

**NEED FOR THE INDOOR AIR QUALITY STANDARDS****Deepak Dixit, Senior Manager, Engineers India Limited, (CPSE, under MoP&NG), Delhi-66**

Air Pollution is a public health emergency and this fact is of common knowledge for considerable time. However, the term 'Air Pollution' in common discourse is largely associated with Ambient Air Quality i.e., outdoor air. This association instinctively leads to the notion that indoor spaces are much safer than outdoors, especially in highly polluted urban cities. Further, of the many lifestyle's changes brought about by increasing urbanization, one important change is amount of the time being spent indoors. Depending upon the demographics, People in urban habitats tends to spend more than 90% of their time in indoor spaces like homes, schools, day care centers, malls, factories etc. The ill effects on health because of exposure to any kind of pollutant is directly proportional to both, quantum and exposure time to these pollutants. Considering the huge amount of time that an individual or a group of people tend to spend indoors, it is imperative to closely scrutinize the quality of air in indoor spaces for public good.

Based upon the existence of indoor sources, availability of data (toxicological and epidemiological), World Health Organization (WHO) has already published the guidelines for indoor air standard. Refer 'Table-1' below,

Table-1.

<b>Pollutants</b>	<b>Sources</b>	<b>Potential Long term health Risk</b>
Benzene	<ul style="list-style-type: none"> <li>• Infiltration from outdoor air.</li> <li>• Smoking tobacco.</li> <li>• Building materials and furniture.</li> <li>• Attached garages and parking.</li> <li>• Heating and cooking systems.</li> <li>• Stored solvents.</li> </ul>	<ul style="list-style-type: none"> <li>• Cancer (Benzene is a genotoxic carcinogen).</li> <li>• Blood dyscrasias.</li> </ul>
Carbon monoxide	<ul style="list-style-type: none"> <li>• Combustion sources (cooking and heating) because of low-grade or solid fuel and improper venting.</li> <li>• Infiltration of carbon monoxide from outdoor air.</li> <li>• Incense burning in poorly ventilated areas.</li> <li>• Poorly ventilated underground parking spaces</li> </ul>	<ul style="list-style-type: none"> <li>• Hypoxia leading to unconsciousness and death.</li> <li>• Decrease in capacity to do exercise.</li> <li>• Reduced cognitive capabilities.</li> </ul>
Formaldehyde	<ul style="list-style-type: none"> <li>• Furniture and wooden products containing formaldehyde-based resins such as particleboard, plywood and medium-density fiberboard.</li> <li>• Paints, wallpapers, glues, adhesives, varnishes and lacquers</li> </ul>	<ul style="list-style-type: none"> <li>• Sensory irritation of the eyes and upper airways.</li> <li>• Formaldehyde can induce nasopharyngeal cancer in humans.</li> </ul>

Naphthalene	<ul style="list-style-type: none"> <li>• Crystalline (pure) naphthalene as a moth repellent and disinfectant</li> <li>• Solvents, lubricants, herbicides, charcoal lighters and hair sprays, unvented kerosene heaters, tobacco smoke, rubber materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Haemolytic anaemia.</li> <li>• Poisoning especially in children.</li> </ul>
Oxides of nitrogen	<ul style="list-style-type: none"> <li>• Tobacco smoke.</li> <li>• Poorly maintained gas-, wood-, oil-, kerosene- and coal-burning appliances such as stoves, ovens, space and water heaters and fireplaces.</li> <li>• Underground parking</li> </ul>	<ul style="list-style-type: none"> <li>• Respiratory symptoms, bronchoconstriction, increased bronchial reactivity, airway inflammation.</li> <li>• Decreases in immune defense leading to increased susceptibility to respiratory infection.</li> </ul>
Polycyclic organic matter (POM)	<ul style="list-style-type: none"> <li>• Infiltration or intrusion of outdoor air</li> <li>• Smoking, cooking, domestic heating with fuel stoves and open fireplaces, as well as from incense and candle emissions</li> </ul>	<ul style="list-style-type: none"> <li>• Lung Cancer</li> <li>• Low birth weight in case of prenatal birth weight.</li> </ul>
Radon	<ul style="list-style-type: none"> <li>• Decay of radium in the soil subjacent to a house</li> <li>• Building materials having concentrations of radium</li> <li>• Water supplies from sources having high uranium content</li> </ul>	<ul style="list-style-type: none"> <li>• Lung cancer.</li> </ul>
Trichloroethylene (TCE)	<ul style="list-style-type: none"> <li>• Wood stains, varnishes, finishes, lubricants, adhesives, typewriter correction fluid, paint removers and certain cleaners, where TCE is used as a solvent.</li> <li>• Foodstuff prepared from solvents with TCE</li> </ul>	<ul style="list-style-type: none"> <li>• Neurotoxic effects likes affecting the optic and trigeminal nerves.</li> <li>• Lung and kidney Cancer</li> </ul>
Tetrachloroethylene (PCE)	<ul style="list-style-type: none"> <li>• Paint removers and printing inks</li> <li>• Adhesives and specialized cleaning fluids</li> <li>• Consumer products like fragrance, water repellents, vehicle cleaners.</li> <li>• Dry-cleaned clothes</li> </ul>	<ul style="list-style-type: none"> <li>• Kidney damage.</li> </ul>

Health risks posed by above pollutants are no less in severity than those posed by outdoor air pollutants like particulate matter, SO<sub>x</sub>, NO<sub>x</sub>, Ozone, lead etc. and considering the time being spent indoors by a very large urban population, the problem is very likely to compound. Chemicals like formaldehyde, naphthalene, trichloroethylene etc. do not find mention or weightage in the ambient air quality index. Therefore, separate Indoor air quality standards are very much required.

Work on assessing the health effects of indoor air pollution has lagged behind that on outdoor air pollution because of a number of reasons. But the formulation, monitoring and implementation of ambient air quality standards has been of tremendous help in planning the response against adverse conditions. It is now quite a policy tool. So, this experience gained in the process needs to be properly adopted for developing the indoor air quality standard. Presently, most of the studies in the area of indoor air pollution are focused on in case of rural India and on the environmental tobacco smoke in case of urban India. Based on

available data and guidelines, this spectrum of indoor air pollutants needs to be broadened. Standards specific to schools, home and office building need to be developed.

Thus, to contain ill effects of indoor air pollution, it is absolutely essential to start making concrete efforts as are being done in the case of outdoor pollution. In this context, some of the measures that can be taken up immediately are listed below:

- Undertaking extensive studies to identify pollutants based on their toxicology in Indian urban settings.
- Formulation of Indoor Air Quality Index for public indoor spaces like offices, schools, malls, day care centers etc. after considering lowest-observed-adverse-effect level (LOAEL).
- Formulation of Industry Specific Indoor Air Quality Index for workers working on indoor factory floors.
- Notifying nodal agencies for monitoring of indoor air quality of indoor public spaces.
- Involving stake holders like urban planners, construction companies to implement indoor air pollution mitigating measures right from the inception of buildings.

The COVID-19 pandemic has brought about a paradigm shift in many walks of life and scientists are calling to bring about some changes in indoor public spaces too. We need to not only mitigate pollutants in indoor air but also environment in indoor settings should be able to prevent rampant spread of infectious diseases. Hence, the situation calls for even more comprehensive response towards improving indoor air quality.

'Bad air makes us dumb', this is what Harvard researchers concluded when they studied effect of indoor pollutants on cognitive abilities of a workforce working indoors. However, bad air not only makes people dumb, it makes them susceptible to sickness which drains their vitality, be it a healthy adult or a child.

Formulating an Indoor air quality standard is first of many steps needed to be undertaken. To that we may have a chance of even facing the challenges which contamination of indoor air brings in the domain of public health and time of act is now.

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