

EDITORIAL ▶▶

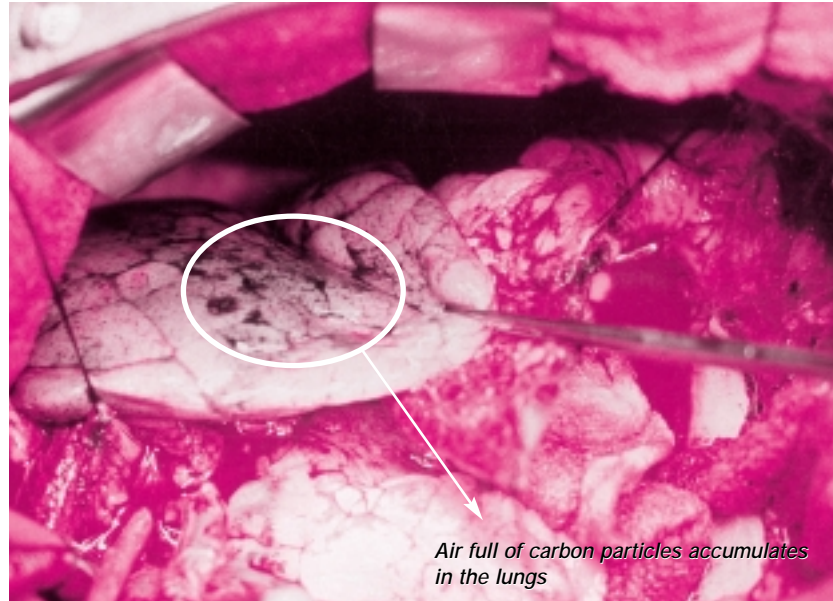
A few weeks ago, the Ministry of Environment and Forests (MoEF) invited us to a meeting to discuss a national action plan for environment and health issues. As we would like the government to take this issue seriously we decided to go for the meeting. But predictably the meeting was in the usual government-style. We learnt that the real reason why the meeting had been convened was to discuss the forthcoming programme of the administrator of US Environmental Protection Agency (EPA), Christine Whitman and a roundtable on environmental health, which had been proposed by her office. The ministry was putting together its list of participants and needed some names.

The conference was convened later that week. Whitman spoke of initiatives in the US. The ministry made a presentation. Views of other participants were heard. And the meeting ended. Nothing substantial was discussed, or decided. Sad.

Sad, because I believe this was an opportunity for us, not just to listen to what the EPA administrator had to say, but also for us to explain why the issue of environment and health is becoming so critical for us. We have a double burden of diseases — dirty water kills Indian babies even today — and at the same time toxification of the environment is adding to our

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LEAD STORY ▶▶



Air full of carbon particles accumulates in the lungs

AIR TIGHT

Deceptive asthma

Globally, over 180,000 people die from asthma each year

India has approximately 15-20 million asthmatics

The prevalence and incidence is more amongst the affluent

New evidence points to the ever-increasing role of environmental factors and triggers

The increasing trends in childhood asthma continue to haunt researchers and parents

Asthma is one of the most prevalent chronic health conditions among children and adults. The increasing mortality rates and hospitalisations related to asthma are a major cause of concern for physicians. The complex nature of the disease and the difficulty of pinpointing exactly what causes asthma or

triggers an attack, make it a challenge for the medical community. Genetic factors do play an important role. But new evidence points to the ever-increasing role of the environment.

Years ago when a severe hurricane hit the island of Tokelau in the South Pacific, the entire indigenous popu-

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death toll. It is critical for us to involve our medical community – doctors, epidemiologists, public health specialists – to deal with our challenges. We would also explain that our action plan on health and environment would have different components. The first would be to learn more from the emerging knowledge abroad. There is a growing and fascinating science of linkages between the human body and the environment. We don't have to recreate this knowledge base. Instead we must take what is most applicable to us and learn from it. This is partly the purpose of our newsletter to you.

Secondly, we have to do our own research. We must find out more about our specific concerns in our specific conditions. For this we need a dynamic research programme which will fund and direct long term and rigorous epidemiological studies. This is imperative. We would suggest to the ministry that such a research programme must be designed to reach out and involve health researchers and professionals working in different institutions across the country. To do this, the process of inviting and selecting proposals must be open and transparent. We have found that the response to our newsletter is overwhelming. Clearly, professionals are interested. The challenge is to build upon this community of interested professionals and secure their commitment.

Thirdly, the action plan must prioritise the policy changes needed on the basis of our knowledge on health and environment linkages. In other words, research must be linked to public policy.

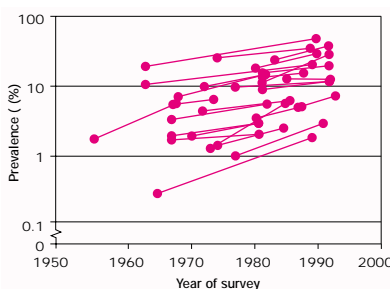
Fourthly, and perhaps most importantly, the action plan for health and environment must be driven by a strong public constituency. The reason why our policy makers can remain complacent about public health concerns is because we have a health-illiterate population. This must change. We are not the government (thankfully so) and we cannot hope to implement a national action plan on health and environment. But we hope, that in some small way, our newsletter will help to bridge this information gap, to make these links, to inform so that we can build strong knowledge network for a green and healthy tomorrow.

— Sunita Narain
Director

lation was forced to move to New Zealand. On the Tokelau Islands, asthma was virtually unknown. However, after the move, widespread incidence of asthma was noticed, especially amongst children. This suggests that environmental factors have an important role to play in causing asthma. Another anomaly is that while most lung diseases are related to poverty or air pollution, the prevalence and incidence of asthma is higher amongst the affluent. The increase in childhood asthma continues to puzzle researchers and parents. Will these children outgrow asthma or will they continue to be asthmatic throughout their lives? Can asthma be prevented or cured? What role does air pollution play in the development of asthma? Ongoing research may help to unearth as yet

Chaotic trends

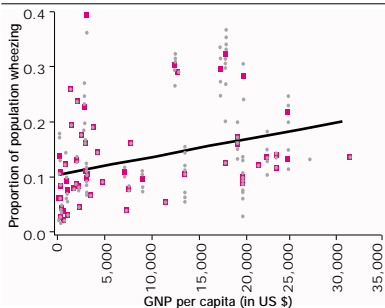
Every survey throws up different trends. But they are all in agreement: asthma is on the rise globally



Source: D Jarvis, P Burney, 1998, ABC of allergies — the epidemiology of allergic diseases, *British Medical Journal*; Vol 316, pp 607-610

Telling difference

Asthma prevalence rates in high-income countries like the US and Canada are higher than in low-income countries such as India



Source: Alistair W Stewart et al, The Relationship of per capita gross national product to the prevalence of symptoms of asthma and other atopic diseases in children (ISAAC), *International Journal of Epidemiology* 2001; No 30, pp 173-179.

unknown causes of asthma and could lead to the development of better preventive strategies.

Asthma: facts and figures

Worldwide, asthma cases are increasing at a rate of 50 per cent every decade, and according to the World Health Organisation, by the year 2020, asthma, along with chronic obstructive pulmonary disease (COPD) will become the third leading cause of death

- Each year asthma accounts for 10 million missed school days, 1.2 million emergency room visits, 15 million outpatient visits, and 500,000 hospitalisations
- Nearly 5 million people in the UK are currently being treated for asthma and 8 million have been diagnosed as having asthma at some point in their lives
- Globally, over 180,000 people die from asthma each year
- New Zealand has the world's highest incidence of asthma- 32 per cent, whereas the disease is virtually unknown in Papua New Guinea.

Prevalence of asthma in India

Try finding specific data on the number of asthmatics in India — and chances are that you will not come across any. Different reports and unscientific studies present an inaccurate picture of the prevalence of asthma in India.

- India has approximately 15-20 million asthmatics
- 50 per cent of the patients visiting the OPD at the Post Graduate Institute of Medical Research in Chandigarh are asthmatic
- The climate of Bangalore, where the weather can change every two hours, gives it the dubious distinction of having the highest number of asthmatics in India
- Though the prevalence is higher amongst men, it is women who suffer the most from asthma (see box: A social stigma for women).

Social and Environmental determinants

Environmental exposures and factors have been often associated with the onset of asthma, both in children and adults. Most environmental determinants of asthma are linked with changing lifestyles. Exacerbations have

also been linked to air pollution levels, obesity, exercise, indoor smoke and exposure to environmental tobacco smoke (ETS) and an affluent lifestyle. The table depicts the various environmental factors that have a role to play in the increasing prevalence of asthma. Poor housing conditions such as dampness encourage the growth of moulds and house-dust mites. House-dust mite is known to be the leading cause of asthma worldwide. Changing homes often and to areas where there may be larger concentrations of allergens is also known to exacerbate asthma. Studies have thrown light on the role that excessive salt consumption and junk food play in the prevalence of asthma. Inadequate breastfeeding practices may lower an infant's immune response to exposure to environmental agents. In about 40 to 90 per cent of asthma cases, exercise is known to act as a trigger. Between 20 per cent and 54 per cent of patients suffer from aspirin-induced asthma (AIA), in which asthma is worsened after taking aspirin or other nonsteroidal anti-inflammatory drugs such as ibuprofen. An association between obesity and asthma has also been found where excess weight pressing on the lungs can cause a hyperreactive response.

Environmental determinants of asthma are important since many of these are modifiable and can be targeted for specific preventive measures. Though for most part they may not

A social stigma for women

Survey conducted amongst 126 asthmatic women by the Asthma and Bronchitis Association of India (ABAI), found that asthma was actually a taboo subject for the women and also a major social handicap. According to Pramod Niphadkar, chest physician and allergologist, "women are specially vulnerable to several social stigmas and therefore go out of their way to hide their condition."

His study found that

- 59 per cent of the women did not get any help from their husbands in coping with their ailment.
- 30 per cent reported that their families publicly denied that there was an asthmatic in the family.
- 34 per cent of women suffered from depression because they have asthma



PRADIP SAHA / CSE

- nearly a third of them claimed to have given up travels altogether
- embarrassment on being called an asthmatic made 21 per cent withdraw from attending social functions.

This study is in line with a survey conducted by Schulman, Ronca and Bucuvalas, Inc, a national research firm specializing in health issues. More than 500 women with asthma in America were interviewed in October 2001 and the study found:

- for 83 per cent, asthma was a

source of worry

- 40 per cent had to decline social events because of their asthma
- 38 per cent have had to stop playing with their children
- asthma caused nearly 48 per cent of them to feel more anxious or frightened at times

The ABAI notes that women, because of their physiology, are in a more disadvantageous position than men. Cases of women locking themselves in bathrooms to take the inhalers so that they could conceal their condition result from the fact that women do not realize that asthma can be controlled and that asthmatics can lead an absolutely normal life.

Environmental determinants

| DETERMINANT | PRIMARY OR SECONDARY |
|------------------------------------------|----------------------------------------|
| Occupational exposures-e.g. isocyanates | Primary |
| Pollen allergens | Primary |
| Sustained exposure to indoor allergens | Primary or secondary |
| Viral infections | Secondary, possibly primary |
| Pre and postal natal exposure to ETS | Secondary, possibly primary |
| Urbanization and migration | Secondary, possibly primary |
| Changing homes | Probably secondary, but may be primary |
| Exposure to vehicle exhaust | Probably secondary, but may be primary |
| Poverty | Probably secondary |
| Home characteristics-dampness, carpeting | Probably secondary |
| Diets and breastfeeding practices | Probably secondary but may be primary |

Source: Margaret R Becklake, Pierre Ernst 1997, Environmental Factors, The Lancet, Vol 350, supplement 2: pp10-13.

be the primary determinant, they do have a role to play in the worsening of the existing disease, by triggering symptoms, exacerbating airway inflammation, and by increasing the severity of the disease.

Children and asthma

- Nearly 5 million children in the US — one in every ten — has asthma
- In Australia one in six children under the age of 16, suffers from asthma
- In the UK, estimates of the prevalence rate for current asthma in children ranges from 12.5 per cent to 15.5 per cent
- In the Caroline Islands, over 50 per cent of all children are asthmatic

- Between 1982 to 1994, pediatric asthma cases rose from 40.1 per cent to 69.1 per cent of all cases
- In 1999, over 30,000 children in England and Wales were admitted to hospital for asthma
- 30 per cent of pediatric disorders in Karnataka are some form of respiratory disease
- In India, 10 to 15 per cent of children between the ages of 5 and 11 years show symptoms of asthma
- Poverty and malnutrition exacerbate asthma in children, leading to compromised lung function
- Among younger children, asthma develops twice as frequently in boys as in girls, however after puberty it is more common in girls.

Why is childhood asthma on the rise?

Asthma rates as one of the most common chronic childhood diseases. Almost 50 per cent of all cases of

asthma develop before the age of 10 and about 80 per cent of these before the age of five. It is difficult to say whether there has actually been a dramatic rise in childhood asthma or whether the apparent increase is attributable to higher parental awareness of the disease and differences in diagnostic criteria. However, the rise in related disorders (e.g., allergies, sinusitis, and ear infections) suggests that the increase is real and environmental factors are to blame. Even exposure to second-hand smoke in the home increases the risk for asthma and asthma-related emergency room visits in children.

The mechanisms that cause asthma are complex and vary among population groups and even within individual cases, going beyond the simple explanation of environmental exposures. Aspects of foetal development and genetics are now believed to inter-

act with environmental factors.

The new broader picture of asthma development in children includes:

- Allergies — about 75 per cent to 80 per cent of children with asthma also have allergies
- The maternal — foetal interface: the risk of childhood asthma is greater for infants with a maternal history of asthma than those with a paternal history of asthma
- Susceptibility of a child to environmental triggers, such as infections, diet (which increasingly includes more fast food and less fruit, vegetables and fibre), and air pollution
- Problems in early lung development, such as small lungs
- Overexposure of children to indoor allergens as they spend more time indoors watching television, playing video games, or using computers
- The presence of dust mites in energy — efficient homes

Something in the air....

Bad air hurts. It is also costly: the Center for Disease Control and Prevention (CDC) places air pollution-related health costs at \$14 billion a year. The urban poor bear the brunt of air pollution because they often live in densely populated neighbourhoods that use dirty household fuels, burn garbage nearby, and are close to traffic corridors or industries. They travel in open vehicles or walk, and spend much more time outdoors. Thus, the world's poor are increasingly experiencing the 'double burden' of both traditional and modern environmental health risks.

The debate on the role that ambient air pollution has to play in the severity of asthma, has been ongoing for many years. And it is not yet clear how air pollution exacerbates asthma. For example, Tokyo has a much higher incidence of pollution than Wellington, New Zealand, yet the asthma incidence is at least five times higher in Wellington than in Tokyo. Similarly, though there is no pollution or dust mites in the Isle of Skye in the UK, it has the highest incidence of asthma anywhere in the UK. The global pattern of asthma prevalence provides evidence that air pollution is not a major risk factor for the development of asthma, rather, it is merely a minor trigger in some individuals. Studies conducted in some regions in China and Eastern Europe with high levels of air pollution has shown low rates of asthma prevalence. Though air pollution is not amongst the primary causes of asthma, it significantly exacerbates the condition and contributes to increase in hospital admissions and emergency room visits. Air pollutants such as sulphur dioxide, particulate matter and ozone are known to trigger acute respiratory symptoms. Ozone has been associated with rising asthma, allergic and cardio-

respiratory disorders and death. Exposure to even low levels of sulphur dioxide is known to alter lung function. Particulate matter has been linked with decreased lung function to absenteeism from school and work and to increase in emergency and hospital admissions due to asthma. Recent study carried out by Ritz's team at the University of California Los Angeles (UCLA) has found that pregnant women exposed to air pollution are more likely to give birth to children with heart defects.

Since children have narrower airways as compared to adults, they have been found to be more susceptible to air pollution. Edward Avol of the Keck School of Medicine of the University of Southern California followed 110 children through their teen years staying in polluted areas and compared them with those who stayed in less polluted areas or those who moved away to other communities. His study showed that air pollution levels could have long term effects on lung health of children. The lungs which acts as a protector from breathing dust, pollen, germs, is made to work more due to air pollution.

Ultrafine particulate matters even bypass the lung's defenses all together to slow down the healthy growth and development of children's lungs. Children breathe faster than adults, taking in more pollutants, making them more susceptible to soot and other small particles in the air. Indoor air pollution due to second-hand smoke, and poor ventilated homes have also been strongly linked to the development of pediatric asthma.

With more evidence coming in on associations between air pollution and increase in severity of asthma, it is time that something definite is done to clean the air around us.

The debate on the role that ambient air pollution has to play in the severity of asthma, has been ongoing for many years. And it is not yet clear how air pollution exacerbates asthma

- Immunisations that prevent many childhood diseases making the child more susceptible to an allergic response
- Low birth weight
- A decline in breast-feeding: breast milk contains important anti-inflammatory agents, such as omega-3 fatty acids, that could protect against asthma.

The incidence of asthma in children could be reduced by as much as 30 per cent — that is 530,000 cases per year — if their exposure to allergens and indoor-smoke was eliminated. This is reported by Bruce Lanphear, associate professor of pediatrics at Children's Hospital Medical Centre of

called leukotriene modifiers. Leukotrienes are pro-inflammatory substances released during pathogenesis of asthma resulting in broncho constriction, edema, and inflammation. By selectively and competitively blocking leukotriene receptors, *zafirlukast* helps in effectively controlling range of asthma symptoms and improves lung function. *Zafirlukast* will be available in oral pill form, and 2 daily doses of the drug will provide 24-hour protection from asthma attacks. It remains to be seen how effective this new oral dosage treatment will be given physicians' existing preference for inhalers in treating chronic patients.

While still not a part of mainstream

drug. There is a clear need for broader and more definitive studies.

The ultimate tool

The reason why asthma incidence varies between countries continues to baffle physicians even now. In a study conducted by Alistair Stewart for the International Study on Asthma and Allergy in Childhood (ISAAC), a moderately strong correlation has been found between gross national product (GNP) and the prevalence of asthma. Done across 56 countries the world over, the study showed that with higher per capita income, there is a greater the prevalence of asthma. However, asthma tends to be poorly

PREETI SINGH / CSE



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Cincinnati whose study on 8,257 children younger than six years of age found a strong link between risk factors in the home and incidence of asthma.

New strides in treatment

The conventional line of treatment for asthma is the use of bronchodilators and anti-inflammatory medication. Ongoing research and development of new asthma drugs has resulted in advances in the range of treatments currently available. Longer-acting beta 2 agonist-corticosteroid combination drugs, which ease muscles around the airways, will soon become the popular choice of physicians. An anti-immunoglobulin E (IgE) monoclonal antibody, omalizumab, manufactured by Genentech/Novartis is being hailed as the future medicine for asthma relief. In India, Dr. Reddy's Laboratories has been given permission to market *zafirlukast*, a non-steroidal drug, belonging to a new class of drugs

The conventional line of treatment for asthma is bronchodilators and anti-inflammatory medicines.

However, Complementary and Alternative Medicine is gaining popularity all over

conventional therapy, Complementary and Alternative Medicine (CAM) is gaining popularity all over. Alternative therapies are being widely used by children as well as adults with asthma. Therapies include acupuncture, hypnosis, meditation, breathing relaxation techniques, and homeopathic remedies. Various herbal medicines are used to treat asthma. *Coleus forskholii* — an ayurvedic remedy — is a bronchodilator with few side effects. *Ginkgo biloba* has also been investigated and has been shown to improve pulmonary function and to protect against exercise-induced asthma. *Tylophora asthmatica* is another commonly used

diagnosed and under-reported in developing countries like India and China. Hence the true picture may actually be very different.

The increasing number of allergens that are now known to trigger an asthma attack also continues to baffle physicians. In light of this, education and awareness of the disease and its management along with prevention strategies is the most potent weapon in tackling asthma. Guidelines on these for both doctors and patients ought to be an integral part of our response to the challenge.

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Review of recent studies on Asthma

Outdoor Air Pollutants

A large cross-sectional study was done to assess whether common outdoor industry-generated air pollutants were associated with bronchial hyperresponsiveness (BHR). Y K Kim and his colleagues of the Department of Internal Medicine, Seoul National University College of Medicine, Korea, collected information from 7,511 children ages 7 to 12 years (approximately equal numbers of boys and girls) from primary schools located in polluted areas of Korea; 1,009 children from a more polluted, heavily industrial area and from 6,502 children from a less polluted, neighboring area. The prevalence of asthma, rhinitis, eczema and conjunctivitis was found to be higher in children living in a more polluted area (those having high levels of sulphur dioxide and nitrogen dioxide). The presence of outdoor pollutants is known to enhance BHR, and this may later play a substantial role in the development and aggravation of asthma in exposed individuals.

Ann Allergy Asthma Immunol.,
2001; 86:456-460

Alternative therapy use common

Paul D Blanc and colleagues from the University of California, San Francisco, conducted a random population telephone survey of 300 adults with asthma or rhinosinusitis without concomitant asthma to estimate the prevalence of specific alternative therapies. Forty-two per cent reported using at least one alternative therapy among which twenty four per cent reported using herbal agents. Shung-Te Kao from China Medical College, Taiwan investigated the mechanism of a traditional Chinese medicine-Xiao-qing-long-tang (XQLT), to find out how XQLT prevented a common allergen from triggering an asthmatic response. The study suggests that XQLT may act as a bronchodilator, stimulating certain proteins on bronchial smooth muscles, and also act in inhibiting the eosinophil infiltration into the airway. These studies call for healthcare providers and

public health and policy analysts to pay more attention to the use of alternative therapies since it could have potential impacts on the health outcomes of those persons using it.

Chest 2001; 120:1461-1467,
Allergy 2001; 56:1164-1171

Athletes more prone

Researchers at the Keck School of Medicine at the University of Southern California have found that ozone inhaled by young athletes may contribute to them developing asthma. The study involved 3,500 children in the age group of 9 years to 16 years, with no prior history of asthma. Five years later, 265 children were diagnosed with asthma and this was found more among those involved in sports. These young athletes were residing in highly polluted areas and were taking higher

Risk often begins before birth

Prenatal environment may play a role in whether or not an infant becomes more or less susceptible to asthma and allergies later in childhood. Wilfried Karmaus, associate professor of epidemiology at the Michigan State University, hypothesizes that a change in the mother's body between the first and later pregnancies can cause a shift in the womb that affects the child's immune system. The presence of endocrine disruptors such as contaminating chemicals, may be higher during a woman's first pregnancy. Later these chemicals are released during breast-feeding and each subsequent pregnancy. The study covered nearly 1,000 infants whose blood from the umbilical cord was tested for levels of immunoglobulin E (IgE), an antibody linked to allergies. First-born children were found to have twice the concentration of IgE, as compared to second/ third-born children.

American Journal of Epidemiology 2001;
154:9090-915

doses of ozone into their lungs because of their rapid and deep breathing. No risk of asthma was found in children who played sports but resided in low-ozone areas.

The Lancet 2002;
Vol 359, No 9304, p 386

New gene family identified

A new gene family that appears to influence asthma susceptibility, has been reported. After studying and analyzing a mouse chromosomal segment homologous to a region on human chromosome 5, the researchers have identified a locus known as the T cell and Airway Phenotype Regulator (*Tapr*).

The research conducted by Rosemarie H.DeKruyff of Stanford University California found that *Tapr* controls the development of airway hyperactivity and T-cell production of interleukin-4 and -13, but it is also genetically distinct from known cytokine genes.

On positionally cloning a gene family that encodes T-cell membrane proteins (TIMs) within the *Tapr* region, the researchers found major sequence variations of this gene family strongly linked to T-helper cell differentiation and asthma susceptibility.

Further finding of the fact that the human homologue of one of the TIM proteins is the hepatitis A virus receptor, may explain why people with hepatitis A virus infection are at reduced risk of developing asthma.

Nature Immunology 2001;
2:1095-1096, 1109-1116

Sedentary lifestyle

A study of 171 women with adult-onset asthma requiring medication, and 137 age matched controls found a strong association between sedentary lifestyle and onset of genetically influenced asthma. R Graham Barr and colleagues at the Harvard Medical School, Boston, UK, noted that polymorphisms of the *beta2-adrenoceptor* genes appear to have an association with adult-onset asthma in sedentary

women.

Glu27 polymorphism of the *beta2-adrenoceptor* may predict body mass index (BMI) whereas *Gly16* polymorphism is also associated with asthma severity. However, neither the presence of *Gly16* alone or in combination with *Glu27* predicted the occurrence of asthma.

Yet, in 76 women with a self-reported sedentary lifestyle, the adjusted odds ratio for the *Gly16* allele were 7.4 for asthma and 13.8 for asthma requiring steroid treatment. Such associations were not found in the physically active women. BMI was associated with asthma and the *Glu27* allele in sedentary women. The risk of asthma was less elevated in sedentary women with both alleles.

Chest 2001;120:1434-1435, 1474-1479

Obesity linked to asthma

Evidence of a positive association between asthma and obesity in adults and in children has been found to be true. A cross sectional analysis of 18,218 children aged 4-11 years in the UK found that obesity had a role to play in the development of asthma symptoms in children. This was regardless of the ethnicity of these children. The study made an association between the body mass index (BMI) and the prevalence of asthma attacks. The association was found to be stronger in girls than in boys. A similar study conducted by L M Schachter et al of the Institute of Respiratory Medicine, Sydney, found that although obesity played a role in wheeze and shortness of breath, it did not support an increase in airway hyperresponsiveness.

Thorax 2001; 56:133-137 and 4-8

Troubled parenting linked to asthma

A child's early psychological environment may also play a role in the development of asthma. Researchers studied 150 children from shortly before birth until age 8 to see who developed asthma and found that troubled parenting had a role to play in the further development of the disease. Children whose parents had parenting difficulties when the youngsters were three

weeks old were compared with those whose parents coped well.

Mary Klinnert of the National Jewish Medical and Research Center, Denver, said that out of these 150 children, 40 had developed asthma. This leads further evidence to the fact that emotional stress may be linked to asthma, and is a potential trigger for an asthmatic attack. Inability on part of the parents to offer proper emotional care and support to children could cause emotional stress to the infant, impairing the disease-fighting immune system.

Pediatrics 2001;
Vol 108, No 4, p 69

Allergen exposure in children

Children and young adults with asthma are known to have increased levels of IgE to indoor allergens such as dust-mite, pets and cockroach exposure. A case-control study of three schools done by Richard Sporik et al in Virginia, USA, found that the domestic reservoir concentration of mite and cockroach was closely related to the prevalence of sensitisation in atopic children. They however do not rule out the role that other factors may have to play in determining which allergic individuals ultimately develop asthma.

Thorax 2001; 54:675-680

Hospital admission patterns

By linking hospital admission data to asthma prevalence, D S Morrison and P McLoone studied the recent trends in asthma admissions in Scotland. Admission records from 1981 to 1997 were studied and

WEBSITE REFERENCES

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www.thoracic.org
- British thoracic society:
www.brit-thoracic.org
- Canadian thoracic society:
www.lung.ca/cts/
- Swiss society of pneumology:
www.lung.ch
- Thoracic society of Australia and New Zealand: www.thoracic.org.au
- German respiratory tract league (in German):
www.gesundheits-web.de/atemwegserkrankungen

Bone loss in young women

New findings talk about the loss of bone density in young women using inhaled steroids. Elliot Israel from Boston's Brigham and Women's Hospital found a direct relation between the amount of inhaled steroids used and a decrease in bone density. A total of 109 women were studied and their bone density was measured periodically over three years. Those who used higher doses had more bone loss in the hip but not in the spine. The study calls for being cautious in the usage of inhaled steroids. It also recommends that patients should get sufficient calcium, vitamin D, exercise and have their bone density checked.

New England Journal of Epidemiology 2001;
345:941-947

annual trends in bed days were also explored. The study found that after a period of increasing hospitalisation for asthma in Scotland, rates of admission among children begun to fall but among the adults, admissions continued to rise.

Thorax 2001; 56:687-690

GNP and the prevalence of asthma

A paper by Alistair W Stewart et al from Auckland, New Zealand examines the relationship between the symptoms of asthma, rhinitis and eczema with gross national product per capita (GNP). The prevalence of atopic symptoms in 6-7 and 13-14 year old children from over 56 countries were assessed in the International Study of Asthma and Allergy in Childhood (ISAAC). The relationships between the 1993 GNP per capita for each country and asthma symptoms were assessed. The study found that the positive associations between GNP per capita and atopic symptoms were of only moderate strength, suggesting that environmental factors are not just related to the wealth of the country.

International Journal of Epidemiology 2001;
30:173-179

PRODUCT WATCH



ARVIND YADAV / CSE

Plastic bags

Plastic bags may look harmless and innocuous. After all, they are so handy to carry and sometimes come in a variety of colours and designs. However, food carried in these bags can actually turn poisonous. Plastic bags made of poor quality contain many harmful compounds that can easily mix with food and enter the human system. These lethal compounds are known to suppress the human immune system and also become toxic to our nervous system. Further, these compounds may be deposited in various organs, leading to cancers. Plastic bags made of poor quality and freely available with the local grocer contain aromatic compounds like benzene, polyvinyl compounds and dyes. Aromatic and polyvinyl compounds along with cheap dyes used can dissolve easily in fat and mix with food. Coloured plastic bags are more dangerous since leaching of colours takes place if wet food is brought in contact with these plastic bags. Food-grade plastic either does not contain any colour or uses permitted food colouring. Since these are expensive, manufacturers resort to producing cheap grade plastic bags. Many a times plastic bags are burnt along with garbage. Plastic bags are highly combustible and burning 1 kilogram of plastic bags produces approx. 50 micrograms of toxic compounds called dioxin. In addition to dioxin emissions, combustion of these bags produces over 75 other toxic emissions including vinyl chloride, polychlorobenzenes (PCBs), chlorobenzene, benzene, hydrogen chloride, lead, cadmium, etc. Inhalation of high amounts of dioxin not only chokes the lungs but also enters the blood stream. The liver becomes directly affected leading to increased susceptibility to cancer. Hydrogen chloride and other emissions released due to burning of these bags are known to cause acid rain, metal corrosion, and destruction of the ozone layer.

BRIEFS ▶

Noisy labour

Noise pollution is known to harm people. However, even unborn children are not spared from its ill-effects. When exposed to a loud sound, the unborn baby becomes stressed, causing either the fetal heart beat rate to increase or become slow. Either of this is known to trigger premature labour. The human cochlea and peripheral sensory end organs complete their normal development by 24 weeks of gestation. The hearing threshold (the intensity at which



AMIT SHANKER / CSE

one perceives sound) at 27 to 29 weeks of gestation is approximately 40 dB and decreases to a nearly adult level of 13.5 dB by 42 weeks of gestation, indicating continuing postnatal maturation of these pathways. Thus, exposure of the fetus and newborn to noise occurs during the normal development and maturation of the sense of hearing. Sound is therefore well transmitted into the uterine environment. Constant exposure to high levels of noise can reduce the blood supply to the fetus and lead to low-birth weight baby. Sudden exposure to high decibels of noise can even cause premature labour, leading to the birth of a still-born child. Exposure to noise during the first trimester of pregnancy may be associated with congenital anomalies. In adults, sudden explosions can lead to partial or even complete hearing loss. Alteration of the inner ear cells due to such exposure may lead to per-

manent and irreversible changes. Constant exposure to noise is also associated with chronic stress, leading to increased blood pressure, heart attack and angina pain.

Childhood cancers

A detailed study carried out by the Cancer Research Campaign to study the incidence of children's cancer has found that environmental factors may be the reason behind an increase in rates of certain types of childhood cancer. Professor Jillian Birch from the Department of Pediatric Oncology at Manchester University looked at the rates of children's cancer from 1954 to 1998, and found an average annual increase of between 1-3 per cent. Compared to the 1950s, the current rate of brain cancer is up by 36 per cent, while the rate of acute lymphoblastic leukaemia has gone up by more than a third. Chemical pollution, lifestyle factors, diet, radioactivity or infections may be linked to the increase. Though survival rates for children's cancers have improved over the years, with successful treatment available for more than 70 per cent, the rise in the incidence is something to be taken very seriously.

A similar study done in 1998 by Estelle Gilman of the Leukaemia Research Fund Centre for Clinical Epidemiology in Leeds, found that exposure to industrial hazards at birth increased the likelihood of developing childhood cancer. The study, which covered deaths between 1953 and 1980 found that children born near industrial sites that used high-temperature furnaces or discharged volatile organic compounds were more likely to develop cancers such as leukaemia. The study suggested that a mother exposed to low-atmospheric concentrations of cancer-causing substances may have acted as a filter, passing them on to her foetus or baby through the placenta or breast milk.

Mercurial milestones

Research conducted at the Kagoshima University of Japan has confirmed that there exists a definite link between children's first step and the high levels of mercury found in their mothers. The study spanned over three years,

examining 44 mothers who had less than 10 parts per million (ppm) of mercury in their hair. The normal mercury level for women is around 2 ppm. For every 1 ppm increase in mercury, children started walking 1.58 months later than usual. The Japanese mothers may have got the high levels of mercury in their hair after eating large amounts of fish, which may have been affected by the Minamata disease. Industrial pollution in Minamata in the 1950s and 1960s caused deaths, disabilities and birth defects. Minamata disease results in paralyzing the central nervous system. Philippe Grandjean, a professor at the University of Southern Denmark, has reported about possible language deficiencies, among other things, in children who are born to mothers with mercury levels of 3-10 parts per million (ppm) in their hair.

Deep impact

Study conducted by H J Bunn, D Dinsdale, T Smith and J Grigg of the Leicester Children's Institute for Lung Health, University of Leicester, the UK, has found that particulate matters less than 10 microns in diameter penetrate very deep into the lungs of even healthy children and cause respiratory problems. Fifty-one normal healthy children were studied and samples of their bronchoalveolar lavage (BL) were analysed. BL fluid consists of alveolar macrophages (AM) ,the lung cells that eat up all foreign particles, including particulate matter. This makes AM as the reservoir of all inhaled pollutants. Samples of children having insufficient number of macrophages or infected macrophages were rejected and a shortlist sample of 22 children

between the age of three months to 16 years were selected for the study. The researchers also looked into the locality where each child lived and divided the sample according to the vehicular movement present in the respective residential area. The predominance of ultrafine particles (<0.1 micron) in the samples of macrophages was evidence enough to prove that very small pollutant particles penetrate very deep into the airways of children. The presence of these carbonaceous fine parti-

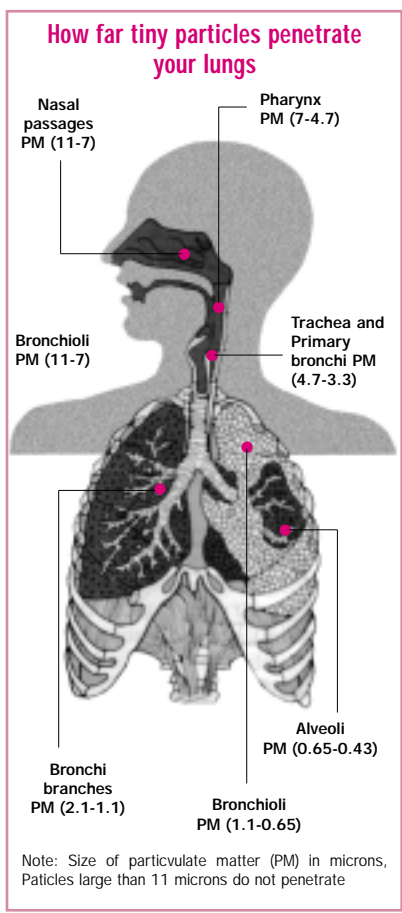
cles on the airways, may give rise to respiratory diseases in children.

Carcinogenic benzene

Researchers from the Danish Cancer Society and the National Environmental Research Institute, Denmark, have found that exposure to low concentrations of benzene such as those present in vehicular emissions, can also cause cancer. Evidence that occupational exposure to benzene causes cancer already exists.

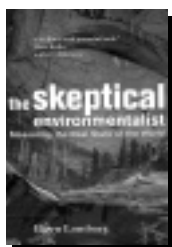
Children registered in the Danish Cancer Registry during 1968-1991 and suffering from various forms of cancer- leukaemia, tumour of the central nervous system and malignant lymphoma were chosen for the study. The histories of 1,989 children suffering from cancer were compared with the medical records of 5,506 healthy children selected in random. Residential history of all these children was collected to assess the amount of vehicular pollution they were exposed to. The residential history covered the entire period from the time the children were conceived till the time the disease was diagnosed. This information helped assess the amount of exposure that these children had to vehicular pollution. Other potential causes of cancer such as exposure to electromagnetic radiation, mother's age at conception and level of urbanization were also studied.

The study found that the risk of Hodgkin's lymphoma increased by 25 per cent when the amount of benzene in the air was doubled during pregnancy. This was also noted in the case of nitrogen dioxide emissions, during which the risk increased by 51 per cent.



B O O K R E V I E W

THE SKEPTICAL ENVIRONMENTALIST-Björn Lomborg-Cambridge University Press-Cambridge-2001-pp 515-US \$25.71



The Skeptical Environmentalist: Measuring the Real State of the World by Björn Lomborg is an interesting first. It is the first of its kind book that debunks the hype about the environmental degradation and tries to deconstruct the sensationalisms of the environmental movement. However, Lomborg makes certain losses acceptable, without us really understanding the long-term implications. As a statistician, he has dispassionately weighed what is acceptable and what can be forsaken.

The chapter on asthma for example criticises epidemiological studies for not giving a clear picture on trends and therefore debunks the actual seriousness of the issue. Ditto for issues like air pollution, pesticide in food and breast milk among other. For Lomborg, the absence of evidence is the evidence of absence.

A good read but it is a little difficult to accept that business as usual will work for the planet's future and that there is no environmental crisis looming ahead of us.



Asthma Education

A non-profit NGO, Society for Asthma Care and Research (SACR), has been educating people about asthma and helping patients and their families gain control over it. SACR has, among its activities, organized asthma camps, seminars and school-based programs. It conducts free camps, about 3 to 4 per year, where patient

check-ups are undertaken and free medicines and inhalers distributed. So far 15 such camps have been conducted. Emphasis is given to educating people on the disease, its triggers and its prevention. SACR also conducts seminars twice a year, attended by patients, doctors, social scientists and journalists, in which the disease and its management are explained. Programs in schools are conducted and material on asthma awareness distributed to these schools. Additionally, SACR runs an asthma center in Pitampura, Delhi for detection, treatment, management and awareness of the disease. While check up facilities for patients and emergency treatment is available here, the emphasis again is on patient education. SACR also publishes educational articles and books in Hindi and English for patients

and doctors and organizes 3-day workshops for doctors on "Advances in Asthma Care and Management". So far 4 such workshops have been organized which physicians, pediatricians and chest specialists have attended.

Asthma education is gaining ground and other initiatives too have been made. Notable among these is the "Asthma Education Program", an educational website run by S K Chhabra of the Vallabhai Patel Chest Institute that aims to disseminate information on asthma awareness and control.

The website address is:
<http://www.asthmatoday.net>

To know more about the work being done on Asthma Education please contact:
SACR ritarun@nda.vsnl.net.in
S K Chhabra skchhabra@mailcity.com

A Clean Sweep



AMIT SHANKER / CSE

Come winter and autumn, and leaves are shed. But what then?

Unfortunately, instead of leaving them to decompose, leaves are burnt. This produces high levels of hydrocarbons, as moist leaves burn without proper circulation. The dhak tree, a dust trapper found across Delhi, sheds leaves in winter. These absorb dust, carbon and sulphur and emit pollutants when burnt. Particulate matter and polyaromatic hydrocarbons, the major pollutants from leaf burning, contain toxic carcinogenic compounds and carbon monoxide. Inhaling these triggers respiratory problems and asthma — as particles are lodged deep in the lungs and stay there for years. Gases released from leaf burning during autumn and winter are estimated to equal emissions from 50,000 vehicles.

Uttam Vasvani, Joint Director, Municipal Corporation of Delhi (MCD) feels leaf burning should be made illegal. He says, "despite strict vigilance, MCD officers have no legal powers to punish the guilty." In fact, MCD "malis" themselves burn leaf litter. MCD's limitation has prompted a new strategy involving retired sub-divisional magistrates on morning rounds. They can take the guilty into custody or fine them Rs 1,000. Iqbal Malik of Vatavaran, a waste management NGO, says the anti-leaf burning campaign cannot be the government's exclusive responsibility. Residential Welfare Associations should be involved, public pressure created and better, more practical and environment-friendly litter disposal ways — such as through composting, where piled organic material at adequate moisture levels is periodically turned to mix with air wherein micro-organisms breakdown the pile into humus-like compost - should be promoted. Vatavaran works with the motto of converting garbage dumps into flower pots. Waste paper collected is made into charming papier mache bowls or converted into handmade paper.

The sight of overflowing garbage in Mumbai, compelled Kunti Oza to actually do something about it and

thus the "Clean Mumbai Foundation" was born. "Green Beans" of Delhi run by Roopa Vajpeyi recycles bio-nondegradable waste, works on composting its organic waste including leaves, and practices vermiculture. Other NGO's working in the field of solid waste management are the "Vasavya Mahila Mandali", Vijaywada and the "Health of People and Environment (HOPE)" in Ooty.

To participate in the campaign run by Vatavaran, please contact:
Iqbal Malik at 011-6493881

Kunti Oza of Clean Mumbai Foundation can be reached at 022-2044838

JOIN OUR NETWORK!

**Are you in the medical profession?
Do you have news to share with us?
A campaign to talk about?**

CSE's Health and Environment Newsletter invites comments, suggestions and views.

If you are interested in receiving the copy of the newsletter, do write to us. Join our network.

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Readers write in

I am happy that you have initiated a newsletter on Health and Environment. It is an excellent approach to bring together people of multidisciplinary approach working for common cause.

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◆ ◆ ◆
Good luck with the campaign. It is good to see this taking root.

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◆ ◆ ◆
I have received the health and environment newsletter. It is a good campaign, and will add to your responsibility.

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◆ ◆ ◆
I am happy to note that CSE is bringing out a newsletter for medical fraternity addressing health related programmes.

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◆ ◆ ◆
It was nice to receive your newsletter "Health and Environment." It is a well-written newsletter highlighting various environmental health problems. I strongly feel that doctors can join

hands with your organisation to make environmental health an important issue in this country.

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◆ ◆ ◆
Thank you for the newsletter on health and environment. I have gone through the newsletter and found this very informative. We wish you all the success.

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◆ ◆ ◆
By bringing out a separate newsletter, CSE has been able to establish a link among the professionals in the areas of health and environment. I hope through evidence based analysis we would succeed in sensitising these groups and the policymakers.

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◆ ◆ ◆
Three cheers to CSE. The newsletter is truly a pathbreaking attempt... and so very relevant to the man on the street. Your cover issue on poverty, health and environment was very well timed and more importantly well compiled. Here's wishing you all many more such milestones.

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Initiating a poison control centre at Sir Ganga Ram Hospital. Also working on a study on "poison prevention, knowledge and practices among pediatrician".



PRADIP SAHA / CSE

Facing a Silent Spring...

Pesticides. Ecological devastation. And cancer. The story of an environmental victim

As an environmental activist and writer, I have tried for years to promote nationwide concern about the deteriorating state of our environment. The idea of writing about my own travails as an environmental victim had, however, never crossed my mind. But obviously, I could not have escaped what was and is happening all around me.

Cancer is a frightening word. It means a terminal disease with periods of excruciating pain. And the treatment, full of poisons, is often as horrific as the disease itself. So how would you feel if you are told that you are suffering not just from cancer, but from such an extremely rare form of it that there is hardly any treatment available? That it has already invaded both your eyes, formed a small tumour in the centre of your brain so that it cannot even be surgically removed without cutting up the brain completely and has even reached your spinal cord? And that as the cancer grows in the eyes, the mass of cancerous cells will pull out the retina in both your eyes and make you go permanently blind; the tumour in the brain will grow to put pressure on the brain and cause strokes, among other things; and the malignant cells in the spinal cord could affect the various nerve endings

attached to the cord any time and cause you acute pain and/or irreversibly paralyse parts of your body? The end of all this suffering will, of course, be death. Maybe not more than a year later, but a large part of that year could be spent in bed groping in darkness and pain.

Terrifying prospects, as you will agree. These were the prospects I faced in early 1994. And they were enough to make me think how merciful was God to those whom he let die peacefully in their sleep.

Failing to find even a diagnosis for the symptoms in my eyes — black lines inside my left eye so that I could hardly see from it — in India, I was finally referred to the National Eye

Chairperson and founder of the Centre for Science and Environment (CSE), Anil Agarwal passed away on January 2, 2002, after a seven-year battle against cancer. He also suffered from asthma. In 1999, he wrote this article on his experience with cancer. He believed that his own cancer had a message. As a tribute to our boss and guru, we reproduce for our readers his very own story in his own words.

Institute in USA, whose scientists after diagnosing ocular and central nervous system Non-Hodgkin's Lymphoma (NHL), referred me to their prestigious sister institution, the National Cancer Institute (NCI). I learnt that the black lines in my eyes were cancer cells which had formed a sheet in front of the retina.

Fortunately, doctors at NCI had an experimental chemotherapy for the disease. They first pumped in fatal doses of a cancer drug so that it could break past the blood-brain barrier and enter the otherwise well-protected central nervous system and eyes in quantities sufficient to kill the cancer cells. They had to immediately follow up with an antidote to save me from dying. The treatment gave me an year's blissful 'remission' (a period without measurable cancer). After an year, in late 1995, the cancer cells returned. I was faced once again with the prospect of blindness, neurological disorders and death.

The doctors said that this time they had caught the recurrence so early that they were sure the 1994 treatment would get me back in remission, but they were also certain the remission would not last even a year. I needed something more definite, something with a higher probability of cure — "such that you can live till 70 or beyond till only old age kills you", as one of the doctors who was very fond of me put it. She and others knocked their heads together and came up with a solution: medicos in Paris were experimenting with bone marrow transplants to cure nhl. "After we put you into remission, you must immediately go in for this treatment," they recommended.

Bone marrow transplant is one the most invasive medical procedures developed by modern science. I went through it in mid-1996 and hope that I have finally gotten rid of the disease. That, however, is something that only time will tell. Meanwhile, I will keep praying that some medical scientist somewhere, will continue to look for a simpler, less horrifying and more definitive cure for this rare disease.

People as statistics

But why should this story of an individual cancer patient be of interest to

anybody in a large and growing nation like India? Individuals are, after all, mere statistics. My case, however, is instructive because it represents today the scale of life-threatening and destructive processes that we are inflicting upon ourselves. My cancer, like most other cancers, is deeply related to environmental pollution — an issue, on which, ironically, I have written numerous articles and books, given lectures and made films to increase public awareness of the threats we face. Therefore, I feel a sense of moral responsibility for going on.

The poor, naturally, suffer more than the rich from environmental degradation. However, at least the powerful urban middle and upper classes — we had thought — were intelligent and self-indulgent enough to try and protect themselves and moderate the impact of environmental destruction on their own lives. That theory has proved to be a total chimaera. The elite of our nation have failed to internalise the ecological principle that every poison we put out into environment comes right back to us in our air, water and food. These poisons slowly seep into our bodies and take years to show up as cancer, as immune system disorders, or as hormonal or reproductive system disorders — affecting even the foetus.

Is it, therefore, not imperative for a society to find a way that balances its urge for economic growth and material comforts with the requirements of its natural and human health? Isn't this something that we owe to ourselves and to our children?

Cancer as statistics

Although cancer statistics in India — relatively poor — probably understate the extent of the disease, what they tell us is terrifying. There are six hospital-based cancer registries in India — five in Bangalore, Mumbai, Madras, Delhi and Bhopal and one in the rural area of Barsi near Pune — which give us an idea of urban and rural cancer incidence in India. Age-adjusted cancer incidence rate per 100,000 people in the five urban centres varied between 101.2 (Bhopal) to 143.6 (Delhi) for women in 1990, whereas for males it was between 107.5 (Bhopal) and

If you are living in any of the metros — the chance of your catching cancer during a lifetime is as high as seven-11 per cent

138.9 (Mumbai). This incidence was twice the incidence rate of 56.2 in Barsi, which shows that living in our polluted urban centres more than doubles our chances of developing cancer.

There is another way of looking at this data by asking the question: what is the chance that I will be affected by cancer during my lifetime? The answer is stunning. If you are living in one of the four metros — Bangalore, Mumbai, Madras or Delhi — the chance of your catching cancer during a lifetime is as high as seven-11 per cent. In other words, one out of every 10-15 people living in these cities is going to become a cancer victim during his/her lifetime. Or, assuming an average household size of five, it means every second to third household in these metros will have a member falling victim to the disease. However, if you were living in Barsi, the chances of cancer in a lifetime would go down by half — only one out of 20-36 persons will get cancer in their lifetime.

But while cancer is an issue that impinges on national consciousness in the West, it does not do so in India. Experts in us argue that what is occurring in their country is nothing short of a 'cancer epidemic'. The concern for cancer shared by millions in the public has strongly fuelled environmental regulations for control of air and water pollution and toxic wastes. In India, cancer is still largely regarded as a relatively insignificant threat to public health. Yet one conservative estimate puts the total number of national cancer cases by the year 2001 at 806,000. This figure, of course, does not include people who probably cannot even reach hospitals and get diagnosed, especially amongst the vast population of rural and urban poor.

Let me look at statistics about the cancer I am suffering from Non Hodgkin's Lymphoma. In 1990-91, NHL was listed amongst the eight most common forms of cancer in Delhi,

Madras and Bangalore amongst males and in Delhi, amongst females, too. But there are less than 200 medically recorded cases worldwide where NHL has affected the eyes; I am probably the first case of ocular lymphoma diagnosed from India.

Causes of NHL

It is impossible to pinpoint why a particular individual gets cancer. Carcinogenesis can result from stress (which depresses the immune system), bad diets, environmental toxins like pesticides, air pollutants and industrial chemicals, waste products and even genes. While diet and stress are factors more associated with personal lifestyles, environmental contamination is a societal problem and, therefore, needs greater attention and regulation.

In India, the meagre data collected by NCRP for different cities shows a steady increase. In Madras, there is literally a doubling of incidence in 10

Delhi has the highest incidence amongst both males and females followed by Mumbai

years between 1982 and 1991 amongst both males and females, besides substantial increases in Mumbai and Bangalore. While the database for Delhi and Bhopal is too small to identify any trend, the statistics do show that Delhi has the highest incidence amongst both males and females followed by Mumbai. Interestingly, a comparison clearly shows that NHL incidence is rising faster than overall cancer incidence; in Mumbai and Madras, the difference in increase is quite dramatic. However, in a conspiracy of silence, almost all specialists at the Tata Cancer Memorial Centre in Mumbai replied in the negative when asked if NHL was increasing in India.

Cancer experts believe that risk of lymphatic cancers including NHL increases when the body's immune system gets affected or suppressed. Says N K Mehrotra, head of the environmental carcinogenesis laboratory in the Industrial Toxicology Research Centre (ITRC), Lucknow, "The causes of lymphoma are as yet unknown, but it

mainly occurs due to cumulative effects of pollutants and reduced immunity in the body." A number of NHL cases in the US occur in people who have been affected by HIV, the dreaded AIDS virus. In India too, the spread of HIV will definitely boost the incidence of NHL. But the NCI does not believe that the HIV virus, or cancer-causing viruses like human t-cell leukaemia virus-1 or the Epstein-Barr virus, play an important role in the increase of NHL. Neither do dietary factors, according to it.

The NCI says that certain immunosuppressive genetic syndromes can play a role in causing NHL, but that they are too rare to bring about any major increase in cases. Similarly, 50-fold increases in risk of NHL have been observed among organ transplant patients, because they receive powerful immunosuppressive drugs on a long-term basis; but again, these conditions affect very few people. The NIH study argues that improved diagnostic facilities and recent reclassification of other cancers into lymphomas account for a tiny fraction of the increase in NHL.

The menace: pesticides

The key factor which is, therefore, attracting worldwide interest amongst epidemiologists is environmental pollution. Several studies carried out in Canada, Sweden and the US have shown a strong correlation between the risk of NHL and use of pesticides. Frequent use of herbicides, particularly 2,4-dichlorophenoxyacetic acid (2,4-d) has been associated with a 200-800 per cent (two-eight times) increased risk of NHL in Sweden. According to one study, the association between NHL and phenoxy acid herbicides may be because of contamination by dioxin, a highly poisonous immunosuppressant. The NCI study argues that though the number of people working in agriculture occupationally exposed to these and other pesticides is not large enough to explain the overall increases in NHL, the general population is also at a heightened risk because of the use of these pesticides in homes, lawns and golf courses. Dogs whose owners have used 2,4-d, for instance, have a heightened risk of contracting malig-

nant lymphoma.

Since the use of pesticides, particularly phenoxy herbicides (2,4-d, 2,4,5-t or 2,4,5-trichlorophenoxyacetic acid, and MCPA or 2-methyl-4-chlorophenoxyacetic acid) and organophosphate pesticides has increased over the last 40 years, the NCI argues that they could have played a significant role in contributing to the rising incidence of NHL.

The general population can be exposed to pesticides in three ways:

- through vector control
- through residues in environment
- through residues in food

This segment of population tends to have only a low-dose, chronic exposure, but larger doses can be transmitted if the exposure is persistent and bioaccumulative. Persistent pesticides move through air, soil and water, finding their way into living tissues where they can bioaccumulate up the food chain into human diets. Roughly 85-90 per cent of pesticides applied agriculturally never reach target organisms, but disperse through the air, soil and water. People who can be exposed to high levels of bioaccumulated pesticides include

- habitual consumers of fish, livestock and dairy products;
- fetuses and nursing infants whose mothers' bodies have accumulated persistent pesticides; and,
- sick people who metabolise their fatty tissues (which contain bioaccumulated pesticides) while ill.

According to an ITRC survey of studies on pesticide residues, high levels of residues of BHC, lindane, heptachlor, endosulphan and dieldrin have been found in just about everything necessary for life from food to water. The list does not even include tea whose DDT residues are so high that Germany is refusing to import Indian tea.

How do these residue levels compare with residues in industrialised

The use of pesticides, particularly phenoxy herbicides and organophosphate pesticides has increased over the last 40 years

countries or with acceptable daily intake (ADI) standards? Badly, at best. Studies have shown that people in Delhi have one of the highest levels of DDT bioaccumulated in their body fat. Another study of 1991 on pesticide residues in Delhi by A Nair and M K K Pillai reports that DDT and HCH residues were present in Delhi's water, soil and fauna. Human breast milk samples in Delhi show DDT and HCH levels comparable to those found in Punjab, an area of intensive farming. Infants ingesting this breast milk receive roughly 12 times the allowable daily intake of DDT.

Adding to the concern about carcinogenic effects of pesticides are the latest findings of a new discipline of science called immunotoxicity, which studies substances with a negative impact on the immune system. A recent review of over 100 primary experimental studies of immunosuppressive nature of pesticides reports that the large majority of these studies reveal various types of immunosuppressive effects. Reduced immunity influences cancer incidence. A weak or devastated immune system allows cancerous cells to escape and form a tumour. One can only imagine the kind of havoc pesticides can play in a country where a large percentage of the population is malnourished and, hence, suffers from immunodeficiency.

Organic solvents & industrial chemicals

According to NCI, exposure to organic solvents also leads to increased risk of nhl. Organic solvents are widely used in the paints industry, in dry-cleaning and woodcrafts, and large numbers of workers are potentially exposed to them. Among the solvents which are suspected carcinogens are chlorinated hydrocarbon solvents, methylene chloride, trichloroethylene, chloroform, formaldehyde and benzene. A Swedish study also lists styrene, trichloroethylene, perchloroethylene and chlorophenols as substances whose exposure heightens the risk of NHL. A British study shows heightened risk of NHL amongst those exposed to wood dust and epoxy glues.

Enquiries in India conducted by researchers of CSE reveal that no study of contamination of drinking

water sources by these solvents has been conducted so far. Studies, however, have shown that the following solvents were present in effluents of the paint industry:

| | |
|-----------------------|-------------------|
| 2,4,6-Trichlorophenol | Benzene |
| 2,4-Dichlorophenol | Chloroform |
| 2,4-Dinitrophenol | Methylene |
| 4,6-Dinitro-o-cresol | Chloride |
| Pentachlorophenol | Trichloroethylene |
| Phenol | |

What is frightening is that not all these contaminants can be removed by existing wastewater treatment processes in India, thus leading to the contamination of natural water sources which ultimately provide us with drinking water.

Growing horde

The Indian pesticide industry today has an installed capacity of 116,000 tonnes (t) per annum, of which about 70,000 t is in the organised sector, whereas the rest is in some 500-odd units belonging to the smallscale sector. It is doubtful that the smallscale sector has any appreciable control over contamination by pesticides. In 1994-95, India produced almost all the pesticides it consumed — some 83,000 t in the agricultural sector alone. Imports are currently about 2,000 t only. With liberalisation, controls on creating additional capacity for pesticide formulations has been lifted and there is no restrictions excepting six pesticides (aluminium phosphide, dimethoate, quinalphos, carbaryl, phorate and fenitrothion) for which licensing is compulsory. A Planning Commission study has projected pesticide consumption by 2000 ad at 118,000 t — 97,000 t for agriculture and 21,000 t for public health. It is interesting to note that most of the growth in the world pesticide industry is in developing nations.

Like the pesticides industry, the Indian paints industry has also been growing rapidly. Between 1950 and 1982, production increased from 40,000 t to 190,000 t (107,000 t in the organised sector and 83,000 t in the smallscale sector) — the smallscale sector increased production eight-fold compared to the organised sector's slightly over three-fold increase. The smallscale sector is particularly notorious for its poor or non-

The Indian pesticide industry today has an installed capacity of 1,16,000 tonnes (t) per annum

existent waste-water treatment facilities. Following liberalisation, a lot of hazardous paint and dyestuff industry has moved to India because of growing environmental controls in the West and inadequate controls in India.

More questions

There are countless questions that keep crossing my mind. Why did I get afflicted with this disease? How cancer-prone are we becoming as a nation? Who is responsible? What should we do about it? It is clear from the sum total of the evidence available that environmental contamination could have been a key cause of my cancer. As I am not an agricultural labourer or a farmer spraying pesticides, the maximum likelihood in my case is of exposure through food and water.

My principal interest in writing this article is to inform the Indian people that they must not remain ignorant and nonchalant about the acute threats they face to their own health and to the health of their children. I find no concern in India about clean air, water or food, all of which are not just bacteriologically but also chemically contaminated today. At a seminar organised by a leading Delhi-based NGO on Delhi's drinking water supply system in 1995, I had to point out that while there was so much talk about the inadequacy of water supply, there was almost none about its quality. What good is lots of water if it is so contaminated?

Bacteriological contamination shows up in acute epidemics and hence, often leads to a hue and cry amongst the public and in the media. But chemical contamination takes years to show up in the form of cancers or hormonal and reproductive disorders, and hence unless there are good epidemiological studies carried out on a regular basis and a constant effort made by the medical profession and a vigilant media to inform the public about the health threats it faces, there will be no pressure whatsoever on the regulatory authorities to do any-

thing to protect the environment.

Ignorance is bliss for the the politician and the bureaucrat. Apart from the influence of industrial lobbies which may operate underhand, India's overt governance systems themselves are incompetent. An excellent illustration of this is the fact that the Ministry of Environment and Forests has no team working on the dangers posed by toxins like pesticides that permeate the environment and food systems.

Summing up, I can only say that had not fate, friends and well-wishers and committed scientists from various parts of the world not intervened to help in my case, it would have been a Silent Spring for me in the prime of life. I can only hope and wish that that no fellow citizen has to suffer the same fate. And that Indian civil society can, one day, force our misguided government to come to its senses.

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