



#### **4. Noise pollution: deafening decibels**

4.1: Noise levels and health effects

4.2: Noise levels in India

4.3: Regulations on noise: are they adequate?

4.4: The way ahead



“A girl’s cries for help while she was being raped were drowned in the loud music being played in her neighbourhood. She committed suicide later.” *The Times of India, June 1, 1998.*<sup>1</sup>

Shocking it may be but then that is only one aspect of the menace, better known as noise pollution. The problem does not end here, it is only an ingredient in the Pandora’s box. With this comes the apathy of the concerned authorities who still believe that ignorance is bliss. Translation of laws into practical results is still out of sight. The other question lurking in the background is, standards that we have - are they really implementable or are we being fed with something that is doomed to lie only in the stack of files.

“All your spirit is dampened at the very start of the day. I have to bear the unbearable. Passing through AIIMS and then ITO crossing to my workplace at Daryaganj every morning is an ordeal with the kinds of noise you have to encounter due to honking of vehicles.” Says Dr Reema Nair of the Kasturba Gandhi Hospital in Delhi. She is not the only voice, many like her echo similar feelings as they make their way to office in the peak morning hours in Delhi. “ A 10-15 minutes drive to my office makes me feel impatient and irritated. The kind of noise that you have to bear while you travel on Delhi roads is just unbearable. And when you return to your homes , the ordeal is not over. Some or the other function with blaring loudspeakers lead you to the zenith of irritation by the end of the day.” Says Deepa Mathur, an executive with Mini Power Limited.<sup>2</sup>

The situation is surely worsening each day, exasperated commuters can feel it in their ears. “I noticed an amazing fact a few days back. I was passing through the AIIMS crossing and the huge board on display read that honking horns were not permitted in the area, people were reading the board but it was hardly a second that the red lights had given way to the green and the honking of horns was almost deafening. The commuters should also share the blame for increasing noise pollution in the city,” says Varat Sehgal, a management executive with a leading MNC in Delhi.<sup>3</sup> At a point however, views of all commuters seem to coincide, the government should fix stringent standards on permissible levels and also ensure proper enforcement of such rules. Enforcement rather than a change in laws seems to have become the major issue in all pollution related problems in the country.

**4.1: Noise levels and health effects**

Noise levels are increasing,(See table on increasing noise pollution levels in various zones of Delhi) we all know that, but how does that assume importance for us at this moment. Well the question is not of levels rising only but the kind of effects it has on health and well being of man.

**Table 1 - Noise pollution levels (dB) in various zones of Delhi over the years 1991 -1996**

Location	1991	1992	1996
----------	------	------	------



Commercial areas	63-75 (69)	66-80(73)	66-79(p123) (67.5)
Silence zones	62-68(65)	82-87(84.5)	72 – 90(81)
Residential areas	53-71(62)	55-73(64)	62-81(p114 SS) (71.5)
Industrial areas	65-81(73)	70-75 (72.5)	62-82(72)

The recent bombings by the NATO forces on Belgrade, erstwhile Yugoslavia, have brought forth certain findings that history had not seen earlier. It is high time the authorities sit back and take stock of the situation before the health hazards on humans start showing. Animals in the Belgrade zoo have been seen to become cannibalistic as soon as they hear the explosive sound bursts produced by bombings; a tiger in the Belgrade zoo reportedly started ripping its own flesh on hearing such sounds. These are few emerging indications of what can happen to human beings if the noise levels in our cities and towns become unbearable.<sup>4</sup>

Once the noise levels cross a certain limit in our regular lives, they can cause considerable damage to hearing, one of the direct effects of noise rise on the human body. The Environment Protection Act 1986 Schedule III gave the Ambient Air Quality Standards in respect to noise for industrial, commercial, silent and residential zones. <sup>5</sup> “The noise limits prevalent in our country are based on the permissible noise levels denoted in noise related legislations existing in certain countries like UK and USA,” says Dr SK Kacker, former director and professor AIIMS and a well known ENT expert. <sup>6</sup>

**Table II : Ambient Air Quality Standards in respect of noise**

Area code	Noise level Limits in dB(day-6am-9pm)	Noise level Limits in dB (night 9pm-6am)
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence zone	50	40

Noise levels in Mumbai for instance vary between 75-90 decibels that peaks to 100dB during festive seasons and the city stands second only to Calcutta as far as noise pollution is concerned where the noise levels shoot upto 120dB at the busy street corners against a normally accepted level 70 - 75dB.<sup>7</sup> What is true of Mumbai and Calcutta holds good for other major cities of India too. A study by Dr Rajendra Kumar on the noise levels at certain traffic points in Chennai provided a comparison of the noise levels in 1985 and 1993 and in a few areas a significant increase in the noise level was ascertained. <sup>8</sup>

A realization that has emerged from recent studies is that a number of complex factors interact in humans to produce a particular effect. “There is effect of smoking,



atmospheric toxins, heat, humidity, cold and psychological state of an individual which gives a final effect to noise induced trauma to human ears. These effects are being slowly unraveled” says Dr S Kacker.<sup>9</sup>A sample study of 100 individuals randomly selected from a survey of 1100 traffic cops in Chennai in 1997 for the hearing threshold showed a high incidence of 21% of noise induced hearing loss. The incidence of high tone hearing loss which refers to loss of hearing of high frequency sounds, was also found to be around 18%.Of the population studied 31 were smokers, 2 diabetics and 5 hypersensitives.<sup>10</sup> At this stage it is not possible to establish an unequivocal relationship between noise induced hearing loss and other such factors but studies are being carried out to ascertain the linkage. “Few understand, beyond the researchers and doctors that noise annoyance can cause many different health problems. In sleep, the one and a half hour deepest sleep is most important for one's health because it is during this period that the body cells renew. If it is disturbed other ailments would be sure to follow.” says Dr Abhirlal Mukherjee, former head, ENT department, Calcutta Medical College.<sup>11</sup>

Human performance as we know depends on proper coordination of all organs, there has to be a perfect balance between various nerve cells and any hindrance in this coordination shall retard the performance, both intellectually and physically. Several studies have been done in order to estimate the impact of noise on this kind of human performance. It has been good old four decades and more since these sets of experiments were conducted but their importance have increased today with regularly rising noise levels in our surroundings. According to a study conducted in 1954 high intensity noise (80dB, 90dB, 100dB) was used on 5 choice serial reaction time and found that the subjects showed errors at the 100dB level.<sup>12</sup> WTV Adiseshiah et al in 1959 exposed the subjects of the experiment to white noise (90dB-95dB) and found that their reaction time increased. A 1958 study used a decision taking test to assess the impact of sudden sound bursts on human performance. He used sound level of 110dB for his tests and found that there was a tendency of missing signals for about half a minute after exposure to the burst of noise.<sup>13</sup> An experiment conducted in 1959 used high intensity noise in experimental condition of watching for signals in a paper pencil vigilance task.<sup>14</sup> It was found that output did not fall but percentage of omission increased. Analysis of these results showed that failure of perception is the main cause behind it and noise is responsible for this hindrance.<sup>15</sup>

#### **Box 1 - Occupational noise and health**

No environmental factors have caused so much confusion regarding its effect as has industrial noise. Noises in industry originate from processes causing impact and , vibration or reciprocation movements, friction and turbulence in air or gas streams.<sup>1</sup> Permissible limits of noise for industrial workers are hard to determine. It is the total noise in the area where the worker is located rather than exposure to noise from one particular machine, which determines the maximum permissible noise levels and the parallel time of exposure.<sup>2</sup> For this reason noise emission standards must not be confused with noise emission levels of a particular product, in this case machines.<sup>3</sup>



“The noise levels in industries are well above the recommended safe limits of exposure of 90dB for 8 hours daily for a 30 year working life as proposed by the International organisation for Standardisation Rept.No.1999, 1971.” Says Dr SK Bhattacharya. <sup>4</sup>

Studies carried out by the NIOH linking the noise levels above permissible limits and related diseases in factory workers have been tabulated in Table IV.

“Machine noise is itself a hazard, it acts as a masking device and can prevent an alarm from reaching the ears thereby increasing the chances of accidents” says Dr.Ogale, head of the ENT department of GS Medical College, Mumbai and has also done considerable work in the field of industrial noise pollution. <sup>5</sup> This apart each industry has its own level of noise that impairs hearing to various degrees, a further relevant factor here is age of the workers . A study carried out by Dr Ogale et al brought forth results as shown in

The data in table 6 shows that conditions in the industries are far from safe and the people are suffering from noise related disorders to a sizeable extent. <sup>6</sup> The picture is only a representative but a real one. Saying this ofcourse does not mean that there should be no industries. What we require now is implementation of existing legislations and going for noise prevention or protecting device.

A study conducted by Dr Kacker in BHEL, Hardwar way back in 1975 found damaging levels of noise in the industry. “Whereas people use protections for eyes and lungs, they are ignorant about ear protecting devices. In spite of the protectors being present, they are not inclined in using them. The most surprising fact is that information available even in the year 1998 showed that they were not using ear protecting devices” says Kacker. <sup>7</sup> The gaps lie in implementation, if awareness does not help then forcible implementation is the next resort. The basis for all industries is after all human necessity and human comfort but do we really want that at the cost of human health?

**Table III-Studies on effects of noise on human subjects \*\* Part of Box**

Studies	Findings
Weaving shed of a textile mill	frequency of 4000hz
Engine testing section of an	NiHL observed in some workers
Coal washeries	of the workers with slight impairment and the
Hindustan Petroleum corporation	of the employees had sensory neural loss of
Laboratory	
• Physiological	Increased blood pressure, oral temperature, deep body temperature and pulse rate
• Psychological	Impairment in neuromotor activity, visual search, alertness and memory.

Source:

1. Bhattacharya S.K.: Noise hazards in textile plants. Proceedings of Indian Institute of plant engineers, Ahemdabad chapter, Ahemdabad, p56,1987.



## CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>

### A. ENVIRONMENT AND DISEASES

#### 4. NOISE POLLUTION: DEAFENING DECIBELS

2. Bhattacharya S.K., Tripathi S.R. & Kashyap S.K.: A Study of heat & Noise problem in a drug and pharmaceutical firm in India (letter), *Ind. Health* 28, 203, 1990.
3. Bhattacharya S.K., Tripathi S.R. & Chatterjee B.B: Problems of compressor noise in a petroleum crude stabilisation unit. *Indian J. Occup. Health* 30:27, 1987.
4. Bandopadhyay P., Bhattacharya S.K. & Kashyap S.K.: Assessment of noise environment in a major railway station in India. *Ind. Health* 32: 187, 1994.
5. Bhattacharya S.K., Tripathi S.R. & Kashyap S.K.: Calcutta Metro: Is it safe from noise pollution hazards? *Ind. Health*, 34:45, 1996.
6. Bhattacharya S.K., Kashyap S.K.: Studies of noise pollution, *ICMR Bulletin*, August, 1966.

END OF BOX

---

Kathy Peck, founder of the San Francisco based Hearing Education and Awareness for the Rockers (HEAR) is well acquainted with the pain and frustration of hearing loss. A bass guitarist for the 80's girl band *The Contractions*, Peck lost her hearing in 1984 when a congenital problem worsened due to continuous exposure to loud music. Although laser surgery was able to correct a part of the damage, she still has tinnitus and hyperacusis, a heightened sensitivity to sound that makes a vacuum cleaner sound like a jet taking off. Referring to HEAR studies Peck indicates that now there is more of noise induced hearing loss rather than that due to old age. There are 20 and 30 year olds with the hearing of 60 year olds because of extreme noise exposure. <sup>16</sup>

Whether you prefer to blast Mozart, left, or James Hetfield of Metallica, the effects are equally troubling. Loud music addicts can experience hearing loss and symptoms of withdrawal like mood swings, lethargy and depression. Listening to Mozart or Metallica cranked full-blast may be an addiction, a group of American researchers concludes. <sup>17</sup> People dependent on a high-decibel "fix" may experience the same symptoms and side effects as alcohol, tobacco and drug addicts, says a study published in the December 1998 issue of *Ear and Hearing* by researchers at Northeastern University in Boston. <sup>18</sup> The group adapted a 32-question survey used to diagnose alcoholism and recruited 90 self-professed loud-music lovers, eight of whom showed signs of addiction. The addicts displayed symptoms such as craving, loss of control over their music-listening habits, detrimental side effects like hearing loss, an infringement on other activities and symptoms of withdrawal like mood swings, lethargy and depression. <sup>19</sup> According to Mary Florentine, a professor of audiology research at Northeastern University in Boston and one of the study's authors, "people with noise-induced hearing loss who insisted they couldn't stop cranking their stereos planted the seeds for the project. The subjects themselves suspected their music-listening habits might be out of control." <sup>20</sup>

As pop music regularly soars the popularity charts, so does the damage due to high decibel levels. A study conducted in 1987 estimated the risk of permanent damage to hearing at 1 out of every 4000 people from regular rock concert goers. <sup>21</sup> A Japanese study in 1982 also showed that there are people with hypersensitive ears who can face



permanent damage due to exposure to such noise levels.<sup>22</sup> A cross-sectional study of risk factors for assessment of deafness in 1208 young men in Lyon, by a group of French scientists in 1998 showed that of all forms of exposure to music, personal stereos were most harmful. Hearing threshold in all frequencies had increased in 205 men who used personal stereos for at least one hour each day. In practical terms this means that hearing ability of 205 men had decreased considerably and this applied to all levels of sound.<sup>23</sup> If results such as these have emerged in France it can be effectively said that Indians also stand at the receiving end. "You do not need to rediscover a discovered wheel. If results abroad are showing the damaging effects of exposure to high levels of noise, then we do not need to do such studies here in India. The effects will be the same if the exposure is of similar standards." says Kacker.<sup>24</sup> Personal stereos are increasing in demand each day and specially among the children which is a harmful trend as far as health is concerned.

Children are the most vulnerable victims of noise pollution. The effects in this age group ranges from physical to intellectual and psychological. Studies being done abroad are progressively using reading skills as indicators to detect the effect of noise on intellectual capacity and mental well being of children. Researchers in Cornell University in New York (1996) have suggested that children from noisy environs have poorer reading skills than those who come from quieter areas.<sup>25</sup> The reason cited is that these children find it harder to recognise and understand human speech. To establish a relation between noise levels and reading ability about 58 seven year old kids were chosen from a school that lies in the pathway of a New York airport and were compared to 50 children of the same age from a quieter neighbourhood. Arline Bonzaft, a noise specialist at the City University in New York says " the results would probably apply to all schools near any large airport. It does not matter where you are, London, Netherlands or Los Angeles, the study is very significant." <sup>26</sup> A study in Poland has also indicated earlier that students in a classroom at the level of a railway track showed poorer scholastic performance than their counterparts in a classroom situated below the level of the railway track. The principle behind this impairment lies in *filtering out*. This principle entails that brains of children exposed to high levels of noise cope with the din by filtering out i.e by ignoring certain sounds that also includes human speech. This tendency of the brain to ignore human speech results in retardation of intellectual skills.<sup>27</sup> "If studies in various countries have shown that children exposed to high noise levels show retardation in intellectual development, there is no reason to believe that the situation in India is different. We have similar conditions in our country, schools and residential areas situated near the airport and busy areas where noise levels are quite high while silence zone parameters are rarely followed." says Dr Sidhu <sup>28</sup>

**Box 2 – Global scenario of noise pollution.**

Developing countries other than India , specially those in South Asia are suffering from the scourge of noise pollution. Countries like Bangladesh and Sri Lanka are reeling under the menace. For instance in Dhaka city the permissible noise level around educational institutions is 45dB but a survey by the Department of Environment in various schools in 1997, the results have shown that the lowest averages in these areas are 67dB and the highest nears 75dB. According to Dr M Abdullah of the



## CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>

### A. ENVIRONMENT AND DISEASES

#### 4. NOISE POLLUTION: DEAFENING DECIBELS

Department of Orthodology at Institute of Post Graduate Medicine and Research(IPGMR), Dhaka, the noise not only distracts the victims but is also responsible for many diseases. It causes the blood pressure to rise besides being responsible forfor headache, indigestion, insomnia and peptic ulcer. Hydraulic horns are a major source of noise pollution in the city and shortcomings in the law have been cited as reasons for lack in controlling their usage even as the problem enters dangerous proportions in the capital city of Bangladesh. <sup>1</sup>

Sri Lanka for the first time is experiencing what no other country in the near future has. 5 children aged between 21/2 months to 2 years have declared that the unbearable noise being emitted by a power plant in Etul Kotte near Colombo is impairing their developing auditorysenses, thus resulting in an infringement of their rights. The petition was filed through the Legal Aid Clinic of the Environmental Foundation Limited (a Sri Lankan NGO) to the Supreme Court. Sound levels throughout 24 hours vary between 70-100 dB against the standards of 60dB at day and 50dB at night. <sup>2</sup> Preliminary success has already been attained with the Supreme Court providing that the plant should not operate between 10pm-6am until the final verdict is given. The president of Sri Lanka had earlier exempted power plants from the purview of noise and environmental pollution laws fearing a power crisis situation. The ruling by the SC however comes as a major success for a petition that had been unique even by birth. <sup>3</sup>

Kathmandu in Nepal is facing a crisis with about 10 thousand families surviving near the Tribhuvan International Airport where even the smallest aircraft while taking off emits about 140dB. The Ministry of Population and Environment had been set up only in early 1998 and were busy looking into air and water pollution rather than noise while the inhabitants try to survive under the threat of psychological and physiological disorders. <sup>4</sup>

Developing nations due to their commitment to development have mostly underestimated the health impacts of their actions and today find themselves in a precarious situation with very stringent boundaries. It is high time they decided to whether to take strict actions today and improve public health and environment or try and overlook today but pay a heavier price tomorrow.

While the world is still debating on the kinds of effects noise has on children, another manifestation that is slowly unfolding itself is the effect of high noise levels on the foetus. Studies in 1978-79 in USA have shown that sound is well transmitted into the uterine environment and has the potential to cause immense damage to the foetus. In one of these studies children with a high frequency loss, tested at 4-10 years of age were more likely to be born to women who were exposed consistently to occupational noise in the range of 85-95dB during pregnancy. <sup>29</sup> Studies using animals have demonstrated an increased sensitivity of the developing ear to noise induced damage but the effect in humans has not yet been confirmed though tests are on. <sup>30</sup> A fact to be reckoned with at this stage is that animal studies is the first step in decoding the kind of influences of a particular factor on humans.





Noise induced hearing loss (NiHL) undoubtedly is an important manifestation of exposure to high noise levels. But another notable manifestation is irritation. “ There has been a case of a person committing suicide due to the unbearable levels of noise he was exposed to. The suicide note substantiated the fact, it read- ‘the noise, the noise. I just could not stand the noise.’ Although no one at this stage could unequivocally say that noise brings about mental illness, there is evidence that indicates noise related stress can aggravate already existing emotional disorders.” says Dr Sidhu, head of the ENT department at Ram Manohar Lohia (RML) hospital. <sup>31</sup> Initial research in UK and USA have shown that there are more admissions to psychiatric hospitals among people residing near airports. <sup>32</sup> But even till date there are not enough studies that can establish the fact without a doubt, both in India and abroad. “ Psychiatric diseases cannot be said to be directly related to noise, the fact is that exposure to high levels of noise can increase the emotional disturbances that are already present in some people, all this actually stems from irritation which is the most evident effect of high noise levels ” adds Kacker. <sup>33</sup> “ The most obvious price we pay for living in an overly noisy world is the annoyance we frequently experience. Unfortunately the society is ignoring the fact, not realizing the amount of stress and its consequent health hazards ” adds Sidhu. <sup>34</sup>

**Table IV showing a summary of WHO recommended exposure limits and the effects of High decibel levels of noise**

Environment	Recommended Maximum Noise level dB	Health impacts arising from noise levels exceeding limits
Industrial/ Occupational community/ Urban	75	Predictable risk of hearing
a. Daytime	55	Annoyance increase at higher levels
b. Night time Indoor/ Domestic	45	Difficulties in falling asleep at higher levels
a. Daytime	45	Speech communication deteriorates at higher levels
b. Night time	35	Increased awakenings at higher levels

Source:Noise Pollution,quoted in Anon 1998, Nandini Chemical Journal, Vol.5, Issue 6, March 1998,p37.

Heart diseases, another health problem that delegates from exposure to high levels of noise though no study whether in India or abroad have shown that noise directly inflicts



any measurable damage to the heart itself. The effect of noise is secondary. Studies in 1990s suggest that exposure to noise probably has a linkage with the development and aggravation of a number of heart problems. A Japanese study in 1991 reported a possible correlation between noise and blood pressure and also indicated that noise plays a determinative role in hypertension .<sup>35</sup> A set of studies in 1977 examined the effects of airport noise on cardiovascular problems in the neighbourhood. The report suggested that noise constitutes a very serious threat to all forms of public health specially cardiovascular ones.<sup>36</sup> Some recent laboratory studies on animals have indicated that noise levels similar to that found in most industries cause an increase in the levels of blood cholesterol in rabbits exposed to such levels for 10 weeks. Studies on humans are still on the line.<sup>37</sup>

Health is surely facing a major threat from various quarters in the modern world. Noise directly or indirectly aggravates the already deteriorating status of public health. “Today the threshold age for noise related disorders has reduced to forty-five rather than sixty years as observed even five years ago. Now we have an increased number of children coming to us with ENT disorders though it cannot be said that all of it is due to noise pollution” says Dr Sidhu.<sup>38</sup>

**Table V on certain events and their related noise levels.**

Event	Noise levels(dB)
Volcano eruption	190
Thunder	120
Jet plane	120
Factory boiler	110
Trains	110
Cars and bikes	90(approx)
Barking of a dog	70
Loud conversation	70
Typewriting	50
Whispering	15
Breathing	10

Source: CD Verma, Docs sound warning on noise pollution, HT, 18.9.97

**4.2: Noise levels in India**

International levels of 45db are considered acceptable in residential areas. The threshold of normal hearing is 20-25 dB , for normal conversation 60dB. An exposure to 100 dB for more than one hour a day and to 110 dB more than 5 minutes a day are said to be unsafe.<sup>39</sup> This data in itself makes the situation prevalent in various metros of the country very clear. Places like Calcutta with peak noise levels of 120dB are lethal to the people surviving there by all standards.<sup>40</sup> Leave aside metros for a while and concentrate on the so-called small towns. Levels though lower than that of metros are



much higher than permissible limits. Suburban areas or villages and small towns are still considered to be free. But this is only the surface truth, the reality is far removed. For instance Imphal in Manipur in the North eastern region of the country is neither an industrialised township nor a highly populated one. Noise levels in this area are much above the permissible standards. A survey carried out by researchers at the Dept. of Environmental sciences in the DM College of Science, Imphal revealed that noise levels at daytime were in the range of 71-77dB, at night this range varied from 60-68dB. These high noise levels are explainable on the account of heavy traffic, workshops and blasting of horns. <sup>41</sup>

### Box 3 - Calcutta case study

Calcutta - the noisiest city in India. The impression is not incorrect perhaps but in the recent years action by campaigners, High court orders on Public Interest Litigations(PIL) and efforts by West Bengal Pollution Control Board (WBPCB) have made a considerable impact on the existing noise scenario in the city. Calcutta is definitely high on the list, but it cannot be called the noisiest' after these actions, scientists at WBPCB say. <sup>1</sup> The figures would come out clearly after an ongoing project by WBPCB is completed, they add. The eviction of hawkers from the main thoroughfares, restriction on auto-rickshaws from plying in residential areas and introduction of one way traffic have contributed to this improvement. <sup>2</sup>

According to Dr Abirlal Mukherjee, former head, ENT department, Calcutta Medical College, and who has done pioneering work on noise effect on health says that while doing a project on etiology of hearing impairment causes it was found that "12% of the people were not hearing as much as they should. But they themselves were not aware of it. This could be a reason why any measure to contain noise pollution gets less than deserving public attention." he adds. <sup>3</sup> Traffic noise, specially because of the increasing number of vehicles on the limited road surface (only 6% of Calcutta surface are meant for roads) is a major cause for the annoyance level in people. In a survey led by Dr Mukherjee and conducted by WBPCB, Bose Institute, Kalyani University and Indian Statistical Institute people living in 18 crossings in the city with noise level above 85 decibels were tested. The study found 62.14 % of those tested had incurred mild loss of hearing; 25.71 % had moderate loss (unable to hear a range of audio frequencies; 5% had severe hearing loss and 1.42 % suffered deafness. "Noise induced deafness that affect the inner ear and audio nerves is a cause for concern" Dr Mukherjee says. <sup>4</sup>

In another study titled Survey of community annoyance due to traffic noise exposure in Calcutta metropolis\* co-authored by Debashis Chakraborty, scientist, WBPCB, S.C. Santra of Kalyani University (School of Environmental Studies) and B. Roy of the Bose Institute covered 14 road junctions in their premises, it was reported that more people are annoyed by traffic noise than any other source of noise pollution. It found that 27.5 % of those surveyed were highly annoyed and for 4.91% sleep quality was severely disturbed. Of those surveyed 34.6% people were in favour of stringent implementation of legal provisions. <sup>5</sup>



## CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>

### A. ENVIRONMENT AND DISEASES

#### 4. NOISE POLLUTION: DEAFENING DECIBELS

In the past two years Calcutta High Court (CHC) has passed restrain orders to abate noise pollution in many areas. Almost all of them have been a result of PILs filed by NGOs. They pertain to: Use of loudspeakers (order 1/4/96 & 24/2/97): Microphone can be used only after 7 am and before 9 pm. and that too after being fitted with sound limiter. Mikes cannot operate within 100 metres of hospital, schools and court houses. Noise levels for industrial areas, commercial area and residential area has been fixed too. The restrictions are also effective for political parties, cultural functions etc. The order has evoked resistance from Imams of some masjids in the city, as it restricts use of loudspeakers for azans. Restriction has also been imposed on the use of fire works (order 26/9/97) which generate more than 90dB impulse noise from 5 meter from the source. This stopped sale of chocolate bombs, chain crackers etc. A few people were arrested while trying deliberately to defy the ban in the first year of the ban. The ban was also resisted by traders dealing in crackers but there has been an overwhelming response from the local residents.<sup>6</sup>

The Calcutta Environment bench in the High Court, the first of its kind in the country, has now asked WBPCB to submit a fortnightly report on the implementation. However, many of the orders do keep being flouted. Calcuttans point out that just outside the city the long distance and suburb executive or better class buses use air horns with impunity. A report (Anandabazar Patrika, 17/1/99) said that while the police observed a road safety week they used loudspeakers which was above the noise limit. Dr Mukherjee says that awareness among the people is the most effective weapon. WBPCB is now holding workshops with the police personnel so that they know and can control the menace more effectively.<sup>7</sup>

Laws putting a blanket ban on excessive noise exist in books but are seldom enforced. For instance most religious places blare out loudspeakers with devotional songs all day long. Its a wonder how people really manage to devote themselves to the almighty with such blaring music, the main effect, according to doctors, of which is irritation. The police does not do anything probably because it is like touching a live wire and the politicians, well they are more concerned about their vote bank.<sup>8</sup>

The azaan is a call for prayer. Right now, for most political parties in West Bengal, it is almost like an answer to their prayers. The azaan has become a political issue in Calcutta. With the Pollution Control Board having decided that the sound level will not be allowed to go above the ceiling of 65 decibels and the Calcutta High Court having ruled in favour of strict enforcement of this decision, the azaan is now a hot property with the politicians in these parts.<sup>9</sup>

The case is now being fought in law courts and the entire state awaits the Supreme Court ruling on the appeal made against the Calcutta High Court verdict restricting the use of loudspeakers during the azaan. The issue blew up on July 17, 1998 when the Calcutta High Court issued a suo moto contempt notice against eight imams of various mosques in the city for refusing to appear before the court for the fourth consecutive day in the case relating to the use of microphones during azaan.<sup>10</sup> Political parties in their effort to capitalise on such an issue directly came into action saying that law was banning azaans but on the way just exposed themselves to the flak of the courts which



## CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>

### A. ENVIRONMENT AND DISEASES

#### 4. NOISE POLLUTION: DEAFENING DECIBELS

insisted that the order was meant only on the use of microphones. Nothing more than that. The case in West Bengal has surely shown that restrictions can be imposed if political interests are overlooked, a religious colour is the trumcard of todays politicians but only if the authorities buckle under pressure and the citizens fail to voice their grudge.

Calcutta is surely a success story but laws banning use of loudspeakers exist in states like Bihar where flouting such laws has become the order of the day. The nuisance of loudspeakers being happily exploited in the name of devotional prayers and hymns should be stopped now but expecting our politicians to initiate such process will be just expecting too much. It will be wrong to harp on devotional songs only and not mention the blaring loudspeakers just for entertainment sake. A marriage next door means a sleepless night for neighbours and immense irritation and the police personnel seem to be at a loss as far as controlling this regular menace is concerned. Only effective laws can answer the problem but only with proper enforcement mechanism. Calcutta has shown an example, it is for others to follow. (11. Raising the Political Pitch by Abhijit Das Gupta (PIO 09.08.1998) Page 48 CSE- India green file)

Calcutta has been a frontrunner example for the rest of the country and has proved that dedication from the authorities with support from the local citizens can change menacing situations and put them on the track of improvement.

A picture of the metros can be easily deciphered from the situation existing in silent zones of cities like Mumbai. It has been reported that the noise levels of about 75dB has been recorded around Jaslok, Nanavati, Sion and Cooper hospitals of Mumbai and during night times, it reaches 86dB when the aircraft takes off or lands. The levels of noise here can be said to be very high when compared to the set standards of the silent zones of the country.<sup>42</sup>

Delhi is no better, in fact the scenario in this capital city is nothing less than grim. The Delhi Pollution Control Committee (DPCC) conducted a survey in 102 locations in Delhi and their findings were enough to prove the increasing menace of noise pollution in the capital city of India. The report says that three wheelers, trucks and motor cycles remain the chief source of noise pollution on Delhi roads and is closely followed by generators in residential and commercial areas. 15 of the 46 residential locations surveyed have noise levels within the permissible range for 90% of the time in the day. But on the other hand there is an extreme situation in 12 locations where the noise levels are much above permissible levels round the clock.<sup>43</sup> Even silence zones like hospital areas are alarmingly noisy. Areas around important hospitals like All India Institute of Medical Sciences(AIIMS), Ram Manohar Lohia hospital (RML) have recorded sound levels of 86dB which is about 1000 times that of levels permitted even in residential areas. Apart from this the major traffic corridors of the city cross even the critical 100dB mark in peak hours. The rise in noise levels in the last two decades can be well accounted for by the unprecedented rise in the vehicular population in the city from about 2 lakh vehicles in 1971 to about 27.6 lakh in 1996.<sup>44</sup>



**Table VI-Table on average noise levels around hospitals in Delhi**

Location	Noise level (dB) - day	Noise levels (dB)- night
AIIMS	87	77
Jai Prakash Narayan hospital	83	103
Kalawati Saran hospital	83	103
Guru Teg Bahadur hospital	82	102
Dr RML hospital	71	-
Safdarjung hospital	88	-
LNJP hospital	80	90
Mool Chand hospital	60	69

“The absence of a proper rapid public transport system in the city has made the situation precarious. Formulation of legislations requires an insight into technical aspects of noise pollution and even today we do not have enough comprehensive data on noise pollution ” says Dr MK George, Scientist with DPCC and co author of the book Sonic Spectrum which deals with the status of noise pollution in the capital. <sup>45</sup> The DPCC has also come up with a series of recommendations to the CPCB to aid in formulation of legislations which includes a ban on pressure horns and installation of silencers and mufflers in vehicles and generators. It has also recommended the phasing out of three wheelers and upgrading road construction and maintenance alongwith a launch of mass awareness programmes. <sup>46</sup> Official sources in the committee however said that the recommendations have been lying with the central board since 1997 and now with talks of a new quasi judicial authority being set up to recommend and help in formulation of new laws , there is a feeble hope that these recommendations might see the light of the day. <sup>47</sup>

Uttar Pradesh, the largest state of the country is also under the scourge. Allahabad and Meerut are among the noisiest cities of the state - the facts were revealed by the noise monitoring programme conducted by UP Pollution Control Board. <sup>48</sup>Noise is highest in the state in the residential and industrial areas of Allahabad while the commercial and silence zones of Meerut are the noisiest. The study was carried out in eight major cities - Lucknow, Kanpur, Allahabad, Meerut, Gorakhpur, Bareilly, Agra, Varanasi. Silence zones of Meerut recorded noise levels of 83dB compared to the prescribed level of 50dB during daytime, while in the night it recorded 63db against the prescribed limit of 40dB Allahabad stood second with noise levels of 75.5dB during daytime followed by Gorakhpur Agra, Varanasi and Kanpur. <sup>49</sup> To sum it all it will not be wrong to say that the noise bug has bit every part of the country and the disease is fast spreading to other areas.

**Table VII-Noise levels in small towns(1996)**

Town/city	Noise level (dB) range in peak hours	Source
Allahabad(Uttar Pradesh)	69-75	Anon 1996, Allahabad,



		Meerut noisiest cities, <i>Pioneer</i> , The Pioneer Limited, Lucknow, January 18.
Meerut(Uttar Pradesh) • Commercial areas • Residential areas	70-88 64-74	--Do--
Agra	60-72	--Do--
Varanasi	53-70	--Do--
Bareilly	58-70	--Do-- --Do--
Chandigarh (Punjab)		--Do--
Hosur(Karnataka)		--Do--
Nagpur(Maharashtra)	74-83	IJEP, VOL 17, NO4, APRIL 1997
Tiruchirapalli(Tamilnadu) • Residential • Commercial	66-106 82-108	IJEP, VOL17, NO11, NOV 1997
Jaipur(Rajasthan)	64-80	IJEP, VOL17, NO11, NOV 1997
Pondicherry	70-80	IJPR VOL15, No 2, 1996
Imphal(Manipur)		

**4.3: Regulations on noise: Are they adequate?**

Noise from the lawyers point of view is in the first place a fact that has to be looked into from three quarters, psychological, physiological and technical.<sup>50</sup>

The foundation for noise abatement in Civil law is mostly contained in the environmental regulations. Each case is judged on the basis of local conditions, economic considerations and social aspects.<sup>51</sup> In civil actions the prosecution roughly has the following possibilities at its disposal:

- The normal complaints about environmental defence and claim for damages, claims of disturbance to property due to forbidden interference, a complaint of this nature can be won in summary action.<sup>52</sup>
- A complaint about the freedom of property.

Although the police law contains few suitable regulations and measures, there is still enough space to make use of experience from civil law as regards protection from noise emission, specially the results of exposure to such levels for a long duration and most of all the concept of excessive noise above a limit of tolerance with regard to the protection of peace, quiet and health.<sup>53</sup>



*Existing legal provisions with regard to noise in India are:*

**Indian Penal code**

Section 290: "Whoever commits a public nuisance in any case not otherwise punishable by this code will be punished with fine which may extend to two hundred rupees."<sup>54</sup>

Section 133: The magistrate under this section has the power to make a conditional order requiring the person causing such nuisance to remove the same.<sup>55</sup>

The problem with the section 290 is that a fine of two hundred is just not enough in the 90s to prevent the violators from resorting to noise nuisance.<sup>56</sup> Under this section the fine should possibly be increased to an exorbitant amount that may in a way help in preventing people from indulging in activities leading to production of high noise levels. Empowering magistrates will only help when the authorities care about enforcement which seems to be totally lacking. The Central Pollution Control Board however begs to differ. "What is lacking is public awareness and community participation. The media should play a greater role in disseminating information and increasing awareness" says Dr B Sengupta , Member secretary ,CPCB.<sup>57</sup>

**Motor Vehicles Act 1939:** Various sections of the Act empower a state to frame rules for the upkeep of motor vehicles and control of noise produced by them in its jurisdiction. Rules framed by the states are mostly concerned with horns and silencers.<sup>58</sup>

**Motor Vehicles Act 1989:**Under section 119 the subject of concern is horns. The law states that every motor vehicle shall be fitted with an electric horn and any multitonned horns that produce shrill,loud or alarming noises are not permissible under law.<sup>58</sup> Anyone travelling on Delhi roads knows how far removed the actual situation is; it is very easy to locate cars that whistle various multitonned horns on the roads. Do we call this a failure of law or a failure in enforcement. "Now we all know that the entire problem lies with improper enforcement, laws are mostly there but the authorities are still not thinking in lines of enforcing them with resolute power. But the onus also lies with the general public. Even doctors inspite of being totally aware of harmful effects of high levels if noise, do not keep away from continuous honking of horns on the roads." Says Dr Kacker.<sup>59</sup>

Noise pollution as a separate subject still does not find a place in our legal system unlike countries like UK and USA that have Noise Abatement Act 1960 and Noise Pollution and Abatement Act 1970 respectively.<sup>60</sup> Sources of noise pollution have seen unprecedented rise in the last few years but that has not changed the legal situation. A heartrending fact here is that whatever embedded legislations we have fall short of the demand of 1990s. Acts formulated in the last century are still in vogue without changes even as we brace up to enter the next one.





**Railways Act 1890:** A huge amount of noise is attributed to railway engines and there has been no space for curbing noise pollution under this act. It appears that no one can get a relief against the railways although they are a major constituent of noise pollution.<sup>61</sup> With an increase in the railway network the noise pollution aspect has been totally ignored though the intensity of the problem is rising with each day. An act formulated in 1890, sounds quite ancient and so it is and no one has cared to see whether the law is preventing or actually aggravating an already deteriorating situation. Under this Act the railway administration is provided with statutory authority for the use of locomotives. There is no restriction as to the noise level or other emissions from the engines. In common law in England it would have been an actionable nuisance to use engines which were such a source of danger to health and it would have been of no defence that it had been made as safe as possible.<sup>62</sup> Statutory protection has however been possessed by various railway companies with respect to various nuisances that are incident in management of the companies, for instance with respect to noise and vibrations. But in India railway engines are able to produce as much noise as they feel like and there is no redressal against it.

**Factories Act 1948:** No industrial law in India provides any protection to the workers from noise pollution. Only Section 11 of the Factories Act, 1948 provides protection from nuisance which reads: Sec.11(1): Every factory shall be kept clean and free from any drain, privy or other nuisance.<sup>63</sup> The use of word nuisance in the section may include noise. It is also very interesting that that under Section 35 of the Act protection to eyes of an employee is given but protection to ears is nowhere given in the act.<sup>64</sup> With noise levels in most industries crossing permissible levels it is high time that the government cares to give a look to these ancient legislations.

This is not a single case, there are endless such examples in the legal system and it is high time the authorities wake up from their peaceful slumber before it gets too late.

Every finger seems to point at lack of implementation of existing legislations. But in this are we really overlooking something very important. Are the standards posed forward by various committees really implementable. A closer look shows that they are not. Official sources at the DPCC indicated that we have contrasting standards and no force can ensure their implementation as the fault lies in the source. For instance we have a standard of 65dB for residential areas whereas the Motor Vehicle Act speaks of vehicle standards at 80dB. How can we really expect to implement a standard of 65dB when we are allowing traffic with noise levels of 85dB to pass through the area and that too legally.<sup>65</sup> It is high time that we look forward to proper implementable standards rather than stacking the racks with superficial solutions that have their worth only in paper and not elsewhere.

#### **4.4: The way ahead**

Noise pollution as a subject comes under various ministries ranging from that of surface transport, railways, industries to environment and forests. The actual onus to formulate proper guidelines, legislations and standards lies with the CPCB which is then finally



communicated to the MoEF for notifications.<sup>66</sup> According to Dr Sengupta CPCB is trying hard through implementing authorities to ensure proper implementation of noise standards. CPCB is working on new legislations for standards on gensets, automobiles, aircraft noise monitoring and other such laws.<sup>67</sup> But there are really a few takers. With the dismal performance of the government with already existing provisions it is hard to believe that things will get back to the right track once new laws are formulated but authorities across various departments are at least optimistic that a change in legislations shall bring an impressive change in the scenario. Dr SK Bhattacharya, Dy. Director of the National Institute of Occupational Health says “ The most effective way to ensure functional and implementable legislations is the creation of a green bench in the Supreme Court. A vigilant eye of the law into the increasing menace of all forms of pollution , not only noise, will surely help in curbing this unwanted growth.”<sup>68</sup>

Mr Vijay Sharma, Joint secretary MoEF however feels that the ministry recognises noise as a pollutant and is trying to implement stringent rules to contain the menace. In 1997 the ministry had come up with an action plan and a white paper after a series of meetings with concerned agencies, experts and NGOs.<sup>69</sup> Norms are being laid down to contain the situation. Prof. Kameshwaran, emritus professor, Madras ENT Research Foundation is of the opinion that an arbitrary selection of noise free zones or silence zones is not going to help, a careful selection of such zones is required and an efficient mechanism for checking and controlling offenders should be made available.<sup>70</sup> “The media has to play an effective role in educating the public, who themselves can try and improve the situation to a considerable extent. Leaving aside the role of Media and other organisations, a fact that cannot be ignored is that it is high time to persuade the government to enact suitable legislation so that manufacturers design engines with low noise levels. The attitude that any thing can run on the roads should be corrected now,” he adds.

The MoEF has however promised to set up an authority headed by a retired Supreme Court judge for redressal of complaints lodged by citizens harassed due to various forms of pollution including noise. The authority with quasi judicial powers is being set up under the Environment Pollution Act, Section 3. Sources in the ministry said that the authority will take its final shape by end of June 1999 and will probably answer the problem of implementation.<sup>71</sup> But with old untouched laws, improper enforcement mechanisms and non functional authorities being the order of the day, can we really hope that a new authority will answer the problems of hassled citizens? Only time will tell.

## REFERENCES

1. Rakesh Bhatnagar 1998, SC seeks Govt's explanation on steps against noise pollution, *The Times of India* , Bennett Coleman & Co. Ltd., New Delhi, June 01.
2. Deepa Mathur 1999, Mini Power Limited , New Delhi, May, *personal communication*.



## CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>

### A. ENVIRONMENT AND DISEASES

#### 4. NOISE POLLUTION: DEAFENING DECIBELS

3. Varat Sehgal 1999, Management Executive, New Delhi, May, *personal communication*
4. Siddarth Vardarajan, Noise kills tiger in Belgrade Zoo, *The Times of India* , Bennett Coleman & Co. Ltd., *Delhi*, \*\*
5. Dr I.K. Kapila and Dr. M.P. George 1997, Policy measures needed to regulate noise in metropolitan India, Delhi Pollution Control Committee, New Delhi, *mimeo*.
6. Dr. SK Kacker 1999, Batra Hospital and Cancer Research Centre , New Delhi, May, *personal communication*.
7. Anon 1996, Indians reeling under pollution, *Assam Tribune*, Assam Tribune Pvt. Ltd. Guwahati, October 18.
8. Prof. S.K.Kacker 1998, Overview of the Health Effects of Noise Pollution with Special reference to India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.
9. Dr. SK Kacker 1999, Batra Hospital and Cancer Research Centre , New Delhi, May, *personal communication*.
10. Prof. S.K.Kacker 1998, Overview of the Health Effects of Noise Pollution with Special reference to India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.
11. Dr Abhirlal Mukherjee 1999, former head ENT department Calcutta Medical College, Calcutta, May, *personal communication*
12. Sadique Razaque 1999, Noise Pollution and Human Performance - An Analytical Study, *Journal of Human Ecology*, Kamla Raj Enterprises , Delhi , Vol.10 , No.3, March 99, p 224
13. Sadique Razaque 1999, Noise Pollution and Human Performance - An Analytical Study, *Journal of Human Ecology*, Kamla Raj Enterprises , Delhi, Vol.10, No.3, March 99, p224.
14. Sadique Razaque 1999, Noise Pollution and Human Performance - An Analytical Study, *Journal of Human Ecology*, Kamla Raj Enterprises , Delhi, Vol.10 , No.3, March , pp224-226.
15. Sadique Razaque 1999, Noise Pollution and Human Performance - An Analytical Study, *Journal of Human Ecology*, Kamla Raj Enterprises , Delhi , Vol.10 , No.3, March , pp224-226.
16. Sara Jean Green 1998, Bad Vibrations, *internet site*



**CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>**

**A. ENVIRONMENT AND DISEASES**

**4. NOISE POLLUTION: DEAFENING DECIBELS**

17. Allisson Hanes 1998, Loud music as addictive as drugs, study says, *The Ottawa Citizen*, December 14
18. Allisson Hanes 1998, Loud music as addictive as drugs, study says, *The Ottawa Citizen*, December 14
19. Allisson Hanes 1998, Loud music as addictive as drugs, study says, *The Ottawa Citizen*, December 14
20. Allisson Hanes 1998, Loud music as addictive as drugs, study says, *The Ottawa Citizen*, December 14
21. Prof. S.K.Kacker 1998, Overview of the Health Effects of Noise Pollution with Special reference to India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.
22. Prof. S.K.Kacker 1998, Overview of the Health Effects of Noise Pollution with Special reference to India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.
23. Laura Spinney 1997, Pump down the Volume, *New Scientist*, New Science Publications, Holborn Publishing Group, London , Vol.155 , No.2091, July 19, p22.
24. Dr. SK Kacker 1999, Batra Hospital and Cancer Research Centre , New Delhi, May, *personal communication*
25. Vincent Kiernan 1997, Noise affects learners, *Telegraph*, Ananda Bazar Patrika Ltd., May 12.
26. Vincent Kiernan 1997, Noise affects learners, *Telegraph*, Ananda Bazar Patrika Ltd., May 12.
27. Prof. S.K.Kacker 1998, Overview of the Health Effects of Noise Pollution with Special reference to India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.
28. Dr TS Sidhu 1999, ENT department Ram Manohar Lohia Hospital, New Delhi, May, *personal communication*
29. Dr.T.S.Sidhu 1998, Need for research on health hazards due to noise pollution in metropolitan India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.



**CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>**

**A. ENVIRONMENT AND DISEASES**

**4. NOISE POLLUTION: DEAFENING DECIBELS**

30. Dr.T.S.Sidhu 1998, Need for research on health hazards due to noise pollution in metropolitan India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.
31. Dr TS Sidhu 1999, ENT department Ram Manohar Lohia Hospital, New Delhi, May, *personal communication*
32. Dr.T.S.Sidhu 1998, Need for research on health hazards due to noise pollution in metropolitan India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*
33. Dr. SK Kacker 1999,Batra Hospital and Cancer Research Centre , New Delhi, May, *personal communication*
34. Dr TS Sidhu 1999, ENT department Ram Manohar Lohia Hospital, New Delhi, May, *personal communication*
35. Dr.T.S.Sidhu 1998, Need for research on health hazards due to noise pollution in metropolitan India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*
36. Dr.T.S.Sidhu 1998, Need for research on health hazards due to noise pollution in metropolitan India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*
37. Dr.T.S.Sidhu 1998, Need for research on health hazards due to noise pollution in metropolitan India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*
38. Dr TS Sidhu 1999, ENT department Ram Manohar Lohia Hospital, New Delhi, May, *personal communication*
39. Anon 1996, Indians reeling under pollution, *Assam Tribune*, Assam Tribune Pvt. Ltd., Guwahati , October 18.
40. Anon 1996, Indians reeling under pollution, *Assam Tribune*, Assam Tribune Pvt. Ltd., Guwahati , October 18.
41. KK Koljam et al 1998, *Noise pollution in select urban areas of Imphal valley*, Indian Journal of Environmental Protection , Kalpana Corporation , Varanasi ,Vol 18, No 3, March, pp 215-217.
42. Ravichandran et al 1998, *Status of noise pollution in Hosur*, Indian Journal of Environmental Protection , Kalpana Corporation , Varanasi , Vol 18, No.4, April , pp278-280.



**CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>**

**A. ENVIRONMENT AND DISEASES**

**4. NOISE POLLUTION: DEAFENING DECIBELS**

43. Anusha Subramanian 1999, Health hazard in decibels, *The Observer of Business and Politics* , Observer (India) Ltd., March 06.
44. Dr. I.K. Kapila and Dr. M.P. George 1997, Sonic Spectrum of Delhi, Delhi pollution Control Committee, New Delhi p628.
45. Dr MK George 1999, Delhi Pollution Control Committee, New Delhi, May, *personal communication*
46. Dr I.K. Kapila and Dr. M.P. George 1997, Policy measures needed to regulate noise in metropolitan India, Delhi Pollution Control Committee, New Delhi, *mimeo*
47. Official Sources 1999, Delhi Pollution Control Committee, New Delhi, May, *personal communication*
48. Anon 1996, Allahabad, Meerut noisiest cities, *Pioneer*, The Pioneer Limited, Lucknow, January 18.
49. Anon 1996, Allahabad, Meerut noisiest cities, *Pioneer*, The Pioneer Limited, Lucknow, January 18.
50. Gr Chhatwal et al 1997, Legal Aspects of Noise Pollution, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, p277-289.
51. Gr Chhatwal et al 1997, Legal Aspects of Noise Pollution, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, pp277-289.
52. Gr Chhatwal et al 1997, Legal Aspects of Noise Pollution, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, pp277-289.
53. Gr Chhatwal et al 1997, Legal Aspects of Noise Pollution, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, pp277-289.
54. Gr Chhatwal et al 1997, Legal Aspects of Noise Pollution, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, pp277-289.
55. Dr I.K. Kapila and Dr. M.P. George 1997, Policy measures needed to regulate noise in metropolitan India, Delhi Pollution Control Committee, New Delhi, *mimeo*



**CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>**

**A. ENVIRONMENT AND DISEASES**

**4. NOISE POLLUTION: DEAFENING DECIBELS**

56. Gr Chhatwal et al 1997, Legal Aspects of Noise Pollution, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, p277-289.
57. Dr B Sengupta 1999, Central Pollution Control Board, New Delhi, May, *personal communication*
58. Dr I.K. Kapila and Dr. M.P. George 1997, Policy measures needed to regulate noise in metropolitan India, Delhi Pollution Control Committee, New Delhi, *mimeo*
59. Dr. SK Kacker 1999, Batra Hospital and Cancer Research Centre , New Delhi, May, *personal communication*
60. Dr I.K. Kapila and Dr. M.P. George 1997, Policy measures needed to regulate noise in metropolitan India, Delhi Pollution Control Committee, New Delhi, *mimeo*
61. Dr I.K. Kapila and Dr. M.P. George 1997, Policy measures needed to regulate noise in metropolitan India, Delhi Pollution Control Committee, New Delhi, *mimeo*
62. Dr I.K. Kapila and Dr. M.P. George 1997, Policy measures needed to regulate noise in metropolitan India, Delhi Pollution Control Committee, New Delhi, *mimeo*
63. Gr Chhatwal et al 1997, Legal Aspects of Noise Pollution, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, p277-289
64. Dr. I.K. Kapila and Dr. M.P. George 1997, Sonic Spectrum of Delhi, Delhi Pollution Control Committee, New Delhi, pp 6-8.
65. Official Sources 1999, Delhi Pollution Control Committee, New Delhi, May, *personal communication*
66. Dr B Sengupta 1999, Central Pollution Control Board, New Delhi, May, *personal communication*
67. Dr B Sengupta 1999, Central Pollution Control Board, New Delhi, May, *personal communication*
68. Dr SK Bhattacharya 1999, National Institute of Occupational Health, Ahmadabad, May, *personal communication*
69. Vijay Sharma 1999, Ministry of Environment and Forests, New Delhi, May, *personal communication*



## CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>

### A. ENVIRONMENT AND DISEASES

#### 4. NOISE POLLUTION: DEAFENING DECIBELS

70. Prof. Kameshwaran 1998, Effect of Traffic Characteristics on Noise parameters, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*

71.

#### Box 1: Occupational noise and health

1. G.R Chhatwal et al 1997, Noise in Industries, *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, p
2. G R Chhatwal et al 1997, Noise from Industry and its Control , *Encyclopaedia of environmental pollution and its control* Vol III, Anmol publication pvt. Ltd., New Delhi, pp176-177.
3. Dr SK Bhattacharya 1999, National Institute of Occupational Health, Ahmadabad, May, *personal communication*
4. Dr SB Ogale 1999, GS Medical College, Mumbai, May, *personal communication*
5. Prof. S.K.Kacker 1998, Overview of the Health Effects of Noise Pollution with Special reference to India, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*.
6. Dr. SK Kacker 1999, Batra Hospital and Cancer Research Centre , New Delhi, May, *personal communication*

#### Box 2: Global scenario on noise pollution

1. M. A. Chowdhary 1997, Dhaka: The City of Noise, *Bangladesh Observer*, Al-Helal Printing and Publishing Co. Ltd., Dhaka, June 21.
2. Kishali Pinto Jayawardana 1997, Kotte Kids Seek Right to Life, *Sri Lanka Times*, April 13.
3. Anon 1997, Baby Power Shuts Down Plant, *Telegraph*, Ananda Bazar Patrika Ltd., Colombo, May 14.
4. Surendra Phuyal 1998, Who cares for the million affected by jet noise? *Kathmandu post* , *Nepal* , Kantipur Publications Pvt. Ltd., Kathmandu, Nepal , August 12.

#### Box 3: Calcutta case story

1. Scientists 1999, West Bengal Pollution Control Board, Calcutta, April, *personal communication*
2. Scientists 1999, West Bengal Pollution Control Board, Calcutta, April, *personal communication*





**CSE DRAFT DOSSIER: HEALTH AND ENVIRONMENT>>**

**A. ENVIRONMENT AND DISEASES**

**4. NOISE POLLUTION: DEAFENING DECIBELS**

3. Dr Abirlal Mukherjee 1998, Health Effect due to Noise Pollution, A Case Study in Calcutta, Paper presented at the National Conference of Health & Environment, Center for Science and Environment, New Delhi, *mimeo*
4. Dr Abhirlal Mukherjee 1999, former head of ENT department Calcutta Medical College, Calcutta , May, *personal communication*
5. Debashish Chakrabarti 1999, West Bengal Pollution Control Board , Calcutta , May, *personal communication*
6. Ranjita Biswas 1999, e-mail, Calcutta , May, *personal communication*
7. Dr Abhirlal Mukherjee 1999, former head of ENT department Calcutta Medical College, Calcutta , May, *personal communication*
8. Abhijit Das Gupta 1998, Raising the Political Pitch, *Pioneer*, The Pioneer Limited, Calcutta, August 9.
9. Abhijit Das Gupta 1998, Raising the Political Pitch, *Pioneer*, The Pioneer Limited, Calcutta, August 9.