

Environmental Crisis – Health Implications of Poor Air Quality

Sadhna Kothari and Anju Kohli

Abstract

Environmental crisis or pollution is one of the most vital problems faced by mankind today. Pollution can be in the form of air, water, soil, and land, noise and radiation. Focus of this paper is on health implications due to poor air quality. It is rightly said, air is poisonous, there is death in the air. But air pollution control has traditionally been a low priority environmental issue in developing countries. Air pollution leads to respiratory infections and lung cancer. Various studies conducted so far on health implications of pollution show most of the major Indian cities have crossed the critical limit of Suspended Particulate Matter (SPM). In this regard Delhi and Calcutta are leading metropolitan cities. Transport sector is contributing heavily to this pollution load. Air pollution not only causes premature deaths and sickness but due to these monetary losses are also increasing in India. This problem in India is not only in big cities but emerging trends of smaller cities are also shocking. For this not only urbanization and industrialization but mismanagement of resources is also responsible. The solution to this problem lies not in western models but only in Indian models, which will be based on local parameters, and which would also judge the effectiveness of pollution control measures.

Introduction

Environment has been defined as the total cosmos, which forms not the world alone, but the total universe. It mainly consists of three elements - the physical, the biological and the cultural. The physical environment includes such major areas as geology, topography, surface and ground water resources, water quality, air quality and climate. The biological environment refers to the flora and fauna of the area. The cultural environment includes human pollution distributions, historic and archaeological sites and economic indicators of human welfare. The gradual deterioration of environment is a worldwide issue whose ills and miseries are in a myriad form in the developing countries. First UN Conference on environment (Stockholm, 1972) had explicitly recognised that poverty was indeed one of the worst threats to the environment and it was recognized that development needs of the country should be married with the

parallel need to conserve the environment and natural resources.

Environment crisis or pollution is one of the most vital problems faced by mankind today. This is the result of adverse effects of interaction between man and environment. Any agent-chemical, physical or microbial, that alters the composition of environment is called a pollutant.

This pollution is not merely because of urbanization or industrialization but because of mismanagement of resources. Pollution can be in the form of air, water, soil and land, noise and radiation.

The focus of this paper is on air pollution in India and its health implications. The pure air is vital for survival as it provides indispensable oxygen gas for respiration and metabolism. But nobody bothered about purity of the air, it is taken for granted. The constituents of air are

altered with the addition of several kinds of toxic gases such as carbon dioxide, carbon monoxide, nitrogen dioxide, sulphur dioxide, hydrogen sulphide, hydrogen fluoride, ammonia, ozone and several hydrocarbons. The air pollutants react in the environment to produce additional pollution. The main sources of air pollution are transportation, industries, thermal power, refuse disposal etc. Domestic sector also contributes to the air pollution due to fuel burning. The particulates are in the form of solid or liquid and range in size from 0.1 to 100 microns.

Various studies conducted so far show the quality of diesel in India is abnormally low; which has high sulphur content. As per the target of the government, by 2000, this would be reduced to 0.25 percent, whereas in Europe and the United States, it is planned to be reduced to 0.05 percent. Primary emissions from diesel vehicles have a high Suspended Particulate Matter (SPM) load, particularly PM 10 due to high sulphur content. They also emit nitrous oxide, which upon exposure to sunlight release ozone. In India, an attempt has been made to monitor SPM levels but no attempt has been made to monitor PM 10 and PM 2.5 particles which are less than 10 micron in diameter. The researchers in the West show they are more detrimental to health.

It is now being realised that small particles in the air are killing people. According to researches, there is poison and death in the air and with every breath taken, life is shortened or health is ruined. And this situation is getting worse day by day. Among the host of pollutants that are inhaled daily, some may cause trivial irritation to the upper respiratory pathways. While others may lead to acute or chronic injury to the lungs and some are implicated in causation of lung cancer. It has been reported that 6 out of the 10 largest cities in India have such severe air pollution problem that the annual level of suspended particles is about three times higher than the WHO standard. Following table -1 and fig. 1 (A & B) show the air pollution deaths and

Table 1: Pollution Deaths and Sickness (1991, 1995)

	Pollution deaths (Number)		Pollution related Sickness	
	1991	1995	1991	1995
Delhi	7,491	9,859	39.50	60.0
Mumbai	4,477	7,023	25.50	40.0
Kanpur	1,897	3,639	8.03	15.4
Chennai	863	1,291	4.50	6.8
Calcutta	5,726	10,647	29.30	54.5

World Bank, CSE Report (1991, 1995)

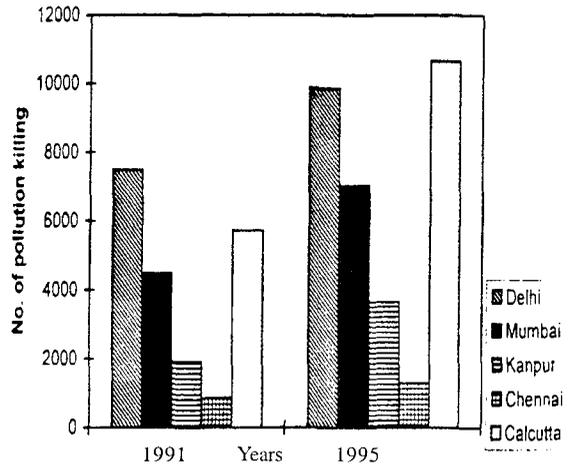


Fig. 1(a)

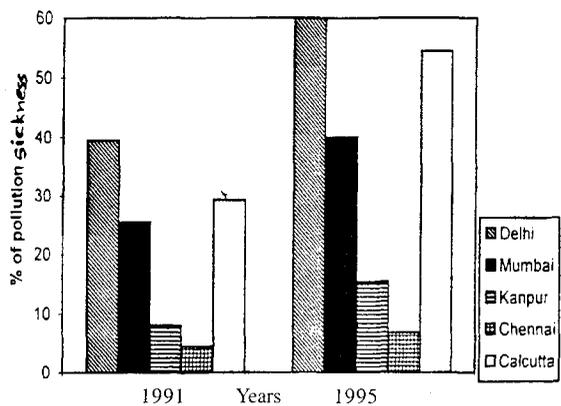


Fig. 1(b)

Table 2: Sector wise Emission (Delhi) (In metric tonnes per day) (1993-94)

	Transport	Power	Industry	Domestic	Total
Hydrocarbons	310	2	6	2	320
SPM	13	50	60	12	135
Nitrogen Oxides	187	143	20	3	323
Sulphur dioxide	11	121	35	12	179
Carbon monoxide	810	8	128	117	1063
Total pollutants	1310	324	249	148	2020
Contribution to the pollution load (%)	64.5	16.0	12.3	7.2	100

Source: CPCB report.

related sickness in 1991 and 1995 in five big cities.

Delhi is on the top of five selected largest cities with regard to deaths by pollution and related sickness. According to Washington-based World Watch Institute, pollution levels in Delhi are comparable to the infamous 1952 London smog that claimed 4,000 lives. In all these cities the number has increased in both the cases. This shows death is in the air due to its poor quality. Table -2 shows the sector wise emissions in Delhi, which leads in air pollution in India.

Transport sector shows the highest contribution to pollution, its contribution to the total pollution is 64.5 per cent. Its contribution to smaller and deadlier particles such as PM 10

and PM 2.5 is also highest. In another recent study (1997) conducted by CSE in 36 Indian cities including Delhi, there is an increase in air pollution by 28 per cent in the last 3-4 year period in all these cities. It is estimated that nearly 52,000 people died prematurely in 36 Indian cities due to high levels of SPM, of which 7,500 are in Delhi alone. Table -3, shows the classification of 36 cities according to critical, high, moderate and low annual average level of SPM in the air in 1995.

This survey points out that out of the 36 cities, 19 cities are in the critical level of SPM, 7 in high, 8 in moderate and only 2 in low level. This critical level of SPM in Indian cities is responsible for monetary losses due to premature

Table 3: Annual Average Level of SPM (1995)

Critical (more than 210 SPM)	Faridabad, Bhillai, Jalandhar, Dhanbad, Surat, Ludhiana, Dehradun, Delhi, Jaipur, Agra, Kanpur, Varanasi, Patna, Ahmedabad, Indore, Calcutta, Mumbai, Satna, Kota
High (140-210 SPM)	Shimla, Bhopal, Jabalpur, Hyderabad, Chennai, Nagpur, Kottayam
Moderate (70-140 SPM)	Pune, Bangalore, Mysore, Kozikode, Jamshedpur, Kochi, Haldia, Guwahati
Low (less than 70 SPM)	Tuticorin, Shillong

Source: CPCB rating scheme, Measurements in micrograms per cubic metre

Table 4: Health and Monetary Losses Due to Air Pollution (1991-92, 1995)

Health/Monetary Losses	Unit	1991	1995
(a) Premature Deaths	(No.)	40,351	51,379
(b) Pollution related sickness	(Million)	19	23
(c) Monetary losses due to premature deaths	(Rs. Crore)	3,507	4,500
(d) Monetary losses due to pollution related sickness	(Rs. Crore)	122.2	159.6

Source : Report of CSE.

deaths and sickness caused. It is estimated that economic and health cost due to pre-mature deaths range between Rs. 1,747 and 7252 crores and of sickness is Rs. 107 to 213 crore. Table -4 and figures (2a, 2b, 2c & 2d) show the trend of health and monetary losses due to air pollution. There is clear rise in premature death and sickness and corresponding monetary losses in 36 Indian cities due to air pollution.

In the 1995 report, entitled; “Valuing Environmental Costs in India – The Economy-Wise Impact of Environmental Degradation” World Bank, a model was developed to establish a relationship between air pollution and human

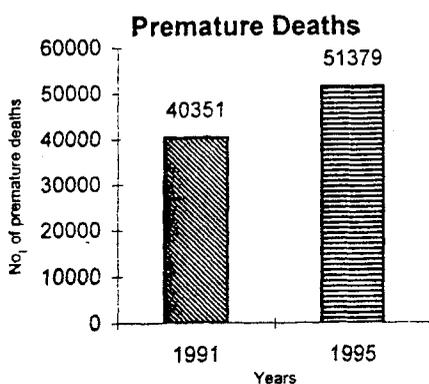


Fig. - 2(a)

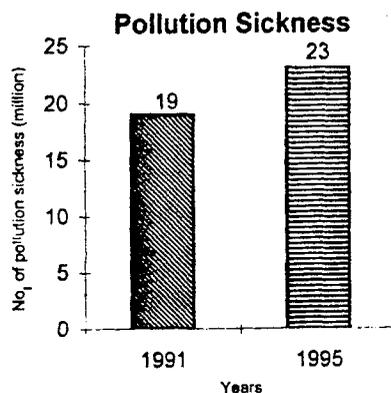


Fig. - 2(b)

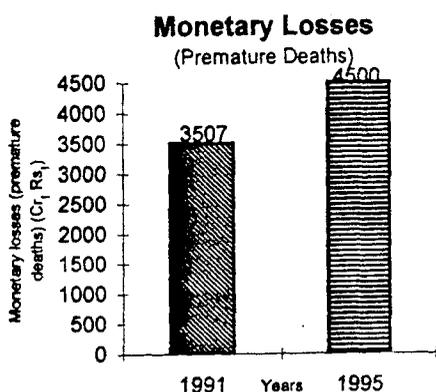


Fig. - 2(c)

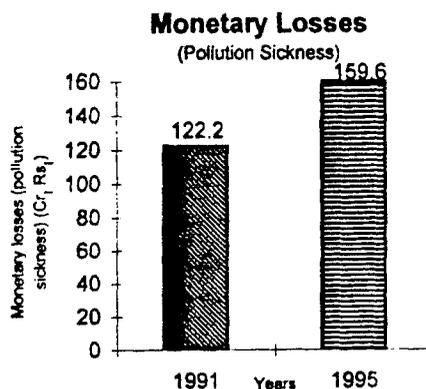


Fig. - 2(d)

mortality and morbidity while using the air quality data of 1991-92, provided by the Central Pollution Control Board (CPCB) for 92 Indian cities and towns, it was found that air pollution results in 40,351 premature deaths in India. Calcutta, Mumbai and Delhi accounted for 5,276 (14 per cent), 4,427 (11 per cent) and 7,491 (19 per cent) deaths, respectively. Substituting these data by 1995, the number of premature deaths increased to 51,779, which is an alarming number by all standards.

Thus the air quality in India is deteriorating at a shocking rate. Though major cities like Delhi and Calcutta are facing severe problems but the picture emerging in the smaller cities is also not encouraging. The adverse effects of air pollution on health depends on longer duration of exposure, total dose of exposure, impaired ability of the host to clear inhaled particles and on the size of particulates. Along with the conventional measures like dilution and dispersion of pollutants in the atmosphere, zoning of residential and industrial areas, afforestation and reforestation programmes, use of smokeless fuel and desulphurisation of fuel prior to use, ban on smoking and over loading of vehicles, less use of fossil fuel and more use of nuclear plants instead of thermal plants etc. to control pollution and its health hazards in India, there should be an Indian model based on local parameters rather than a Western model. Indian models will not only provide reliable local estimates of health damages due to air pollution but also provide means of evaluating the results of pollution con-

trol measures. To educate and make people conscious of the health hazards of air pollution it should be included in the programmes at national level. The increasing trends of air pollution are generally associated with the development needs but there is no need to cut down or hold back the process of economic development. Economic development is the first priority of a nation, So it should be married with the parallel need to conserve the environmental and natural resources.

References

- Botking, Daniel B. Edward A Keller (1982): *Environmental Studies, The Earth as a Living Planet*.
- Kuman, H.D. (1977): *Modern Concepts of Ecology*, Vikas Publishing House Pvt. Ltd. New Delhi.
- Mohan Rao, G.J. (1972): *The Air we Breathe, The Water we Drink, Every Man Science*, October Report of CPCB.
- Report of CSE.
- Report of World Bank.
- Seth, G.K. (1976): *Know Your Environment*, Science Reporter.

Dr. Sdhana Kothari
Associate Professor,
Department of Geography,
M.L. Sukhadia University, Udaipur.

Dr. Anju Kohli
Associate Professor,
Department of Economics,
M.L. Sukhadia University, Udaipur.