NEED ENVIRONMENTAL SUSTAINABILITY: IMPACT ASSESSMENT OF THE POLLUTION CAUSED BY DYEING AND BLEACHING INDUSTRIES

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Abstract: There are negative externalities which mainly arise from adverse environmental consequences like industrial pollution. We are procrastinating this burning issue in the hands of future generation to deal with. It is also important to recognize the social and ecological objectives that are a part of sustainable development, and to reconcile these concepts and operationalize them with the economic framework. This paper is an attempt made to assess the impact of informal regulation of dyeing and bleaching unit's pollution on rural communities in Noyyal River basin. Water pollution reduces the amount of pure fresh water used for various purposes. The econometric model has been adopted as a precise instrument for the analysis of the impact of the natural environment deterioration. It tests the hypothesis that communities exposed to high levels of pollution will have loss of human health due to polluted water. The econometric model analyses the socio-economic and environmental impact of the dyeing and bleaching unit's pollution on the society by estimating the loss of opportunity cost. In addition to that, this analysis estimates the loss of man-days and health damage cost due to water quality contamination. The multiple-equation, fixed effects model attempts to account for cross-section of the issue.

I.   INTRODUCTION

During the 20th century significant changes occurred in the way in which society views its relationship with nature. The emergence of Environmentalism in the 1960s reflected the growing concerns of the developed world in relation to the undesirable effects that industrial and economic development have on the environment. New Environmentalism highlighted the detrimental impact that environmental degradation could have on human survival. Development and conservation remained to be viewed as incompatible as the consumption of finite resources, pollution and environmental deterioration were perceived as unavoidable consequences of industrial development.

The pollution and drying-up of local water sources is having serious implications for the daily lives of girls and women who are responsible for travelling long distances to collect safe water. This not only affects the health of these women but prevents many girls from attending school and is therefore having a negative impact on the social development of the country (Archer 2005, pp. 24-26).

II.   INDUSTRIAL POLLUTION AND HEALTH EFFECTS

Human health is one of the most important factors in economic development. A healthy workforce requires a healthy environment, that is, clean air and water and wilderness. Pearce and Warford (1993) have argued that the most important immediate consequence of environmental degradation in the developing world take the form of damage of human health.

This analysis is an attempt in the direction of facing this challenge. Its principle aim is to understand the problems faced by the local communities in India due to industrial pollution and to suggest certain sustainable measure for the mitigation of these problems. It deals with the status and consumption of unsafe water and its impact on health related problems faced by people in and around dyeing and bleaching units in the study area.

Tiruppur city has large number of textile, dyeing and bleaching units, where generally weaving, dyeing, bleaching, printing and finishing of cloth is carried out. These operations usually produce intensely alkaline liquor high in dissolved materials and suspended solid. In the absence of adequate treatment facilities and effective drainage system, bulk of the effluent from these industrial units flow into open land and low lying areas with consequential severe damage to flora and fauna. The offensive smell of stagnant pools of waste water is great source of nuisance to the local people.

The prevalence of illness and the repeated occurrence of diseases apart from suffering due to chronic ailments kept the workers off the job. The number of workdays lost would be the second stage effect of pollution. The ailing respondents of the study area could not attend to their profession and domestic routines in the patterns in which they might have done under normal condition. They had lost a number of days for taking treatment and also for convalescing. This was a loss not only to the extent that their productivity and income suffered. With the loss of workdays, income of the households also decreased proportionately. Medical expenditure escalated on account of prolonged treatment. Thus a fall in income and rise in expenditure simultaneously affected the worker, generally resulting in large scale spending and borrowing.

Table 1 shows the average number of workdays lost by sample respondents annually in the study villages. The total number of workdays lost in the year was 949 days at the time of survey period. In which landless respondents are 565 (59.64 percent) lost their workdays in the year. The farmers reported that the 145 (15.28 percent) marginal farmers, 71(7.48 percent) small farmers.80 (8.43 percent) semi-medium farmers and 88 (9.27 percent) were lost. According to S K Pant's study, India loses 1,800 million person-hours or over 200 million man-days annually because of diseases and deaths caused by contamination of water.

Table 1 Distribution health damage cost

Landholding Pattern		Medical expenses	Travel cost	Man-days lost	wage per day	Loss of Opportunity cost	Place of treatment			Distance To Treatment	Total loss Per family (Per year)
							Govern-ment	private	Locally		
Landless	Mean	4717.92	476.26	7.64	148.51	482.90	15	84	5	3.38	5577.92
	Sum	500100	43340	565	9950	29940	14.4	80.8	4.8	1462	563370
	% of T.S	40.04	59.58	59.54	53.19	50.07	48.4	42.6	83.3	38.8	42.15
Marginal (0.5 - 2.49)	Mean	6455.32	429.64	4.26	115.36	396.30	2	44		5.85	7000.64
	Sum	303400	12030	145	3230	10700	4.3	95.7	-	767	329030
	% of T.S	24.29	16.54	15.28	17.27	17.89	6.5	22.3		20.3	24.62
Small (2.50 – 4.96)	Mean	6556.76	284.76	2.96	120.65	329.57	8	28	1	4.22	7172.06
	Sum	242600	5980	71	2775	7580	21.6	75.7	2.7	494	243850
	% of T.S	19.43	8.22	7.48	14.84	12.68	25.8	14.2	16.7	13.1	18.24
Semi-medium (4.97 - 9.89)	Mean	1252.10	114.41	4.21	102.63	388.95	3	27		5.48	856.21
	Sum	38815	1945	80	1950	7390	10.0	90.0	-	439	24830
	% of T.S	3.11	2.67	8.43	10.43	12.36	9.7	13.7		11.6	1.86
Medium (9.90 - 24.71)	Mean	9645.29	859.09	11	100	598.57	3	14	0	15.25	11700.67
	Sum	163970	9450	88	800	4190	17.6	82.4	.0%	610	175510
	% of T.S	13.13	12.99	9.27	4.28	7.01	9.7	7.1	.0%	16.2	13.13
Total	Mean	5247.42	433.01	5.97	129	433.33	31	197	6	4.71	5914.12
	Sum	1248885	72745	949.00	18705	59800	13.2	84.2	2.6	3772	1336590
	% of T.S	100	100	100	100	100	100.0	100.0	100.0	100	100

Source: primary survey 2013

It is found that three people in the village were paralyzed due to consumption contaminated water. This has led to severe psychological and economic pressure on the families. People are exposed to the toxic chemical water while working in the farm. The additional expenditure on health care per annum increased steeply for affected farmers. In terms of increase in the number of visits to doctor per month in the case of dyeing and bleaching unit's polluted village, while in the control village it is just one visit to the doctor per month per family. The study villages incurred the medical treatment cost to an amount of Rs. 12, 48,885.

III. ESTIMATING COST ON THE IMPACT OF HUMAN HEALTH

The present study is an attempt in the direction of facing up this challenge. Its principal aim is to understand the problems faced by the local communities due to industrial pollution and to suggest certain sustainable measures for the mitigation of these problems and also to bring out the broader orders of status and consumption of unsafe water and its impact on health related problems faced by them in and around the way side villages of Noyyal river. In particular it is, to assess the health impact on society by the industrial pollution, and to elucidate the problem of industrial effluent from dyeing and bleaching units to estimate the loss of opportunity cost.

3.1 Hypothesis

Pollution point in kilo metres, Disease code male adult, Potable water collection distance in kilo metres, Distance travelled for treatment, Treatment taken male adult, Number of days man-days lost male, Chemical parameters, Arsenic are the foremost parameters, which influenced ill effects on health.

The damage to human health is estimated from a difference in the expenditure on human health (due to water pollution) of polluted areas. Hence, the difference in number of waterborne disease affected people reflects the damage due to water pollution. The price factors of both areas are assumed to be the same. Therefore, the impact on human health can be estimated. Damage functions were estimated to comprehend the degree of damage caused by leather pollution and its impact on human health. The details of the damage functions used for estimation are presented. The results of the model are reported below.

Table 2 Regression result Health damage cost

s.no	Independent variables	Regression Coefficient	Standard. Error	't' Value	Sig.
1	A	-1538.647	529.964	-2.903	.004
2	X_1	-18.840	4.371	-4.310**	.000
3	X_2	810.396	179.009	.249**	.000
4	X_3	7.257	1.679	1.40**	.000
5	X_4	147.753	18.103	.252**	.000
6	X_5	-4672.777	832.443	-309**	.000
7	X_6	1244.463	85.155	.445**	.000
8	X_7	711.198	299.322	.069*	.018
9	X_8	1246.948	364.593	.113*	.001

Note: N= 800, R=0.404, R^2=0. 398 significant at 1 % probability level; ** significant at 1 % probability level.

Functions: $Y = a - X_1 + X_2 + X_3 + X_4 - X_5 - X_6 + X_7 - X_8 + \mu$

$Y_{(ADC)} = -1538.647a - \beta_{ADC}\ 18.840 - \beta_2\ 810.396 + \beta_3\ 7.257 + \beta_4\ 147.753 - \beta_5\ 4672.777 + \beta_6\ 1244.463 - \beta_7\ 711.198 - \beta_8 1246.948 + \mu$

Y = Health damage cost (HDC), a = Constants, X_1 = Pollution point in Km, X_2 = Disease code male adult, X_3 = Potable water collection distance in km, X_4 = Distance travelled for treatment, X_5 = Treatment taken male, X_6= No of days man lost male, X_7 = Chemical parameters (1-yes,2- No), X_8= Arsenic, μ = Error term

For estimation purpose, the salient features of the present data set that need to be taken into account is the cost due to health decline(dependent variable) which is a count of the total health expenditure incurred by an individual due to water pollution induced illnesses. In JETIS case, the application of the multiple regression models is appropriate because it accounts for the whole number, nature of the dependent variable while least square and the linear models have to be taken into consideration for these characteristics.

Generally a portion of the income earned is spent in the treatment of human illness. To know the marginal value of health cost incurred in every additional income of respondents, regression analysis was used for estimated affected people of wayside villages of Noyyal River. R^2 value for the affected people analysis indicates that 40 percent of variation in the dependent variable is due to change independent in the variable i.e., gross income. The 't' value for both groups are significant at 1 percent level of significance.

The regression co-efficient for the affected people, analysis indicates that for every additional income of rupee one, Rs. 0.04 will be incurred for health cost. A certain set of variables may be dominant to determine the health damage cost. This can be a hypothetical situation as to which type of variable exerts its influence significantly as a determinant factor is a matter to be taken for hypotheses testing. It is obvious from the table 1 that the health damages were influenced Pollution point in kilo meters, Disease code male adult, Potable water collection distance in km, Distance travelled for treatment, Treatment taken (by males), No of days man-days lost male workers, Chemical parameters and Arsenic are the foremost parameters, which were influenced by the health damage cost extensively and turned significantly at 5% level. 74 percent of these independent variables explained the dependent factor (Table 2).

IV. CONCLUSION

Although, industrialization brought prosperity in our country, but at same time, it has ruined the ecological assets, degraded the water and air quality and depleted the precious resources to a great extent in many parts of our country. The study has systematically delineated the impact of water contamination and the changing nature of human livelihood systems. The water got polluted due to the effect of the process of industrialization, one of the poorly planned development interventions that have been made at the outskirts of the village community. There are negative externalities which mainly arise from adverse environmental consequences like industrial pollution. We are procrastinating this burning issue in the hands of future generation to deal with. It is also important to recognize the social and ecological objectives that are a part of sustainable development, and to reconcile these concepts and operationalize them with the economic framework.

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