ECONOMICS OF HEALTH HAZARDS OF PRE-SCHOOL CHILDREN IN CUDDALORE SIPCOT, TAMIL NADU

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Abstract

The present study analyses the health of pre-school children in the SIPCOT region of Cuddalore. The industrial area of State Industries Promotion Corporation of Tamil Nadu (SIPCOT) in the Cuddalore district has been declared a 'global toxic hotspot'. Because of this, the people are highly affected by the pollution and children's are severely affected. The present study makes an attempt to identify the health problems of the children in particular. From the results, the preschool children were severely affected by fewer, stomach pain, head ache, cold and skin allergy and that lead the disease prevalence for a long period. Therefore, the problem is serious and immediate action is emergent to recover the problem in the SIPCOT region. The preschool children's are highly affected due to SIPCOT pollution and the Government has to come forward to shutdown the industries that pollute beyond the safety limit.

Keywords: SIPCOT, pollution, health, morbidity, treatment.

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Introduction

The present study analyses the health of pre-school children in the SIPCOT region of Cuddalore. Environmental health includes all aspects of human health and disease that are influenced by factors in the environment. These range from the direct effects of chemicals, radiation and some biological agents that indirectly effect the physical, psychological and social environment on health and wellbeing. Environmental factors can influence health in different ways. Exposure to some pesticides, toxins, asbestos or other chemicals could increase the risk of developing cancer; exposure to lead and mercury can lead to developmental disorders in children. Particulate matters from air pollution are associated with increased mortality, especially from cardiovascular and cardiopulmonary diseases. Obesity, later followed by diabetes development, can also be considered as an environmental health issue because it is caused by lack of exercise as well as by dietary problems. In some cases, the association between environmental factors and health effects is strong and consistent. The vulnerability of individuals and communities to environmental health threats also depends on age and health status, genetic factors, diet and well-being.

Vulnerability of children to environmental pollutants

Children are more vulnerable to pollution for many reasons, including the fact that their airways are narrower than adults, they have markedly increased needs for oxygen relative to their size, they breathe more rapidly and inhale more pollutants per pound of body weight, and they spend more time engaged in vigorous outdoor activities than adults (Stephen Gislason, 2007). While levels of outdoor pollutants decreased substantially after passage of the Clean Air Act, levels of ozone, carbon monoxide, and particulate matter are still high enough to present hazards to children. Although healthy children appear to experience losses in pulmonary function that are comparable to those observed in adults for a given dose of ozone, children do not report symptoms to the same extent, possibly because they do not recognize the significance of respiratory symptoms. Epidemiologic studies from various locations indicate a relationship between outdoor air pollution and adverse respiratory effects in children, and the most common pollutants implicated are respirable particulates and ozone. Air pollution correlates with increased prevalence of chronic cough, chest illness, bronchitis, hospital admissions for respiratory conditions, and decrements in lung function.

SIPCOT Pollution

The industrial area of State Industries Promotion Corporation of Tamil Nadu (SIPCOT) in the Cuddalore district has been declared a 'global toxic hotspot' by environmentalists after a finding that the air in the area contained extremely high levels of at least 22 toxic chemicals including eight cancer-causing ones. At least 13 chemicals found were used as raw materials in SIPCOT industries. In India, SIPCOT is the first industry to test for toxic gases, such as volatile organic compounds and sulphur compounds that are breathed by the people living nearby the industry. From the study, trichloroethene, carbon tetrachloride, acrolein, methylene chloride and hydrogen sulphide were released by SIPCOT and those were beyond the safety limits suggested by the US Environmental Protection Agency's (US EPA). So, the SIPCOT is termed as "slow-motion Bhopal". The Pollution Control Board (PCB) did not monitor for toxic gases in the industrial estate. The PCB and the Tamil Nadu Government have ignored the complaints of the people which show the Government failure towards managing natural resources, public health and livelihood.

Children, foetuses and pregnant women are most at risk of exposure. These chemicals attacks children at a very vulnerable stage of development and in cases, permanently damage their ability to fight diseases or their mental, physical and sexual development. With addition, the water and land sources were heavily polluted and the livelihood of the farmers in the villages around SIPCOT was questioned. By considering the severity of the issue, the present study analyses the health hazards of the children's in the SIPCOT region.

SIPCOT and Health Hazards

In the SIPCOT region, the population suffer due to health hazards. The industrial wastes dumped in water, land and air leads to air and water borne diseases. Besides, the farmers in the SIPCOT region have lost their fertile land which has affected their livelihood. The farmers are in a position to find employment at Cuddalore town for meagre wages. In this situation, they have to incur additional expenses for safeguarding their life and family from pollution. In particular, the health of the children is highly affected due to air and water borne diseases (The Hindu, 2004). The present study is very particular to study about child health as the children are more vulnerable to pollution for many reasons. This made the researcher to widen the scope to analyse the health of preschool children and whose health is a predominant factor to strength the future India. However, the Government and estate owners of SIPCOT have failed to control the

pollution even after the people and NGOs have complained and agitated against the pollution problem.

As a whole, the pollution of SIPCOT has affected the farmer's livelihood, health and natural resources. Therefore, the present study analyses the social, demographic and economic status of the surveyed respondents in the first part. At next level, the health hazards of pre-school children in terms of age, disease prevalence, sources of treatment and cost of treatment were analysed. Lastly, the preventive measures and awareness of the public regard to pollution were studied.

Methodology

The present study is based on the primary data. Primary data were collected from the village Kudikadu which is adjacent to SIPCOT region of Cuddalore. Simple random sampling technique was adopted to identify the sample and the total sample stood at 50. The household having children's aged below five was selected for the purpose of study. Cross classification tables with average and percentage were calculated in order to analyse the health problems of the children. Statistical Package for Social Science was used for analysing the data. Secondary data of the District, SIPCOT and study village was collected from the Village Administrative Officer for studying the socio-demographic, economic and geographical location of the SIPCOT region.

Morbidity pattern of the preschool children

The SIPCOT pollution has affected the health of the people and children's in particular. The morbidity pattern of the preschool children is given in the table 1.

Table 1: Morbidity Pattern of the Preschool Children of the Surveyed Respondents

Morbidity Pattern			Total	Percentage
I.	**Air Borne Diseases**			
	a)	Cold	6	8.2
	b)	Respiratory	5	6.8
II.	**Water Borne Diseases**			
	a)	Typhoid	5	6.8
	b)	Diarrhoea	4	5.5
	c)	Jaundice	2	2.7
	d)	Stomach pain	14	19.2
	e)	Skin Allergy	6	8.2
III.	**Common Ailments**			
	a)	Fewer	21	28.8

	b)	Head ache	10	13.7
	Total		**73**	**100**

Source: Computed Note: Percentages are to the total

The health infection due to pollution was in terms of air borne diseases, water borne diseases and common ailments. The health problems of the preschool children were assessed for the past six months and the occurrence of disease were 73 in total. Of this, 29 per cent of the children were affected by fewer and 19 per cent by stomach pain. Next to this, head ache, cold and skin allergy has affected the preschool children. The disease due to pollution was air and water borne disease and the registration were 52 and the rest were affected by common ailments. It can be construed that the health problem due to pollution is severe as compared to that of common ailments.

It is hypothesized that "Health hazards due to pollution (water and air borne diseases) have severely affected the pre-school children as compared to that of common ailments". From the above results, the health hazards due to pollution have affected 57.5 per cent of the preschool children whereas 42.5 per cent of them were affected due to common ailments. Thus, the first hypothesis is validated.

Disease prevalence and morbidity pattern of the preschool children

The disease due to pollution may affect the health for a long period. The disease prevalence of the preschool children is presented in the table 2. The disease prevalence was classified as 1-3 days, one week, one month and more than one month. Of this, majority of the children's had health problem for 1-3 days and one week. Of the total 73 infected children's, 29 had problem for 1-3 days while 27 of them for one week. The registration was found more in case of fewer, stomach pain and head ache. In the same time, 12 children's was affected for one month and 5 had health problem for more than one month. The occurrence was due to typhoid, diarrhoea, skin allergy and jaundice. The data infers that pollution problem has affected the children's severely and this has put their health to bad shape. From the data, it is observed that the disease prevalence were even more than a month which threats the health of the future generation.

Table 2: Disease Prevalence and Morbidity Pattern of the Children of the Surveyed Respondents

Morbidity Pattern		Disease Prevalence				Total
		1-3 Days	One Week	One Month	More than one Month	
I.	**Air Borne Diseases**					
	a) Cold	0	6	0	0	6
	b) Respiratory	0	5	0	0	5
II.	**Water Borne Diseases**					
	a) Typhoid	0	0	5	0	5
	b) Diarrhoea	0	0	4	0	4
	c) Jaundice	0	0	0	2	2
	d) Stomach pain	8	6	0	0	14
	e) Skin Allergy	0	0	3	3	6
III.	**Common Ailments**					
	a) Fewer	15	6	0	0	21
	b) Head ache	6	4	0	0	10
Total		**29**	**27**	**12**	**5**	**73**

Source: Computed

Curative of Disease and morbidity pattern of the preschool children

Pollution and health problems are not easy to curb from the society. It is difficult to ease as it has grown strongly and poor population suffer to overcome the same. The details of the curative of disease were given in the table 3. Of the total 73 infected, 58 of the children's have cured the disease fully while 15 have cleared partially. The data is scattered for the children's those who have fully cured the disease. However, few children's have fewer, headache, skin allergy, cold and respiratory problem which could not be cleared thoroughly. Because, the pollution problem is continuous and there is no reduction from the SIPCOT thereby children's face severe health loss.

Table 3: Curative of Disease and Morbidity Pattern of the Children of the Surveyed Respondents

Morbidity Pattern		Curative of Disease		Total
		Fully	Partially	
I.	**Air Borne Diseases**			
	a) Cold	4	2	6
	b) Respiratory	4	1	5
II.	**Water Borne Diseases**			

	a)	Typhoid	5	0	5
	b)	Diarrhoea	3	1	4
	c)	Jaundice	2	0	2
	d)	Stomach pain	14	0	14
	e)	Skin Allergy	3	3	6
III.	**Common Ailments**				
	a)	Fewer	16	5	21
	b)	Head ache	7	3	10
Total			**58**	**15**	**73**

Source: Computed

Source of Treatment and morbidity pattern of the preschool children

The rural population affected by pollution take treatment from public and private clinics. Private source of treatment are too costly and it may be difficult for poor to afford. The sources of treatment of the surveyed population were government and private (see table 4). Of the surveyed preschool children, 30 of them use private source of treatment while 27 approach government hospitals. Besides, for air and water borne disease they rely upon private while for common ailments they approach government hospitals. According to the nature of the disease, the people choose the sources of treatment. This shows the poor service provided by the public sector towards this poor community. In the same time, 16 of the surveyed children's depends both government and private for health care. Altogether, the innocent people pay for what they have not done. That is, the industrial estate owners pollute while the poor pay for it. On the other, poor government health services stands as an additional burden to them.

Table 4: Sources of Treatment and Morbidity Pattern of the Children of the Surveyed Respondents

Morbidity Pattern			**Sources of Treatment**			**Total**
			Government	**Private**	**Govt. and Private**	
I.	**Air Borne Diseases**					
	a)	Cold	2	3	1	6
	b)	Respiratory	1	4	0	5
II.	**Water Borne Diseases**					
	a)	Typhoid	0	4	1	5
	b)	Diarrhoea	0	4	0	4
	c)	Jaundice	0	2	0	2

	d)	Stomach pain	7	3	4	14
	e)	Skin Allergy	0	4	2	6
III.	**Common Ailments**					
	a)	Fewer	13	4	4	21
	b)	Head ache	4	2	4	10
Total			**27**	**30**	**16**	**73**

Source: Computed

Cost of Treatment and morbidity pattern of the preschool children

From the above discussion, it is found that the villagers depend both private as well public health care services for treatment. The private service involves expenditure and the details are given in the table 5. The total cost of treatment stood at Rs. 3820. Of this, the cost of medicine was Rs. 2800 and Rs. 1070 as doctor fee. The amount spent was more for typhoid (34%), diarrhoea (18%) and jaundice (18%). In particular, the above mentioned diseases are highly infectious and the people have to depend exclusively private and the amount shows the same.

In total, the amounts spend for air and water borne disease were more while common ailments constitute lesser amount, which shows the severity of SIPCOT pollution. It is hypothesized that the cost of treatment for water and air borne disease due to pollution is high as compared to that of common ailments. The total amounts spend for disease stood at Rs. 3820. Of this, the cost for air and water borne disease is Rs. 3020 whereas Rs. 300 for common ailments. Of the total health cost, the contribution towards air and water borne disease is 93.2 per cent while 7.8 per cent for common ailments. From this, it is well construed that the cost of treatment for water and air borne disease is high as compared to that of common ailments thereby the second hypothesis is validated.

Table 5: Cost of Treatment and Morbidity Pattern of the Children of the Surveyed Respondents

Morbidity Pattern			**Cost of Treatment (Rs.)**		**Total**
			Medicine	**Doctor**	
I.	**Air Borne Diseases**				
	a)	Cold	150 (5.4)	50 (4.7)	150 (3.9)
	b)	Respiratory	200 (7.1)	100 (9.3)	300 (7.9)

II.	**Water Borne Diseases**				
	a)	Typhoid	1000 (35.7)	300 (28.0)	1300 (34.0)
	b)	Diarrhoea	500 (17.9)	200 (18.7)	700 (18.3)
	c)	Jaundice	500 (17.9)	200 (18.7)	700 (18.3)
	d)	Stomach pain	100 (3.6)	50 (4.7)	150 (3.9)
	e)	Skin Allergy	150 (5.4)	70 (6.5)	220 (5.8)
III.	**Common Ailments**				
	a)	Fewer	100 (3.6)	50 (4.7)	150 (3.9)
	b)	Head ache	100 (3.6)	50 (4.7)	150 (3.9)
Total			2800 (100)	1070 (100)	3820 (100)

Source: Computed
Note: Figures in the parentheses denote percentage to the total

Conclusion

The preschool children were severely affected by fewer, stomach pain, head ache, cold and skin allergy. In particular, the health infection due to pollution has severely affected the preschool children as compared to that of common ailments. Infection due to water has affected the children's health and occurrence of stomach pain and skin allergy is found more. This infers that the contaminated water has affected the children's health and future generation of the country.

The children's of the surveyed village are highly affected by the air and water borne disease and the children's had health problem for 1-3 days (29 children's) while 27 of them for one week. Those children's were affected by fewer, stomach pain and head ache. In the same time, 12 children's was affected for one month and 5 had health problem for more than one month. The occurrence was due to typhoid, diarrhoea, skin allergy and jaundice. From the results, it is construed that the health problem is severe and that lead the disease prevalence for a long period. Therefore, the problem is serious and immediate action is emergent to recover the problem in the SIPCOT region.

Problems due to pollution exist for a long period and affect the nature and human beings. Similarly, the children's those had health problem could not completely recover from the diseases. Of the total 73 infected, 58 of the children's have cured the disease fully while 15 have cleared partially. As the pollution problem is continuous and availability of health sources are too weak and altogether this made the children's and people to suffer.

The surveyed preschool children use private and public source of treatment. Majority of the users took treatment in private (30) while 27 approach government hospitals. Besides, for air and water borne disease they rely upon private while for common ailments they approach government hospitals. The problems in the area are highly dangerous where the government hospitals with all medical equipments are needed to eradicate the problem.

The total cost of treatment stood at Rs. 3820. Of this, the cost of medicine was Rs. 2800 and Rs. 1070 as doctor fee. The amount spent was more for typhoid (34%), diarrhoea (18%) and jaundice (18%). The above mentioned diseases are highly problematic and the people understand the problem thereby find private clinics for treatment. However, the problems are induced by the SIPCOT estate for which the innocent people pay. This has been reported to the government authorities and they have not showed there duff ears to this problem.

Water and air borne disease are found to be more and this has affected the preschool children of the SIPCOT region. Majority of the children are infected for 1-3 days, one week and few for more than one month. With addition, one fourth of the infected children's could not recover completely from the health problems. As a result, they depend private sources of treatment which is costly now-a-days. The respondent's complain that the pollution has affected their health, lifestyle, income and natural resources.

Suggestions

From the above findings, researcher has given few policy suggestions to safeguard the people's health and environment. The suggestions are as follows:

1. The preschool children's are highly affected due to SIPCOT pollution and the Government has to come forward to shutdown the industries that pollute beyond the safety limit.
2. The Primary Health Centre in the SIPCOT regions avails only first aid and people spend more for private health sources. The Government has to open new hospital with all medical facilities.
3. The people suffer to get safe drinking water and they spend more for the same. The Government has to provide drinking water by considering the people's health.

The above suggestions given to the policy makers require immediate consideration as the pollution problems are severe. That is, the problem due to pollution may exclusively affect the natural and human resources and it is the duty of the government to act immediately.

Reference

American Academy of Pediatrics. (2004), "Ambient Air Pollution: Health Hazards to Children", http://pediatrics.aappublications.org/

American Lung Association of California. (2002), "Air Pollution and Children's Health", http://www.oehha.org/public_info/facts/pdf/kidsair4-02.pdf

Bobak M, Leon DA. (1999), "The Effect of Air Pollution on Infant Mortality Appears Specific for Respiratory Causes in the Post Neonatal Period", Epidemiology, 10:666 –670.

Borrego C., M. Lopes, J. Valente, J. Santos, T. Nunes, H. Martins, A. I. Miranda & N. Neuparth. (2007), "Air Pollution and Child Respiratory Diseases: The Viseu Case Study Portugal", http://library.witpress.com/default.asp

Brunekreef B, Janssen NA, de Hartog J, Harssema H, Knape M, van Vliet P. (1997), "Air Pollution from Truck Traffic and Lung Function in children Living Near Motorways", Epidemiology.;8 :298 –303.

Dietert RR, Etzel RA, Chen D, et al. (2000), "Workshop to Identify Critical Windows of Exposure for Children's Health: Immune and respiratory Systems Work Group Summary", Environment Health Perspective, 108:483 –490.

Galen E. (2000), "US Chemical Pollution Threatens Child Health and Development", http://www.wsws.org/index.shtml.

McConnell R, Berhane K, Gilliland F, et al. (1999), "Air Pollution and Bronchitis Symptoms in Southern California Children with Asthma", Environment Health Perspective, 107:757 –760.

Ostro B, Lipsett M, Mann J, Braxton-Owens H, White M. (2000), "Air Pollution and Exacerbation of Asthma in African-American Children in Los Angeles", Epidemiology,12:200 –208

Plopper CG, Fanucchi MV. (2000), "Do Urban Environmental Pollutants Exacerbate Childhood Lung Diseases?" Environment Health Perspective, 108:A252 –A253.

Stephen Gislason. (2007), "Air Pollution Hazards to Children", http://www.alphanutrition.com/index.html

The Hindu. (2004), "New Report: SIPCOT, Cuddalore, A Global Toxic Hotspot for Air Pollution Toxic Air Monitoring a First for India - Using Community Monitors, Simple Buckets", http://www.thehindu.com.

Yu O, Sheppard L, Lumley T, Koenig JQ, Shapiro GG. (2000), "Effects of Ambient Air Pollution on Symptoms of Asthma in Seattle-area Children Enrolled in the CAMP study", Environment Health Perspective", 108:1209 –1214.

Zetterström R. (1999), Child health and Environmental Pollution in the Aral Sea region in Kazakhstan, Acta Paediatrica, 88 (s429), 49–54.