Burden of Disease

Outdoor Air Pollution among Top Killers

CSE Dialogue Workshop, New Delhi, February 13, 2013

A Briefing Note

1. Global Burden of Disease ranks outdoor air pollution among the top killers in India
The new India specific findings of the new Global Burden of Disease (GBD) count, a global initiative involving the World Health Organisation that says air pollution has become the fifth largest killer in India, is shocking. This India specific findings have been released by the scientists of the US based Health Effect Institute who were part of the Ambient Air Quality Expert Group of the GBD assessment, at the workshop jointly organized by the Centre for Science and Environment, Indian Council of Medical Research and the US based Health Effects Institute in New Delhi on February 13, 2013.

The India results are part of the sub regional estimates that have followed the release of the GBD 2010 in December 2012. The GBD tracks deaths and illnesses from all causes across the world every 10 years. GBD has ranked air pollution as one of the top 10 killers in the world, and the sixth most dangerous killer in South Asia. Particulate air pollution is now three places behind indoor air pollution, which is the second highest killer in India.

The India specific analysis has been calculated from the larger global efforts using estimates of air pollution exposure at the national level and India specific deaths and incidence of leading causes of deaths. The GBD results have been produced by a rigorous scientific process involving over 450 global experts and partner institutions including the Institute of Health Metrics and Evaluation, the World Health Organization, the University of Queensland, Australia, Johns Hopkins University, Harvard University and the Health Effects Institute. The new estimates of particulate air pollution are based on ground-level measurements, satellite remote sensing and global chemical transport models to capture population exposure.

The key GBD findings for India:

- **Shocking increase in Indian death toll due to air pollution related diseases:** Air pollution is the fifth leading cause of death in India after high blood pressure, indoor air pollution, tobacco smoking, and poor nutrition. About 620,000 premature deaths occur from air pollution related diseases. This is up from 100,000 in 2000 -- six fold increase.
- **Massive loss in healthy years in India:** Air pollution is the seventh leading cause behind the loss of about 18 million healthy years of life due air to illness. It comes after indoor air pollution, tobacco smoking, high blood pressure, childhood underweight, low nutritional status, and alcohol use.
- **Respiratory and cardiovascular diseases key reasons for air pollution induced premature deaths in India:** Premature deaths caused by the air pollution are caused primarily due to a range of cardio respiratory ailments. These include stroke (25.48%), chronic obstructive pulmonary disease (17.32), Ischemic heart disease (48.6%), lower respiratory infections (6.4%), and trachea, bronchus and lung cancer (2.02%).

Global tally

- **Globally death toll due to outdoor air pollution increase**: Globally, air pollution related diseases cause 3.2 million deaths worldwide. This has increased from 800,000, last estimated by GBD in the year 2000 – a whopping 300 per cent increase. About 74 million healthy life years are lost annually.
- **Ranked among the top 10 killers in the world**: In South Asia, air pollution has been ranked just below blood pressure, tobacco smoking, indoor air pollution, poor intake of fruits and diabetes. This is scary as outdoor air pollution is a leveler that makes everyone – rich and the poor -- vulnerable.
- **Two-thirds of the death burden from outdoor air pollution occurs in developing Asia including India:** The new GBD estimates over 2.1 million premature deaths and 52 million years of healthy life lost in 2010 due to fine particle air pollution in Asia, which is two-thirds of the burden worldwide. Killer outdoor air contributes to 1.2 million deaths in East Asia which is in throes of high level of economic growth and motorization and 712,000 deaths in South Asia (including India) which is at the take-off stage. This is much higher than the combined toll of 400,000 in EU 27, Eastern Europe, and Russia.

This GBD count on air pollution and its health risks must trigger urgent, aggressive and most stringent action in India to curb air pollution to protect public health. India cannot afford to enhance health risk at a time when much of its economic growth and motorization are yet to happen.

2. Foul air of India

The speed with which urban air pollution is growing across India is alarming. Close to half of cities are reeling under severe particulate pollution while newer pollutants like nitrogen oxides, ozone and- air toxics are worsening the public health challenge. CSE estimates show that half of the urban population breathes air laced with particulate pollution that has exceeded the standards. As much as one third of urban population is exposed to critical level of particulate pollution. Smaller and more obscure cities are amongst the most polluted in the country. Some mega cities that have initiated some pollution control action in the recent years have witnessed either stabilization or some lessening of the high levels.

BOX: Scary trends: Highlight of CSE analysis of the NAAQM data

Are there clean cities? 180 cities have been monitored for SO2, NO2 and PM10 in 2010. Only two towns Malapuram and Pathanamthitta in Kerala meet the criteria of low pollution (50% below the standard) for all pollutants.

Trends in polluted cities

- **National PM10 levels**: About 78% cities (141 cities) exceed the PM10 standard.

90 cities have critical levels of PM10 and of this, 26 cities have most critical levels of PM10, exceed the standard by more than 3 times. Gwalior, West Singhbhum, Ghaziabad, Raipur, and Delhi are top 5 critically polluted cities.

- **National NO2 levels**: About 10% of the cities (19 cities) exceed the NO2 standard. Of these about 9 cities have critical levels of NO2. The remaining 10 cities have high levels of NO2. Howrah, Barrackpore, Badlapur, Ulhasnagar and Asansol are top 5 critically polluted cities.
- N**ational SO2 levels**: 1 city -- Lote in Maharashtra, exceeds the SO2 standard. Moderate levels of SO2 are noted in --- Jamshedpur and Saraikela Kharsawan in Jharkhand; Chandrapur, Badlapur, Ulhasnagar, and Pune in Maharashtra; Ghaziabad and Khurja in UP, Dehradun in Uttarakhand and Marmagao, Curchorem in Goa.

- **Cities with double trouble**: **Pincer grip of particulates and NO2**: Howrah, Barrackpore, Asansol, Durgapur, Sankrail, Raniganj, Kolkata (7 West Bengal cities) and Badlapur, Ulhasnagar (2 cities in Maharashtra) have critical levels of NO2 and PM10. Delhi, Haldia, Bicholim, Jamshedpur, Meerut, Noida, Saraikela Kharsawan, Jalgaon and Raipur have high levels of NO2 as well as critical levels of PM10.

- **Worsening trend since 2005:** The PM10 monitoring network has doubled between 2005 and 2010 – it has increased from 96 to 180 cities. During this period the cities with low level of pollution has fallen from 10 to 2 and the number of critically polluted cities have increased from 49 to 89 cities. In 2005 about 75% of cities exceeded the standard. In 2010, a total of 78% of cities are exceeding the standard.

- NO2 monitoring has expanded from 100 cities in 2005 to 177 cities in 2010. In 2005 only 1 city had exceeded the standard for NO2. But in 2010 a total of 19 cities have exceeded the standard. The tightening of the national ambient air quality standards has also changed the air quality profile of the cities.

The first generation action in Indian cities was driven by the emerging health evidences at both local and global level. Public health has driven action. In Delhi and few other cities the Supreme Court had intervened on the basis of the Constitutional provision of Right to Life, precautionary principle and polluter pay principle to set the terms of action.

The first phase of action include relocation of polluting industries, tighter emissions standards for vehicles, improved fuel quality, implementation of the largest ever natural gas vehicle programme, management of in-use vehicles and public transport strategies. But the scale and magnitude of action has certainly not been enough to mitigate public health crisis.

Cities like Delhi where the first phase of action could make the haze thinner and arrest the runaway air pollution are at risk of losing the gains. This is evident from the upward curve in pollution in the recent years. Elevated levels of particulates especially the tinier fraction of PM2.5, rising NOx levels, and ugly peaks of ozone are threatening to undo the initial gains. This winter Delhi has experienced some of the most severe pollution episodes in which particulate levels have gone up by five to nine times the standards. NO2 levels remained consistently high. Explosive increase in vehicles numbers is adding to the crisis. These cities need consistent, sustained and more aggressive strategies. It is time to take stock once again as the pollution levels are going up in Delhi and other cities. What is the second generation health challenge in our cities from the polluted air?

CSE perception survey of Delhi citizens on outdoor air pollution, health and the next steps: CSE is carrying out a rapid survey of the citizens' of Delhi on their perception of air pollution and health and the mitigation strategies. The respondents are fairly well distributed across all age groups. About 30 per cent of the respondents use cars and 8 per cent two-wheelers. The rest public transport. About 80 per cent of the respondents are non-smokers. About 88 per cent of the respondents live within 500 meters from the road side. The survey has exposed overwhelming popular concern for air pollution.
The snap shots:

- The majority -- about 64% have said air pollution is worsening and 26% said it has remained the same.

- As much as 79% have attributed the problem of air pollution to growing number of vehicles.
- As much as 77% have identified vehicles as their closest source of pollution around their residences and offices. About 9.5% have listed open burning, 5.8% power plants, 4.8% diesel generator sets.
- About 58% respondents have shown awareness regarding the recent pollution episodes in Delhi
- 74% have said that air pollution cause respiratory problems and respiratory symptoms have increased in frequency during this winter. About 14% have said this has increased school absenteeism amongst children
- Close to half have said that their doctors have mentioned air pollution as one of the causal factors
- Close to one third of the respondents have said that they are aware of the new Global Burden of disease estimates
- About 26% know that the World Health Organisation and International Agency on Cancer Research have reclassified diesel emissions as class 1 carcinogen, putting it in the same class as tobacco smoking for its strong link with lung cancer.
- There is strong support for improvement in public transport, walking and cycling. It is interesting that about 47% have supported reduction in car numbers. About 62% have said there should be restraint on diesel cars and SUVs on dirty diesel.

3. Mounting health evidences

Review of health impact studies carried out in Asia and India – such as those done by the Health Effect Institute -- show that the health effects are as lethal here as found in the US and Europe. But scientists point out that the effects could be even more severe in Indian cities if the studies begin to account for the unique factors in Indian cities -- very high levels pollution – incomparable with those in the industrialized countries, multiple pollutants rising at the same time, and the vulnerability of large number of poor people in Indian cities. This is further aggravated by the vulnerability of the children, elderly and those with respiratory and cardiac symptoms in our cities.

The second generation air quality challenge in Indian cities is also the challenge of multi-pollutant crisis. While the largest health impacts are due to exposure to very high levels of particulate pollution in our cities, and that continue to dominate the health concern, cities are also worried about rising NOx, ozone, and air toxics.

There are many studies across the world and also in India to prove that outdoor urban air pollution is a serious environmental risk factor that causes or aggravates acute and chronic diseases. Also given the latency period of toxic risk Indian cities are likely to see more cancers due to increase in environmental health risk. This makes a strong case for control of air pollution. Health criteria need to be built into the air pollution control policies more clearly.

While multifarious factors are responsible for health effects and cannot be attributed to any single cause, the mitigation strategy will have to prioritise the important environmental factors to reduce environmental risks. Both outdoor and indoor air pollution enhance risk but this dialogue will focus on the urban outdoor air pollution as this is one of the significant contributory factors and also a complex and a difficult mitigation challenge given the nature of its sources. The emerging health evidences serve to highlight the challenge we face in India and the preparedness needed to deal with it for public health security of the present as well as the future generations.

Many policy opportunities are emerging in India that can be leveraged to address this critical public health concern. It has therefore become necessary to take stock of the available evidences at both local and global level and chart the future roadmap for more robust health risk assessment as well as mitigation strategies.

CSE looks at local and global health evidences: CSE has tracked and reviewed more than 80 studies in India of varying scale and scope to understand the emerging evidences.

- **Indian cities have generated valuable local health evidences**: Over the last two decade consistent efforts have been made at local levels to assess the health impacts of air pollution. Even though the

air pollution related health studies have started around the eighties, the subsequent decades have seen major spurt. More than 70% of the studies have been done during 2000-12 that also coincides with the growing unrest in major cities over the polluted air and growing health scourge. Though most of these studies are small and local in nature they have generated very valuable data to convince that air pollution is a significant health risk. There are a few studies by the international agencies including the World Bank and Health Effect Institute. The studies are of different nature and scope.

- **Majority of studies in India have been done by the doctors themselves:** Most stunning finding is that most of the studies in India have been carried out by the doctors themselves – who understand our health and are concerned from what they are observing from their clinical experiences. This is a very encouraging trend that makes doctors the most important stakeholder. Their evidences have helped to move the policies. 53% of the studies have been done by the doctors themselves; in 17% of studies doctors are co-researchers and in 1% doctors have teamed up with the municipal corporations. The remaining studies have been carried out by health researchers.

- **Both mega cities as well as smaller cities have tracked health effects of air pollution**: The mega cities also the most polluted during the eighties and nineties took the lead to study health effects. But as the pollution crisis spread to other cities more local level studies have happened in smaller cities and towns since 2000 – Bikaner, Amritsar, Varanasi, Puducherry, Mandi-Gobindgarh, Kanpur etc. This is an important development.

- **Focus of research has kept pace with the changes in air quality trends:** While studies in eighties were predominantly focused on suspended particulate matter and sulphur dioxide as those were the key pollutants of concerns then, making up for 33% of total studies each, in the subsequent years the basket has widened to include other pollutants – smaller particulates, NOx, ozone, VOCs etc. This clearly shows that Indian health community is aware of the multi-pollutant crisis.

- **Nearly every year health studies have been published in major cities during the last decade**: the community has also been quite prolific. In the cities like Delhi, Kolkata, Hyderabad studies have been published almost every year during the last decade.

- **Looking beyond lungs to other health effects**: Studies are dominated by the focus on respiratory symptoms. But in the recent years they have begun to include more diverse health end points – cardiac cases, cancer, mutagenic effects, etc. Though this investigation in India is still very nascent global studies have made more robust linkages with a wide range of health endpoints – diabetes, stroke, hyper tension, effects on brain, effects on fetus etc.

- **Doctors have focused on the vulnerable sections** – Studies have put a spotlight on the most vulnerable in our cities -- urban poor, children, elderly and those suffering from asthma, respiratory and cardiac ailments etc.

    - **Urban poor** – more than quarter of urban population are officially classified as poor by the Planning Commission: Delhi based School of planning and Architecture ranked respiratory diseases as the second largest cause of morbidity in urban slums of Delhi. In Bangalore increased prevalence of asthma in children of lower socio economic classes.

    - **Children:** Children are especially vulnerable in our cities. This has serious implication as the future urban growth will see more young people in our cities. In Bangalore children from heavy traffic region and low socioeconomic classes had much higher prevalence of respiratory symptoms. Study of Chittaranjan National Cancer Research Institute (CNCI) shows respiratory symptoms in 32% of children examined in Delhi, in contrast to only 18.2% of the rural children. Lung function reduced in 43.5% school children in Delhi as compared to 25.7% of control group.PM10 level associated with restrictive, obstructive and combined types of lung function deficits. Even Attention-deficit hyperactivity disorder (ADHD) has been noticed in children chronically exposed to high level of vehicular pollution (2010). ADHD 4.1 times more prevalent among school children of Delhi ….

PM10 was positively and strongly associated with ADHD prevalence. The impact of atmospheric pollution on vitamin D status of infants and toddlers: Delhi (2002). Etc.

- **Large number of health studies on vehicular pollution:** As much as 59% of studies have focused on exposure to traffic pollution.

- **Worries about growing toxic risk:** Given the fact that endpoint of all toxic risk is cancer, all environmental risk factors should be minimized. This is particularly serious in India that reports overall over 700,000 new cancer cases and National Cancer Control Programme (NCCP) forecast that by 2026, more than 1.4 million people will be falling in the grip of the disease. NCCP has listed greater exposure to environmental carcinogens as one of the most important reasons. Though there is no one but the mitigation strategy must reduce environmental risk from all factors – and air pollution is an important factor. Numerous studies in the West assessed the causes such as genetic susceptibility, environment factors and lifestyle. Found overwhelming influence of environmental factors. In Mumbai in one of the earlier studies of the Department of Preventive Oncology of Tata Memorial Centre, had found incidence of cancer in the city's slums very high. Air pollution plays a role in enhancing this risk. Impact on urban poor can be quite devastating.

- **Serious concern over growing burden of non-communicable diseases in India and environmental health risks**: Indian Council of Medical Research (ICMR) has assessed the disease burden of non-communicable diseases. Also according to the recent estimates from the the World Bank non-communicable diseases impose the largest health burden in India. In terms of the number of lives lost due to ill-health, disability, and early death NCDs accounts for 62% of the total disease burden while 38% is from communicable diseases, maternal and child health, and nutrition all combined. NCDs largely affect middle aged and older populations, the groups growing the fastest, which will lead to future increases. Cardiovascular diseases cancer, respiratory Diseases, and diabetes are the major NCDs in India. A range of factors including genetic, and lifestyle may contribute but as a public policy the role of the environmental risks should be minimised. It is important to act now to prevent disease explosion in the future.

  Globally, studies are being carried out to understand the link between non-communicable diseases and air pollution including hypertension, stroke, diabetes etc. Toxic PAH is also known to affect the fetus. India needs to strengthen this line of enquiry.

- **International agencies have tracked the effect of polluted air on illnesses and premature deaths in Indian cities**. The US based Health Effect Institute study in Delhi estimates approx.0.15% to 0.17% increase in mortality per 10 µg/m3 PM10 (~0.3%/ 20 µg/m3). In Delhi where overall deaths are 100,000 annually even this increase can translate into 3000 additional premature deaths annually due to air pollution related diseases. Similar studies have been carried out in Chennai.

- **Studies of massive scale carried out in other parts of the world prove beyond doubt that air pollution has definite and insidious health effects**: Action in India must also draw upon the large scale studies carried out in other parts of the world to provide the clinching evidences. Scale of evidences may vary but not the human health. A 1995 American Cancer Society study covered half a million people in 151 cities and examined the long-term effects of exposure to particulate pollution on mortality. The study found strong association between chronic exposure to fine particulate pollution and premature deaths in the study group. Sulphate pollution was also associated with early deaths. The study reported strong associations between sulphates and fine particles and death by cardiopulmonary causes. An HEI re-analysis validated these original studies. (Pope CA 3rd et al 1995).

  Another study that finally clinched the battle against doubters was conducted by C Arden Pope III et al published in 2002 in The Journal of American Medical Association (JAMA). It showed that fine particulate (PM2.5) and sulphur oxide (SOx) related pollution is associated with, all-cause, cardiopulmonary and lung cancer mortality. An increase of 10 microgramme per cubic metre of fine particulate was associated with four, six and eight per cent increased risk from all-cause,

cardiopulmonary and lung cancer mortalities respectively. This analysis is based on data collected by the American Cancer Society, Atlanta, USA, as part of the Cancer Prevention Study (II), an ongoing prospective mortality study of approximately 1.2 million adults from 50 states of the US. Sixteen years, about 500,000 people and 116 metropolitan areas is what it took the researchers to arrive at irrefutable findings. It is frightening to note that the associations between fine particulate air pollution and lung cancer mortality as well as cardiopulmonary mortality are observed even after controlling cigarette smoking and other risk factors that include occupational exposures, diet variables, body mass index and some other individual risk factors. Studies of this nature and scale have not been possible in India yet.

- **Exposure to polluted air –how much we inhale**. Researchers have looked not just at the effect of the ambient air quality – which is the quality of the surrounding air – but the actual exposure – how much we inhale in proximity to a source like traffic. Nearly 60% of the studies are traffic exposure that include studies on occupationally exposed group like the traffic policemen, petrol pump worker and also roadside. These are the first indicators of how much we are exposed to one roads while traveling.

    - **Dramatic evidence of how much we inhale while traveling in Delhi** -- A group of researchers from the University of California, Berkeley, have traveled in auto-rickshaws for 40 days, totaling 180 peak traffic hours, during the months of February and May on a fixed route in South Delhi in 2010. They measured the actual particle concentration inside the vehicle while moving with the traffic. They found commuters breathe far more harmful particles inside vehicles while traveling compared to the ambient concentration. The PM2.5 concentrations inside vehicles can be 1.5 times higher than the surrounding background air and ultra-fine levels about 8.5 times higher. In fact the short-term peaks during travel can go above 1000 microgramme per cum – nearly 16 times the daily limit.

    - **Health Effect Institute estimated that people residing within 500 meter from roads are most exposed to vehicular fume.** According to their estimates about 55% -- more than half of Delhi's population live in the influence zone.

Such evidences have serious implications for the road users, public transport users, walkers and cyclists.

4. Special concern over traffic pollution

Cities have many sources of outdoor air pollution and all require mitigation action. But vehicles pose a special challenge. In the future cities will witness rapid increase in vehicular traffic. Cities are not expected to locate new industry or power plants inside the city. This means in terms actual exposure people will be more vulnerable to vehicular fume while traveling and in close proximity to roads. Vehicular emissions contribute to significant human exposure. Pollution concentration in our breathe is 3-4 times higher than the ambient air concentration. In densely-populated cities more than 50 – 60% of the population lives or works near roadside where levels are much higher. This is very serious in low income neighbourhoods located close to roads. Poor have a higher prevalence of some underlying diseases related to air pollution and proximity to roadways increases the potential health effects. Road users, public transport users, walkers and cyclists are the most exposed groups – they are also the urban majority.

Also India is motorising at a level of technology and fuel quality that can compound health risks. There are special concerns about growing use of poor quality diesel. Several international and national health agencies have also reviewed relevant data on diesel exhaust and have classified either the exhaust mixture or the particulate component as probable human carcinogen. Diesel exhaust includes a large number of toxic compounds that cause cancer, reproductive abnormalities and other toxic impacts.

The new shocker: Diesel emission is a class 1 carcinogen: The International Agency for Research on Cancer (IARC), a wing of the World Health Organization (WHO), has said that diesel engine exhaust can certainly cause cancer, especially lung cancer in humans. Is India prepared to respond to the public health risk of diesel? The IARC has reclassified diesel exhaust and removed it from Group 2A list of

`probable carcinogens` to its Group 1 list of substances that have definite links to cancer – thus changing its status to 'carcinogen'. Diesel exhaust is now in the same class of deadly carcinogens as asbestos, arsenic or tobacco among others.

Their decision is unanimous and is based on compelling scientific evidence. The most clinching evidence has come from one of the largest American studies in March this year by the US National Cancer Institute. This study has analysed 12,300 miners for several decades starting 1947 and found that miners heavily exposed to diesel exhaust had a higher risk of dying from lung cancer. The IARC-WHO has urged worldwide efforts to reduce exposure to diesel fumes as much as possible.

This finding comes at a time when India has failed to adopt a clean diesel road map, prevent use of under-taxed and under-priced toxic diesel in cars, and reduce its overall consumption in all sectors. This decision has come from a rigorous review of the latest scientific evidence on the cancer-causing potential of diesel and petrol exhausts. Evidence on diesel's toxicity has been mounting over the past 20 years, which has already compelled stringent regulatory action on diesel quality and emissions standards in other regions of the world.

Health concerns have driven governments in Europe, the US, Japan and other countries to leapfrog to clean diesel. Diesel is considered relatively cleaner when advanced emissions control systems are used with diesel fuel with 10 ppm sulphur content. But the diesel sulphur level in India is as high as 350 ppm. Only a few cities have 50 ppm sulphur diesel – which is five times higher than the global benchmark.
It is extremely worrying that even after the implementation of the Auto Fuel Policy in 2010 which introduced Bharat Stage III in the country and Bharat Stage IV in 13 cities, the government of India has not set the next target for moving quickly to Euro VI emissions standards. Therefore, new automobile production and investments in the country are not even linked to any further commitment to improving vehicle technology and fuel quality. This will significantly delay adoption of clean diesel technology in the country and add to the toxic risk. In fact, by the end of the 12th Plan, the so called modern diesel technology in India will be 17 years behind Europe!

Even the limited evidences in India point towards high contribution of diesel fuel combustion in cities to the formation of tiny killer particles – PM2.5 (particulate matter less than 2.5 micron in size). A World Bank supported study on source apportionment of PM2.5 in selected Indian cities, released in 2004, shows that depending on the season, the contribution of diesel fuel to the total PM2.5 ambient concentration can be as high as 61 per cent in Kolkata, 23 per cent in Delhi and 25 per cent in Mumbai. Dieselisation will also add to the burden of particulate matter, nitrogen oxides, and ozone -- the key pollutants of concern in Indian cities. The current emissions standards in India legally allow diesel cars to emit more particulate matter and nitrogen oxides.

India's cancer registry says cancer is taking on an epidemic form that demands immediate action to cut environmental risks. Perpetrating the use of conventional diesel will add to this cancer burden. The cancer-causing potential of diesel particulates and emissions is several times higher than some of the worst known air toxics. For instance, the number of excess cancer cases per million people per microgramme per cubic meter diesel particulate emissions concentration over a 70-year lifetime exposure is 300. This is several times higher than dangerous toxics like 1,3-Butadiene which is 170.

The IARC-WHO statement sends out a strong signal for urgent and stringent action. But in India, dieselization has taken off at a maniacal pace with state subsidies. Despite recession, diesel cars have clocked 34 per cent growth last year and are close to 60 per cent of new car sales. How can the government justify the hidden subsidies to the rich and to a killer fuel?

Globally, governments have responded to the science of diesel toxicity. The California Air Resources Board had identified diesel exhaust in 1990 as a chemical known to cause cancer and after an extensive review in 1998, listed diesel exhaust as a toxic air contaminant. The US National Institute for Environmental Health Sciences added diesel particulates to its list of substances that are reasonably anticipated to be human carcinogens, in its ninth national toxicology report on carcinogens. In fact, a multiple air toxics exposure study conducted by the South Coast Air Quality Management District in

California found that diesel particulates pose 70 per cent of the cancer risk in southern California. Europe also began to introduce clean diesel with 10 ppm sulphur and particulate traps from the time of Euro IV emissions standards that are currently in force in 13 Indian cities. In fact, the data available from Europe for urban traffic shows that diesel and petrol cars meeting the same level of emission norms have different toxicity levels. The toxicity is several times higher for diesel emissions even as the emissions standards are progressively tightened.

5. Air Pollution and Public Health Policy: The way forward

There is enough evidence to act urgently to reduce the public health risks to children, elderly, poor and all. India will have to take action now to reverse the trend of short term effects as well as the long term toxic effects. For toxic effects to surface there is a long latency period therefore exposure will have to be reduced today.

In India policy opportunities are emerging to set the terms for the future action and investments. The ongoing preparation for the 12th five year plan, expansion of the air quality monitoring programme, city initiatives on clean air action plans, framing of the post-2010 emissions regulations for vehicles are the opportunities to integrate health criteria to make air quality monitoring and management more relevant to public health protection. Emissions will have to cut at source. But stringency and pace of action should be guided by the health risks consideration.

Indian cities have already demonstrated the benefits of controlling air pollution. In June 2005, a World Bank which analysed air quality data for the period of 1993-2002 in five large Indian cities including Delhi, Kolkata, Mumbai, Hyderabad and Chennai estimated that the decline in RSPM levels during that period had led to 13,000 less premature deaths and a much greater fall in the number of respiratory illnesses annually in these cities compared to the early nineties.

India has set national ambient air quality standards to guide clean air action. These standards have also been revised to make them fully health based and discontinue the earlier practice of keeping them land-use based. Some standards are also tighter for key pollutants and the new standards include new pollutants – PM2.5, ozone, and six air toxics. The next challenge is to make cities meet these standards in a time bound manner. In fact the 12th five year plan states that the urban areas will have to meet the air quality standards by 2017. This requires clear mechanism for achieving this target. The 12th plan has also highlighted the importance of epidemiological studies to assess the improvement in health status due to better management of environment and ecology. This should create opportunities for air pollution action.

The Planning Commission is also proposing to develop environment performance index to incentives states for environmental performance through budgetary allocation. It is also hoped that the National Health Research Policy of the Ministry of Health and Family Welfare will include the health concerns related to air pollution within its scope.

India's National Health Policy revised in 2002 has taken cognisance of the fact that there is an increase in mortality through lifestyle diseases such as diabetes, cancer and cardiovascular diseases during the period after the announcement of the policy in 1983. The policy admits that ambient environmental conditions are a significant determinant of the health risks to which a community is exposed. The policy also states that over the years health research activity has been very limited and low research expenditure could be the reason for the same. The government may lay stress on the need to design epidemiological studies to assess the health impact of air pollution for policy action.

This India will also take decision on the future emissions standards for vehicles and emissions regulations for critically polluted areas. This should be leveraged to address the emerging public health challenge.

Set targets to meet air quality standards in cities: Make National Ambient Air Quality Standards legally binding. The quantum of central assistance to states for implementation of the city action plan for clean air should be linked with the progress in implementation of pollution control measures. For this verifiable benchmark and monitoring system should be developed. Introduce elements of incentive and disincentives for meeting air quality standards. Health imperative can help to identify the mechanics for

enforcement of the National Ambient Air Quality Standards in a time bound manner to protect public health.

Targeting emissions source to meet air quality standards: The national air quality planning and city action plan would need roadmaps for each source of pollution. The National Summary of the Pollution Inventory and Source Apportionment prepared by the ministry of environment and forests during the eleventh five year plan has identified key areas of interventions and has recommended working groups. This includes (i) Improvement of fuel quality & vehicle exhaust norms – roadmap beyond 2010; (ii) old vehicles – retrofitment of pollution control devices, scrap policy, inspection & maintenance issues, etc. (iii) Traffic management (iv) Guidelines on cleaner construction practices (v) Industrial activities and industrial action plan implementation (vi) Road quality improvement and minimizing resuspension of road dust.

This should be carried forward to develop robust roadmaps for each sector and commit funds for implementation. Air quality management should at the same time prioritise interventions to minimize exposure and address the growing toxic risk of air pollution.

Strategy for vehicular pollution control: For clean air action plans for cities to meet the air quality goals vehicles will require special focus. Need stringent vehicle technology and fuel quality roadmap and in-use vehicle management to cut health impact of motorization.

- **Shocking how the terms of reference of the new Auto Fuel Policy Committee ignores health:** As of today there is no post-2010 emissions standards roadmap for vehicle technology and fuel quality in the country. Only now the Ministry of Petroleum and Natural Gas has set up the Auto Fuel Policy Committee. The terms of reference of the committee includes roadmap for auto fuel quality until 2025 taking into account the achievement of last Auto Fuel Policy; suitable mix of auto fuels considering the economics, quality and availability of infrastructure; vehicular emission norms for different types of vehicles; use of alternate fuels to minimize the impact on environment and recommending fiscal measures for upgradation of oil refineries, logistics and removal of inter-fuel pricing distortions. But the TOR makes no reference to linking emissions standard roadmap to meeting the environmental, air quality and public health objectives. This must be immediately corrected.
- **Set an early timeline for introduction of Euro V and Euro VI nation-wide:** Ultra-low sulphur diesel along with advanced emissions control technologies should be implemented nation-wide. Fiscal incentive should be announced for introduction of vehicles meeting tighter emissions before time to speed up the transition.
- **Control and cut explosive increase in vehicle numbers** by scaling up public transport, non-motorised transport and compact city planning. Other traffic restraint measures like parking policy, transportation related tax policies along with plans for non-motorised transport and pedestrianisation should be implemented.

Strengthen implementation plans for critically polluted areas. Develop air pollution management plan for industries including small-scale industries. Identify and promote pollution prevention technologies and strategy. Similar plans be developed for area sources including generator sets etc

Account for the health cost in decision making: A better valuation of acute and chronic illnesses linked to air pollution needs to be carried out in India and integrated with decision making. The estimation of monetary value of health benefits associated with changes in air pollutants can serve as an input for the cost benefit assessment of the air pollution-control strategies. Such approaches are critical to build the rationale for policy intervention. Often emissions standards roadmaps are watered down on cost ground that is because health costs are not accounted for.

But other governments integrate such criteria. For instance, in the US the total cost of moving to clean fuels and vehicles (Tier 2 emissions standards for light duty vehicles, the heavy duty vehicle rules as well as the new standards for non-road vehicles) was estimated to be USD 11 billion but the total estimated benefits far exceeded that -- USD 175 billion. This justifies the investments. The available evidence can help drive policy action. A few studies that have emerged in India assessing the cost associated with

health impacts but they have rarely been able to influence policy decisions, even though they show high economic costs of pollution.

Develop programme for health risk assessment to inform policy making: There is a need to scale up studies and track health effects on an ongoing basis to inform air pollution mitigation policies. This will also make regulations more responsive and dynamic. Health impact assessment should detail out different health end points, effects on different population strata in terms of gender, age, socio economic class etc and pollutants. It is also important to give special attention to the effect of a range of modifiers – poverty, high level of pollution, mixture of pollution etc. The regulators need to use the evidences from toxicological and epidemiological research for policy making. The legislative process of requiring health assessment has not been detailed out to develop a dynamic system. Support medical and other health research institute to initiate health studies on air pollution.

Need strong baseline data on diseases and deaths as well as robust protocol to support health risk assessment: India needs health information management standards with clear definitions, protocols and acceptable values for recording data in all medical institutions. The technical network available in the country for disease surveillance needs to get stronger. Disease statistics are not flowing through an integrated network from decentralised public health facilities to the state or central government health administration. In most cases, the databases do not contain a detailed description on the diseases, past medical history of the patient and the causes. Computerization of health database would be the first step to better data management. Trained personnel need to be employed in this field. The data recorded should be accurate, consistent and comprehensive. Data should be regularly updated and should be easily accessible to all stakeholders, especially for research purposes. The dispersal and use of data should be properly monitored.

Build public information system on daily air quality with health advisories: Globally, governments have developed air quality index to inform people about the daily air quality through easily understood air quality bands and issue health advisories for those who are especially those who are vulnerable to air pollution. Some governments even frame pollution emergency measures to reduce the pollution peaks to more tolerable level.

For more information on air pollution, urban mobility and CSE's work in this sector, please visit our website, www.cseindia.org