

& HEALTH ENVIRONMENT

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LEAD STORY

MERCURY POLLUTION



The Mercurial Menace

More and more Indians today face the threat of being crippled by mercury poisoning. The use of this deadly metal that plays havoc with human health is growing rapidly in India, unfettered by any rules or regulations

Mercury, a heavy metal, is used in a number of industrial applications and products. It is a highly mobile element and cannot be broken down into harmless components. No mercury is actually consumed, so whatever is used has to be discharged with effluents, wastes, air emissions or has to be present in the

products. As it is a highly mobile substance it continuously escapes in traces, even from sludge buried deep within "secure" landfills, and companies have no facilities to monitor this escape. More than 90 per cent of the mercury used in industrial processes literally vanishes into thin air. Though elemental mercury is less hazardous, its other forms, especially organic mercury compounds (when it combines with carbon) such as methyl-mercury are more toxic.

Methyl-mercury, is the most common form of mercury found in the environment. It can pass into the air, soil and the foodchain, mostly through aquatic animals and can become a considerable health risk.

Presently, India is the largest user of mercury in the world (207-531 tonnes annually). While the developed world has an effective retrieval system

and strict norms, India hardly has any regulation worth speaking of. In India, there are no norms for controlling the use of mercury in various products. Chlor-alkali industries are the major source of mercury release in the atmosphere and surface water in India. Other contributors are coal-fired plants viz. thermal power plants, steel industries and cement plants. Plastic industry (mercury is used as a catalyst), pulp and paper industry, medical instruments and electrical appliances, certain pharmaceutical and agricultural product account for additional consumption of mercury. A draft notification was issued by the Ministry of environment and forests in 2000 for a phased elimination of mercury from consumer products like caustic soda but so far no action has been taken. The government may have banned the setting up of new mercury-based caus-

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tic soda plants, but it does not have any concrete plans to phase out the existing ones.

According to the Canadian global emissions interpretation centre (CGEIC), which has published data on the spatial distribution of mercury emissions in air, India is one of the world's mercury hotspots, with mercury being released into the air uniformly at a rate of 0.1–0.5 tonnes per year, with coastal areas having an even higher emission rate ranging between 0.5 to two tonnes per year. According to the CGEIC, anthropogenic emission of mercury is estimated to have increased in India by 27 per cent between 1990-2000. Clearly, mercury is a major problem and action needs to be taken now.

India's industry continues to consume and emit mercury at alarming rates.

Regulations compare poorly to those in developed countries

The Indian government has so far been unable to compile any comprehensive data on all the uses of mercury in the country. There are some 3,000 industrial uses. Chlor-alkali industry is the single largest mercury consuming industry in India, consuming about 55 tonnes of mercury each year. After the chlor-alkali industry, the major consumption of mercury in India happens during the production of batteries, thermostats, thermometers and barometers, and other electrical appliances such as mercury vapour lamps, electrical switches and fluorescent lamps. As India does not produce any mercury, it has to be imported. In 2002-03 India imported 531 tonnes of elemental mercury and 1,312 tonnes of organo-mercury compounds. Nevertheless, it is important to mention that this is probably an underestimation of the real picture as there is a thriving illegal trade of the commodity. In developed countries, the use of mercury in various products is either banned or regulated. However, no concrete initiative has been taken by the government of India to address the issue. India is one of the very few countries, which still allows the use of catalytic mercury compounds in industrial chemical processes.

Total annual mercury pollution in India		
<i>Average between 1991-92 and 2000-2001</i>		
Sources	Mercury use (tonnes/annum)	Mercury released (tonnes/annum)
Chlor-alkali Industry	70	70
Other mercury containing products	100	27.5–55
Unintentional mercury release due to coal use	Nil *	75
Total	170	172.5–200

Source: Anon 2003, calculations done by Green Rating Project, Centre for Science and Environment (CSE), New Delhi.

Unintentional mercury releases

The mercury content in coal found in India ranges between 0.01 parts per million (ppm) to 1.1 ppm. A typical power plant emits 90 per cent of its mercury into the air and 10 per cent to the land. The main reason for such a high rate of emission is that mercury boils at low temperatures. Assuming the average mercury content in coal found in India to be 0.25 ppm, about 65 tonnes of mercury has been released every year between 1991–92 and 2000–2001 into the environment due to coal consumption alone, of which about 45.5 tonnes comes from thermal power plants. The thermal power plants account for 70 per cent of the unintentional mercury emissions in India

End-of-pipe treatment technologies can effectively control this unintentional release (see Table: *Total annual mercury pollution in India*). Unfortunately, the issue of unintentional release of mercury has not even been identified by the government as an environmental problem and therefore no initiatives have been taken to reduce the risks.

Developed countries routinely use India as a dumping ground for mercury

Two multilateral environmental agreements cover mercury and mercury compounds: The Basel Convention on Control of Transboundary Movements of Hazardous Wastes and their Disposal; and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Chemicals and Pesticides in International Trade.

These instruments regulate trade

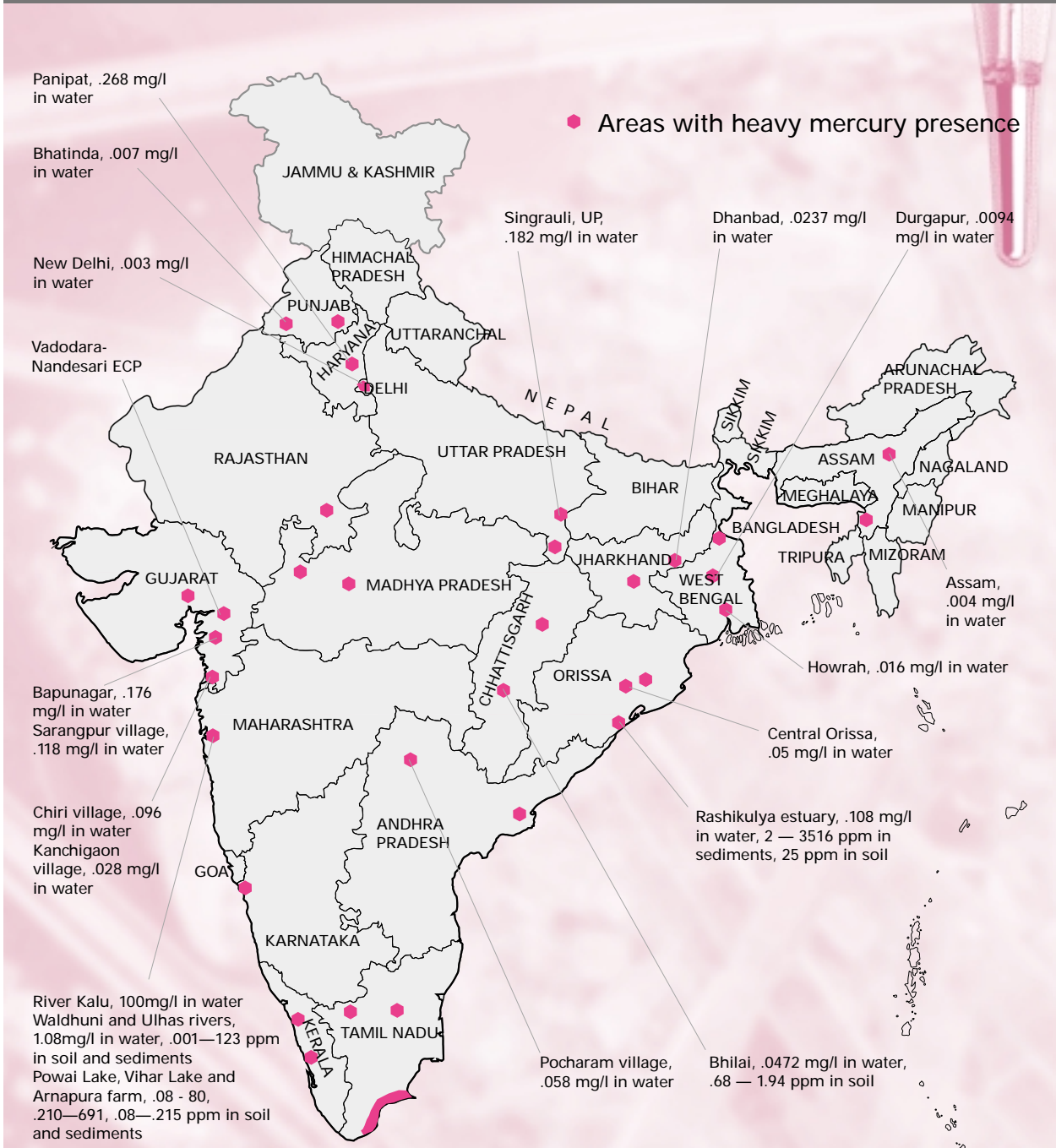
in unwanted chemicals, pesticides and hazardous wastes. However, they do not contain any specific commitment to directly reduce usage and release of mercury. These loopholes are effectively exploited by multinational industries, which virtually use developing countries like India as a dumping ground for cheap mercury and outdated mercury technologies. Pure elemental mercury is not included in the list. It is the mercury in pure form that is used as a raw material in a large number of industries and this is one of the main reasons why even the Rotterdam convention does not apply to mercury compounds with industrial uses. Only mercury wastes of various categories are included in the Basel convention hazardous wastes list.

India growing as a mercury pollution hotspot

Mercury pollution is widespread in India, water pollution being the main concern (see Map: *Some mercury hotspots in India*). This is a very serious problem and urgent steps need to be taken to ban or severely restrict the usage of mercury.

The main reason for groundwater contamination in places like Gujarat (Vatva, Ankleshwar and Vapi) and Andhra Pradesh (Patancheru, Medak) is the practice by rogue industries of discharging untreated effluents into the ground through borewells. Even contaminated effluent flowing through rivers and streams or rainwater percolating through contaminated soil (at sites where toxic wastes are dumped or land-filled) can leach into the groundwater. Rainwater also absorbs mercury vapours present in the atmosphere.

Some mercury hotspots in India (in water and soil)



Source: Down To Earth supplement October 31, 2003, Green Rating Project, Centre for Science and Environment, New Delhi

Mercury has been detected in the water (groundwater and surface water) in the vicinity of the chlor-alkali industries using the mercury cell technology and in the vicinity of dyes, paints and pigments manufacturing units that use mercury-based catalysts in their manufacturing processes.

To avoid a mercury disaster in the near future, industries using mercury in its processes should immediately shift to non-mercury alternatives.

Fish contamination

The coastal areas of India are significantly polluted with mercury and a high

level of it is being detected in Indian fish, both saline and freshwater. Consuming mercury-methyl contaminated fish can be fatal. The Minamata Disaster in Japan in 1950's, which affected more than 3,000 people, was caused by consuming mercury-methyl contaminated fish (see Box: *Minamata*:

a lesson not learnt). To prevent such a tragedy from happening in India, people who eat fish need to be made aware of mercury contamination and its consequences.

Soil and sediments contamination

The level of mercury in soil is an indicator of its potential to contaminate rainwater and groundwater. It also gives an indication of its potential to contaminate crops and vegetables grown in that soil. Soil contamination could be caused either by direct dumping or land-filling of mercury-contaminated wastes or due to the presence of mercury in the atmosphere. The level of mercury in waterbody sediments represents the history of contamination in that waterbody. The Minamata Bay had to be dredged of toxic mercury-contaminated sediments in order to restore the water quality.

From the map, it is clear that mercury hotspots are distributed uniformly throughout the country. Due to the extremely mobile nature of mercury, it is likely that there could be more hotspots. This needs to be investigated by further testing of point sources such as smokestacks, ambient air, surface and groundwater, contaminated soil, dumping grounds and landfills, and random soil samples from other locations.

Where does the mercury go?

Once released by various sources the metal persists in the environment in various forms. It pollutes air, water, sediments of various water-bodies and even soil. It also enters into the various life forms through the foodchain. The form of mercury released varies, depending on source type and other factors. The majority of air emissions are in the form of gaseous elemental mercury, which is transported globally even to regions far from the emission source. Elemental mercury in the atmosphere can breakdown into ionic mercury, providing a significant pathway for its deposition in soil, sediments and various water sources.

Once deposited, it can change (primarily by microbial metabolism) to methyl-mercury. This methyl-mercury has the capacity to collect in organisms (bioaccumulate) and to concen-

trate up in the food chains (biomagnify), especially in the marine foodchain (fish and marine mammals). Methyl-mercury is therefore the form of greatest concern. Nearly all of the mercury found in fish is methyl-mercury. The other emissions are in the form of gaseous inorganic ionic mercury forms (such as mercuric chloride) and other forms of mercury remain bound to the emitted particles. All these forms have a shorter atmospheric lifetime and gradually deposit in land or waterbodies within roughly 100 to 1,000 kilometres of their source. Even while in air mercury vapour can also enter human and animal bodies during inhalation or absorption through skin. This form of exposure to mercury affects the kidneys, nervous, digestive and respiratory system (see Box: Mercury

is toxic to the human body). Various agencies have prescribed limits for exposure to mercury on a day-to-day basis (see Table: Mercury exposure).

Substitution of products containing mercury

Elemental mercury: Intentional use of mercury has to be stopped as soon as possible. There are economically viable non-mercury containing substitutes for almost all current applications where mercury is used.

Mercury compounds: The Minamata disaster in Japan was caused by a mercury compound called mercuric chloride, which was released with the effluent from a company producing fertilisers, petrochemicals and plastics. In India, unusually high levels of

Mercury is toxic to the human body

Short-term exposure to high concentrations of mercury vapour leads to acute mercury poisoning. At higher levels, it can damage vital organs such as kidneys and lungs and the nervous, digestive and respiratory systems. An exposure of 1 to 44 mg/m³ of mercury for four to eight hours can cause chest pain, cough, coughing up blood, impaired lung function and inflammation of the lungs. Inflammation of the oral cavity is one of the manifestations of acute mercury exposure. Effects to the digestive system are in the form of abdominal pain, nausea, vomiting and diarrhoea.

Mercury is a potent neurotoxin. Even at extremely low levels of exposure, it can permanently damage the human central nervous system. Typical symptoms of mercury poisoning include loss of sensation in the fingers and toes, tremors, blurred vision, poor muscular coordination and disintegration of brain cells.

Allergic reactions on the skin are reported in people with occupational exposure to mercury liquid or vapour. The symptoms of methyl mercury poisoning are varied and can mimic other illnesses. In relatively mild cases, the condition is barely distinguishable from other ailments such as headache, chronic fatigue and generalised inability to distinguish taste and smell. Many of the symptoms take a number of weeks, or even months, to appear. The symptoms include tingling and numbness of extremities, depression, emotional instability, memory reduction, irritability, defects in hearing, vision and speech, difficulty in writing, delays in motor and language development, inability to walk properly and tremors. In extreme cases, state of madness, loss of consciousness or death occurs.

Chronic exposure also results in fertility impairment and adverse pregnancy outcomes. Foetuses are at a high risk from methyl-mercury poisoning. Methyl-mercury can cross the placental barrier and cause foetal brain damage without any symptoms in the expectant mother. Newborn babies may experience mental and physical disabilities as well as delayed development of motor and verbal skills. High level of prenatal methyl-mercury exposure causes mental retardation, seizures and other neurological disturbances. Low level of exposure causes visual memory deficits, abnormal behaviour and reduced growth at puberty. This has been demonstrated in non-human primates. Children get susceptible to skin changes on exposure to organic mercury. This includes rash followed by skin peeling on the palms, soles, itching and joint pain.

Methyl-mercury can pass through the placenta and blood brain barriers. It then enters the tissues where it gets converted to divalent mercury. This form of mercury generates free radicals that attack proteins and DNA in the body. Cord blood concentration of the metal is 20-30 per cent higher than that of maternal blood indicating foetal exposure during gestation.

Source: Anon 2005, Lurking Menace, Toxic Link, New Delhi, pp 19-21.

Mercury exposure

Guidelines and standards for chronic mercury exposure

Exposure	Guideline or Standard	Agency
Air (elemental)	0.2 mg/m ³ 0.3 mg/m ³	Agency for Toxic Substances and Disease Registry (ATSDR), USA
Air (inorganic)	1 mg/m ³	WHO
Drinking water	1 mg/L (total mercury)	WHO
	2 mg/L (inorganic mercury)	EPA
Food (methyl mercury)	0.1 mg/kg/day	EPA
	0.3 mg/kg/day	ATSDR
	1.0 mg/g	FDA
Chronic oral intake (inorganic)	0.3 mg/kg/day	EPA

Source: -Donald T. Wigle 2003, Child Health and the Environment, Oxford University Press, USA, pp 100-135.

mercury have been detected in ground-water not only near chlor-alkali units (where elemental mercury is used) but also near industries manufacturing or using dyes, paints, pigments, chemi-

cals (such as H-acid, sulphonic acid and vinyl sulphone), pesticides and herbicides, pharmaceuticals and plastics. It is obvious that these industries still use mercury compounds even though

most developed countries have stopped using them (see Table: *Alternatives are available*).

The government should immediately ban or restrict, through certain fiscal disincentives like high taxes and import duties, the usage of elemental mercury and mercury compounds and provide incentives (lower or zero taxes or import duties) for those using mercury alternatives. In cases of uncontrolled disposal of mercury-containing products or wastes, possible reductions in releases from such practices might be achieved by making these practices illegal and by enhancing access to hazardous waste disposal facilities. Clearly, the central government has to come up with proper legislations to monitor and control release of mercury impurities from all processes that involve the use of this metal.

Source: R Kamolika & Chandrabhushan 2003, Mercury Menace, special supplement in Down to Earth, Green Rating Project, Centre for Science and Environment, New Delhi.

Alternatives are available

Product or application	Available alternatives	Cost effectiveness
Mercury cell process in chlor-alkali industry	Membrane technology	Higher investment costs for conversion but lower operational, waste treatment and disposal costs
Mercury used in dental amalgam	Gold, silver, ceramic, porcelain, polymers, composites, glass ionomers amalgam fillings	While some are less expensive and easy to apply, others are more expensive and difficult to apply
Mercury based batteries	Virtually mercury-free batteries are available	Cost of mercury-free batteries may be higher or about the same but their usage is preferable to costly cleaning of mercury contaminated wastes
Laboratory use	It is possible to restrict mercury use in school or university laboratories to a few controllable uses	The alternatives are generally no more expensive
Thermometers	Other liquids, gas, electric and electronic sensors	More expensive but one electronic thermometer may replace several broken mercury ones
Pressure measuring and control equipment	In pressure gauges, switches and transmitters, mercury can be substituted using flexible membrane, piezoelectric crystals and fibre-optic pressure sensors In barometers and manometers, mercury can be replaced by other liquids or gases	Electrical and electronic instruments are slightly more expensive but alternatives based on gas, other liquids or mechanical spring show no significant price difference
Tilt switch Electronic switch Reed switch Proximity sensor/switch	Mechanical or micro switch Solid state and optical switch Solid state and electro-optical switch, semi-conductor Inductive, capacitive, photo-electric sensor, ultrasonic	No significant price differences
Artisanal gold extraction Pesticides and biocides	Non-mercury electrolytic process, Minataur process Processes not requiring chemical chemical pesticides and biocides or use easily degradable substances	Not more expensive Cost is roughly comparable and environmental benefits are considerable
Energy-efficient lamps	Currently there are no mercury-free efficient alternatives to the energy-efficient lamps	

Source: Global Mercury Assessment, UNEP Chemicals, December 5, 2002

Minamata: a lesson not learnt

During the 1960s and 70s, the Minamata Bay mercury pollution disaster received global media attention, opening the world's eyes to the negative health effects of methyl-mercury. Between 1932 and 1968, the Japanese Chisso Corporation discharged about 27 tonnes of methyl-mercury with its wastewater into the Bay. The pollution caused severe damage to the central nervous system of the people who ate large quantities of contaminated fish and shellfish from the Bay. In addition, congenital Minamata disease occurred as many infants were born with a condition resembling cerebral palsy caused by methyl-mercury poisoning of the foetus during pregnancy. The disease, which was officially recognised on 1 May 1956, caused many people to lose their lives or suffer from physical deformities.

After the cause of the disease was finally confirmed, a number of measures were implemented, ranging from regulation of the factory effluent, voluntary restrictions on harvesting of fish and shellfish from the Bay, installation of dividing nets to enclose the mouth of the Bay and prevent the spread of contaminated fish, and dredging of mercury-containing sediments. It was only in October 1997 that the dividing nets that had closed off the Bay for 23 years were removed. After several studies confirming that mercury levels in fish were below regulatory levels and had remained so, for three years, Minamata Bay was reopened as a general fishing zone. Till 1992, 2,252 people were diagnosed with "Minamata Disease", with 1,043 deaths reported.

EXPERTS ON MERCURY

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Fruits and vegetables for thought



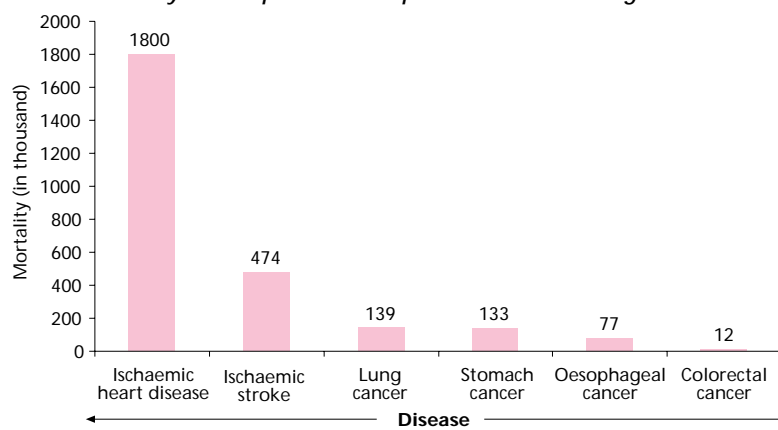
Karen Lock from the London School of Hygiene and Tropical Medicine and his fellow researchers have estimated the global burden of disease attributable to inadequate consumption of fruits and vegetables. In a study concluding in February 2005, they have found that up to 2.6 million global deaths and 31 per cent of the cardiovascular diseases (CVDs) can be attributed to inadequate consumption of food and vegetables. The researchers selected six ailments

and analysed the burden of these diseases as a result of low consumption of fruits and vegetables. These are – Ischaemic heart disease (IHD), cerebrovascular disease, and cancers of the lung, stomach, oesophagus, colon and rectum. A systematic review of all the literature relating to the preventive effect of fruit and vegetable intake on these ailments was carried out. The researchers concluded that fruits and vegetables can have a significant impact in reducing the risk of non-communicable diseases (NCDs), particularly Ischaemic heart disease.

For the first time, "low fruit and vegetable consumption" was included as a risk factor to calculate the global burden of disease (GBD) by the World Health Organization (WHO) in 2000. It had attributed 1.8 per cent of the GBD to inadequate

Deadly diseases

Mortality due to poor consumption of fruits and vegetables



consumption of fruits and vegetables. This is comparable to 2.3 per cent of GBD for obesity. Lock and his associates found that consuming up to 600 gm of fruits and vegetables per day could reduce the GBD by 1.8 per cent. Loosely speaking it could translate into a 31 per cent and 19 per cent reduction in the burden of Ischaemic heart disease and Ischaemic stroke respectively.

This is a clear indicator of the benefits of consuming fruits and vegetables in both developed and developing nations. The study also highlights the need for far greater emphasis on dietary risk factors in the public health policy in order to tackle the rise in NCDs worldwide. A joint fruit and vegetable promotion initiative was launched in 2003 by the WHO and FAO, as a part of the global strategy on diet, physical activity and health of the World Health Assembly 2004. Karen Lock's study supports this initiative as a crucial component in any global diet strategy.

Source : Karen Lock et al 2005, The global burden of disease attributable to low consumption of fruits and vegetables: implications for the global strategy on diet, in Bulletin of the WHO, World Health Organization, Geneva, pp 100-107.

PRODUCT WATCH



Adsorbing Arsenic

Parabond 23 is the latest arsenic removal media developed by Parabond Products International, USA. It can remove 99.5 per

cent of arsenic from a solution ranging between pH 4 and 9 and works on the combined principle of adsorption as well as reduction. The filtering material is granular and comprises varying particle sizes to increase filtration. This removal medium uses particles as small as 50 microns. It can adsorb trivalent, pentavalent and organic arsenic with removal efficiencies in the part per trillion range (arsenic concentration less than 0.01 mg/l). Parabond 23, binds the arsenic tightly enough so that the spent medium can be disposed of in an ordinary landfill without fear that it may leach into groundwater. The manufac-

turers claim that the filtered water meets USEPA standards for arsenic in drinking water. The medium is available in two standard formulations – Parabond 23T and Parabond 23 Max. The former provides optimal arsenic binding and allows for non-hazardous disposal methods. The latter needs to be disposed of in a hazardous waste landfill.

Negotiations are on with a manufacturer in Mumbai to produce Parabond for the company. The company claims it will try to keep the cost as low as possible by manufacturing the substance locally rather than importing it from the US.

BRIEFS

Chemical homes

A US report on household dust reveals that harmful chemicals leach from everyday products assumed innocuous. Young children are particularly at risk, yet the chemicals are legal. The industry seems to be fobbing off these chemicals on people only for profits, alleges the report released recently.

Called *Sick of Dust: Chemicals in Common Products — A Needless Health Risk in Our Homes*, the report is based on a study conducted by Clean production action (CPA), a US based non-governmental organisation (NGO) along with other NGOs.

Dust samples were collected from vacuum bags in 10 homes in each of the seven states studied, California, Maine, Massachusetts, Michigan, New York, Oregon

and Washington. One composite sample was made from the 10 samples collected from each state. Each sample was then tested for the presence of 44 toxic chemicals belonging to six categories and found in common household products such as detergents, cosmetics and toys (see Table: *Living with poisons*). The results showed that 35 of the 44 chemicals were present in at least one sample. "The study is a reliable evaluation of what is in the dust. But it does not tell us how much of these materials are inhaled," comments Peter Orris, director, Occupational health services institute, University of Illinois at Chicago, USA. However, even small amounts of these chemicals inhaled or ingested may prove harmful.

Lack of rules

The adverse effects of several commonly used chemicals have been documented decades ago. For example, it was known as early as 1975 that fumes from hot pans coated with teflon can kill pet birds. Why are these toxic substances still in circulation? Because of lack of legislation, says the report. As per the US toxics substance control act, the chemicals that have been marketed prior to 1979 are considered safe until proven otherwise. But these make up for more than 99 per cent of the commonly used chemicals.

"Manufacturers and retailers need to stop using toxic chemicals which are building up in our bodies and switch to

Living with poisons

<i>Alkylphenols (5.6 per cent)</i>	<i>Detergents, hair colours, paints, agricultural chemicals, stain removers, adhesives, all-purpose cleaners</i>	<i>Can affect sperm production in mammals; may disrupt the human immune system</i>
<i>Organotins (0.13 per cent)</i>	<i>Additive in vinyl products, wood coatings, diaper covers, cellophane wraps, dishwashing sponges</i>	<i>Hormone disruptors. Animal studies show exposure affects brain development</i>
<i>Perfluorinated Organics (0.10 per cent)</i>	<i>Used to make Teflon, water and stain resistant materials for nonstick frying pans, utensils, stove hoods, stain-proof carpets, shampoos</i>	<i>Known to damage organ function and sexual development in lab animals; potentially carcinogenic</i>
<i>Pesticides (2.6 per cent)</i>	<i>Applied to textiles, added to soap and household cleaning products, paints, wallpapers, insecticides</i>	<i>Associated with cancer, reproductive and birth defects; several are neurotoxic</i>
<i>Phthalates (89.6 per cent)</i>	<i>Used in vinyl products such as shower curtains, rain-coats, toys, personal care products (perfume, nail polish) enteric coatings of some medications</i>	<i>Disrupt reproductive systems in animal studies; can contribute to male infertility; linked to respiratory problems in children</i>
<i>Polybrominated Diphenyl Ethers (1.9 per cent)</i>	<i>Applied to textiles, plastics and electrical goods such as TVs to slow down the spread of fire</i>	<i>Mimic thyroid hormones; can retard the nervous and behavioural systems in animals</i>

Source: Sick of Dust: Chemicals in Common Products — A Needless Risk in Our Homes, Clean Production Action, New

safer alternatives which are readily available," says Beverley Thorpe, International Director of CPA. Safer alternatives are available for most, if not all, chemicals. But the Consumer product safety commission that regulates products "has a dismal record of considering chronic long-term health effects resulting from exposure to chemicals from products. They are more focused on injuries and acute poisonings," says Ted Schettler, science director of the US-based NGO, Science and environmental health network.

CPA suggests an overhaul of regulations on chemicals using Europe as an example. Europe's new draft chemicals management programme, entitled registration, evaluation and authorisation of chemicals (REACH), is set for enactment in a year or two. REACH would require industry to publicly provide basic health, safety and environmental impact data on all chemicals, both new and old. Industry also will partly pay for REACH through registration fees.

According to the European Commission, REACH would save an estimated 50 billion Euros in health benefits over the next 30 years and prevent as many as 4,300 cases of cancer.

However, instead of endorsing REACH, the American chemistry council (ACC) and the Bush Administration are lobbying against it, alleges the report. Because of REACH, ACC predicts billions of dollars will be lost in US sales of these chemicals to Europe. Obviously, for the US government,

monetary profits seem to be a bigger concern than health.

DTE, April 30, 2005

Cheaper option to detect cervical cancer

Researchers from the Tata memorial centre (TMC), Mumbai and the International agency for research on cancer, Lyon (France) have found a cheap substitute for a popular but expensive method to detect cervical cancer. They say a combination of two tests visual inspection with acetic acid (VIA) and visual inspection with Lugol's iodine (VILI) costs a fraction of the commonly used human papilloma virus (HPV) test but works as well. The HPV test costs at least Rs 350 (subsidised rate at TMC) while VIA and VILI together cost Rs 35 per person screened.

The cost is important because of the 470,000 cervical cancer cases reported worldwide every year. Of the total cases reported about 80 per cent occur in the developing world, where people cannot afford expensive medication. In India, of the 126,000 new cases reported yearly, about 71,000 women die. A cheap diagnostic method would enable screening of entire populations and increase the chances of survival through early detection.

The scientists compared five methods of screening for cervical cancer. Besides HPV, VIA and VILI, the two other methods studied were cytology and the visual inspection with acetic acid using low-level magnification, or VIAM. All the five tests were conducted

on 4,039 women between 35-60 years of age, chosen from two slums in Mumbai. The researchers found that using a combination of VIA and VILI proved to be highly sensitive and could be used for screening the population. The positive cases could then be verified using the standard pap smears. "As this removed the need to test the whole population using the more expensive method, the cost of screening comes down," says Surendra S Shastri of TMC.

On the basis of these results, TMC is currently carrying out a population-based cancer screening in two districts — Ratnagiri and Sindhu Durg — of Maharashtra.

DTE, April 30, 2005

Over wood as cooking fuel

If people in Africa were to switch to charcoal as a cooking fuel from wood, it would not only significantly reduce greenhouse gas (GHG) emissions but also save millions of lives, claim researchers. Led by Dan Kammen of the University of California, Berkeley, the scientists calculated the health and environmental effects of moving to new fuel-use and land-management strategies either gradually (over the next 50 years) or rapidly (within 10 to 15 years).

The study suggests if current trends in fuel use in sub-Saharan Africa continue, the number of premature deaths among women and young children exposed to wood smoke from stoves will reach nearly 10 million by 2030, from about 400,000 in the year

Ayurveda Nature's Medicine

David Frawley and Subhas Ranade, Motilal Banarasidass Publishers, Delhi, 2004, pp 357, Price – Rs 195/-



herbal medicine or yoga therapy. Very few (even the practitioners of ayurveda) are aware of its basic principle, philosophy,

approach and methods. Probably, the non-availability of ancient literature to common people rendered them ignorant of the true science of ayurveda. This book can fill in the gaps in the existing knowledge and practices considerably. It is well written and structured. Starting with the basic principle and approach, it provides basic information on ayurveda and its relation with body, mind and nature. It talks of optimal health, promotion of the concept of quality of life to increase well-being and happiness in all aspects. The chapters of the book describe the ayurvedic concept of disease process, diagnosis, clinical procedure and treatment. The uniqueness of this book is its content covering a wide range of knowledge in manageable size.

BOOK
REVIEW



2000. What's more, "cooking fires will pump 6.7 billion tonnes of carbon into the atmosphere as GHG in the next 45 years", they say.

Although charcoal is the leading urban fuel in Africa and releases less indoor particulate matter when burned than wood, its use does not find much support from policymakers or environmentalists.

This is because charcoal is made by covering a stack of wood with dirt and allowing it to smoulder for three to seven days - a process that is inefficient and polluting. On the other hand, charcoal production generates rural employment and so could be a blessing in poor regions.

The researchers' model predicts that a shift to burning charcoal, combined with sustainable forest management and more efficient charcoal-production technologies, would avert some three million premature deaths and reduce GHG emissions by 65 per cent if implemented rapidly. Even if adopted gradually over 50 years, the move would delay one million deaths and cut GHG emissions by 45 per cent, relative to simply carrying on as usual.

Plastics are a health hazard

"Most plastics used in cars emit toxic chemicals not only during their production but also later, potentially exposing users to unhealthy emissions inside their automobile. This is in spite of the fact that safer, less toxic plastics are readily available in the market," says a recent report by a Michigan-based non-profit organisation, Ecology Center, in

collaboration with New York-based Clean Product Action (CPA).

The report graded top-selling automakers in the US according to their commitment to use environment-friendly plastics. The US automakers such as Ford and General Motors received "failing grades". Japanese companies such as Toyota were better off. "Though Toyota has implemented many practices that US automakers can learn from, it received a C grade which means there is still a lot of room for improvement," said Charles Griffith of the Ecology Center.

Plastics make up about 7.5 per cent of a car's weight. This represents almost two million tonnes of plastic waste generated per year in the US alone. Petrochemical-based plastics such as polyvinyl chloride, or PVC, release toxic chemicals throughout their lifecycle: during production (dioxin, furans); during vehicle use (phthalates) and at the time of vehicle incineration (dioxin, hydrochloric acid).

Perhaps today's automakers should follow the example of Henry Ford who produced an entire car body from soybean-based plastics in 1930!

DTE, April 30, 2005

Marburg virus: A viral disease that has no cure leaves a trail of death

Angola is facing an epidemic of Marburg haemorrhagic fever that has claimed as many as 244 lives since October 2004. The World Health Organization (WHO) confirmed the epidemic on March 23, 2005 on the basis of tests done by the Centers of Disease Control and Prevention (CDC) in the US.

The virus is highly contagious and has even claimed the lives of 14 nurses and two doctors who were treating the patients. It can spread through blood, vomit and other body fluids. Multiplying rapidly, it can kill a person within a week of infection by destroying the white blood cells. In the earliest stage of infection, symptoms include diarrhoea, abdominal pain, nausea and chest pain. Haemorrhagic manifestations occur between days 5 and 7.

Marburg virus disease has no cure. However, death rates can be kept down by providing patients with medical sup-

port such as attention to fluid and electrolyte balance and blood pressure. In 2002, GenPhar Inc., a US-based company doing research for the US army's biodefence programme, announced an experimental vaccine that protected animals from a high dose of Marburg virus. The company is now testing the vaccine on non-human primates.

The Marburg virus belongs to the family Filoviridae, which also includes the deadly Ebola virus. And like Ebola, Marburg contains only ribonucleic acid. It can be killed by detergents and commercial hypochlorite and phenolic disinfectants.

The virus was first detected in 1967 when monkeys from Uganda infected laboratory workers in Marburg, Germany. Only sporadic cases were reported till 1998 when 149 cases surfaced from the Democratic Republic of Congo. Initial epidemiological findings by researchers from France suggest that the first cases involved miners who were probably infected by contact with animals such as bats that inhabit mines. This was confirmed by antibody surveys carried out by CDC researchers. According to their results published in 2003, two per cent of the 912 participants in the chosen areas were positive for antibodies against the virus of these 87 per cent were men who worked in the local gold mines. While epidemiologists have tested bats, monkeys, spiders and ticks for the virus, they were not able to come to a conclusion.

According to experts, it is not just chance that such outbreaks occur in regions wracked by civil strife and extreme poverty. People faced with dismal economic prospects push deeper into previously uncharted areas, such as hunting in distant forests or entering into faraway mines in search of precious minerals and expose themselves to pathogens not previously encountered as frequently. "We can certainly invoke environmental stresses from worsening socio-political situations in some areas of the world as factors in an increasing incidence of Marburg and other haemorrhagic fevers," says Daniel G Bausch, Associate Professor, Tulane School of Public Health and Tropical Medicine, New Orleans, USA.

DTE, May 31, 2005

Safe water

Project Well is a non-profit organisation that has developed a self-supporting community-based mitigation programme to provide arsenic-free water to the afflicted villages of India, Nepal and Bangladesh. The primary objective of the organisation is to encourage sustainable use of dugwells via the formation and management of community-based groups and creating a database and follow up programme using a passive surveillance system. In India, the organisation focuses on implementation of a community-based mitigation programme in the district of North 24 Parganas of West Bengal. Project Well has constructed 34 dugwells and has been monitoring their efficient use. It also trains the new users on maintenance of the dugwells for a period of one year, which includes application of disinfectants. The NGO constructs conventional dugwells, modified slightly to

suit carefully selected sites. The diameter of each dugwell is one metre and it is packed with coarse sand to enhance groundwater storage and filter fine-grained sediment, and also to reduce the flow of bacteria into the well water. The wells are protected from external contamination by a net cover and a tin roof. Water is withdrawn by using handpumps.

The organisation carries out a door-to-door campaign to ensure sustainability of the community-based programmes before expanding to adjacent villages as the members feel that



the cost of the process to create sustainability is higher than the cost of construction of dugwells.

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For the child in need

The Child in need institute (CINI) in Kolkata is working among poor communities in the city of Kolkata, South 24 Parganas and surrounding areas. Since 1974, this non-governmental organisation's (NGO) focus has been on the health of women and children, child nutrition and development, and mainstreaming streetchildren through education. CINI's mission is to motivate the community to adopt positive action to sensitise the local self-government

(*panchayat*) about the health needs of the community and develop effective linkage at different levels especially between the *panchayat* and the government health systems. The organisation conducts field programmes, training and research. CINI was recognised as the national mother NGO, under the Reproductive and child health (RCH) programme by the Ministry of health and family welfare, government of India in 1998. As mother NGO it supports

advocacy and Information Education Communication (IEC) activities for awareness generation on reproductive and child health programmes including safe motherhood, quality care for infants, immunisation, counselling on STD / HIV and adolescent issues. CINI reaches out to more than 1,10,000 of the rural population in South 24 Parganas, 2,50,000 of the urban poor population in Kolkata, more than 5,000 street children in Kolkata and 1,000 sex workers in rural red light areas. CINI has a unique "adopt a mother" scheme wherein needy mothers-to-be are identified. They are instructed on the importance of adequate rest for the mother-to-be and are also oriented in the basics of good parenting and the necessity of family planning.



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Readers write in

The health newsletter is very interesting. I am still going through the various articles in the newsletter. CSE is indeed doing excellent work on issues pertaining to social development. Health, education, employment and access to basic natural resources are the issues, which need to be given top priority. Please keep sending us the future issues.

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The information provided in the newsletter was quite useful.

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Thank you for the regular updates that I have been receiving. Besides referring to articles by scholars from outside India, it would be appropriate to have articles from our scholars talking about Indian issues on subjects like malaria, HIV and kala-azar. However, CSE is providing an excellent service.

Ravi Dhar

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Many thanks for sharing the e-mail. I find the health newsletter extremely informative and useful.

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Kindly refer to your article — Product watch (*One dose of life*) dated March-April, 2005. The article says we were waiting for government approval. They did approve, and the vaccine was used in Bihar, west UP and Mumbai in the April NID. The operations went off very well. The vaccine will be used in a somewhat larger area in the May round.

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Send us your views, counterviews and suggestions along with your detailed profile and area of expertise to make our network stronger and more efficient.

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Dr Anoop Misra is an internationally acclaimed researcher on obesity, metabolic syndrome and diabetes in the Indian population. His clinical practice and research is mainly centred on diabetes mellitus, obesity, lipid disorders, and other risk factors for coronary heart disease in the Indian population. He is a key member of the National diabetes control programme (India), and National committees on diabetes and cardiovascular diseases set up by the Health ministry, Directorate general of health services, Planning commission, and Indian council of medical research.



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He is a geologist and has served the Geological Survey of India (GSI) for 36 years. He has worked all over the country but has specialised in the study of paleo-environments and groundwater problems. He is a prolific writer. From September 2001 till date he has published more than 480 articles on environmental issues in leading newspapers and magazines of the country.



CSE's Health and Environment Newsletter is a bi-monthly publication and is available online and downloadable at

www.cseindia.org/html/healthnews.htm

Other stories related to environment and health are available at our website: <http://www.cseindia.org>

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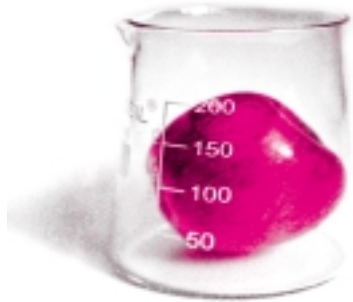
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An apple a day may not keep the doctor away



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Centre for Science and Environment, as part of its commitment towards a clean and safe society, has started a state of the art laboratory dedicated to detect deadly pesticide residue and heavy metals in our foodstuff, beverages, water and bloodstream. It also undertakes testing of water for a complete profile of pollutants, even for individuals. We encourage civil society organisations around the country who are into mass movements against pollution to come forward and use this facility to test any "suspect" material.

CSE POLLUTION MONITORING LABORATORY

For details, contact:
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