1000	43	7.0
1001-1200	53	8.7
1201-1500	38	6.2
1501-2000	23	3.8
2001-3500	09	1.5
3501-9000	06	0.9
9001-15000	01	0.2
	612	**100**

Source: Computed from filed Survey (2008).

Table shows the total loss after pollution in which the total includes income and medical expenditure. 186 people, a little less than one- third ,out of 612, have incurred a total loss of ₹ 300 to Rs.1200 in a year . It is obvious that it is a big loss to the people due to water pollution.

Findings of the study

The health status of the villagers in the study area was assessed through the medical camp, Doctor participated in the medical camps were able to identify the symptoms of water borne disease and health problems such as skin allergy. Respiratory infection, general allergy gastritis and ulcer were common among the villagers who attended the medical camp. It was assessed that one –fourth of villagers had any one of the listed diseases, Most of the diagnosed patients accepted that they were using either that river water or well Water or both for washing purpose, cleaning cattle or fishing in the tank etc. After to realizing the ill effects of the polluted water they totally avoided using at present

CONCLUSION

The industrial effluents discharged from textile processing units in and around Tiruppur have severely polluted the Noyyal River, leading to significant adverse effects on the health of rural households, particularly those belonging to the Scheduled Caste group in the basin area. Through medical camps conducted in multiple villages and a household survey covering 612 families, the study clearly shows that water pollution has caused widespread health problems. Common diseases include skin allergy (affecting the highest percentage of patients), respiratory infections, gastritis, general allergy, joint pain, and ulcers. On average, about one-fourth of the villagers attending the camps were diagnosed with these water-related ailments. Many affected individuals are agricultural labourers and daily wage earners, making the illness more burdensome. The economic consequences are also serious. Households face regular medical expenses, loss of working days, and wage losses due to sickness. The estimated annual loss per household ranges from ₹5,250 to ₹6,615 across the study centres, including both treatment costs and income foregone. A large portion of households reported sickness days (1–10 days per year), medical spending (often ₹101–800 annually), and total financial losses (up to several thousand rupees) directly linked to polluted water use.The findings reject the hypothesis of no significant difference in health effects before and after pollution, as villagers now experience more frequent illnesses and higher costs compared to the pre-pollution period. Although many households have started avoiding direct use of polluted river or well water (e.g., for washing or cattle), the damage to health and livelihoods remains substantial.In conclusion, industrial water pollution in the Noyyal River Basin has emerged as a major threat to human health and economic well-being, especially for vulnerable Scheduled Caste communities. Urgent interventions are needed, including strict enforcement of effluent treatment standards, provision of safe alternative drinking water sources, regular health monitoring, and awareness programs to reduce exposure. Without immediate and effective measures, the long-term socio-economic development of the region will continue to suffer, emphasizing the need to balance industrial growth with environmental protection and public health safeguards.

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