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**INDOOR AIR POLLUTION IN INDIA AND HEALTH HAZARDS**



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**INTRODUCTION**

The ambient air quality in Indian cities has degraded to hazardous levels over the last two decades. People are exposed to extreme health risks due to increasing particulate matter, hazardous airborne agents in indoor spaces Outdoor air quality is affecting indoor air quality too.(1) Indoor air pollution is the degradation of indoor air quality by harmful chemicals and other materials; it can be up to 10 times worse than outdoor air pollution. Over a million people in India die every year because of indoor air pollution, among highest in the world, (2).

Indoor air pollution can be traced to prehistoric times when humans first moved to temperate climates and it became necessary to construct shelters and use fire inside them for cooking, warmth and light. (3) Approximately half the world's population and up to 90% of rural households in developing countries still rely on unprocessed biomass fuels in the form of wood, dung and crop residues (4). Even today, about 43 percent of rural households and 31 percent of all Indian households use kerosene, for lighting purposes. Its impact on health and environment can be threatening.

	<b>Indoor air pollution</b>	<b>Outdoor air pollution</b>
<b>Economic loss (as a % of GDP)</b>	1.3%	1.7%
<b>No. of deaths in 2010</b>	13 lakh	6.2 lakh

Source: Diagnostic Assessment of Select Environmental Challenges in India & Global Burden of Diseases Report

In rural India, the use of biomass as cooking fuel is the primary cause of indoor air pollution. According to estimates from the last Census in 2011, biomass is used for cooking in 67 percent of all households in India, including 87 percent of rural households. This is far above the average of other regions like China (33%), South-East Asia(46%), Middle-East(4%) and Latin America (15%) and about the same as Africa. (Source: World Energy Outlook 2014 – Traditional use of solid biomass for cooking.

**STATUS OF INDOOR AIR POLLUTION IN INDIA**

Indoor air pollution is bigger killer than outdoor air pollution in India with the recent global burden of diseases report listing the former as second biggest killer and later as fifth largest. Around 1.3 million people died of indoor air pollution in 2010 whereas death because of outdoor air pollution

was around 6.20 lakh. Indoor air pollution is second biggest killer after high blood pressure in India, the report said. (5)

The World Health Organization (WHO) has prescribed 20 micro grams in cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air for particulate matter as a norm for indoor air pollution. In India, the average indoor air pollution is  $375 \mu\text{g}/\text{m}^3$  and the prime contributor for this is burning of solid fuels, says a study done by Indian Council for Medical Research.(6)

In India, out of 0.2 billion people using fuel for cooking; 49% use firewood; 8.9% cow dung cake; 1.5% coal, lignite, or charcoal; 2.9% kerosene; 28.6% liquefied petroleum gas (LPG); 0.1% electricity; 0.4% biogas; and 0.5% any other means.(7)

Menon (1988) and Saksena, Prasad, Pal, Joshi (1992) have found reported levels of  $20,000 \mu\text{g}/\text{m}^3$  or more near the cooking location and with much lower concentrations of these toxins in the rest of the kitchen/other rooms in the household(8).

### **SOURCES AND HEALTH EFFECTS OF INDOOR POLLUTION**

According to U.S. Environmental Protection Agency and Consumer Product Safety Commissions report the principal sources of indoor air pollution are: Combustion, synthetic building material and furniture, bio-aerosols and life style materials. While radon, asbestos, pesticides, heavy metals, volatile organic matter, and environmental tobacco smoke are considered major indoor pollutants in developed countries.

Modern homes and offices are frequently more airtight than older structures to improve energy efficiency. Furthermore, advances in construction technology have caused a much greater use of synthetic building materials.

Common health hazards related to above all pollutants are Eye, nose, and throat irritation, headaches, fatigue, impaired lung function and respiratory function, bronchitis, lung cancer, kidney damage, damage to central nervous system etc.

Various studies in India have reported harmful effects of indoor air pollution. The Energy and Resources Institute (TERI) in a recent study said that 27.5 % of under-five infant mortality in India is because of indoor air pollution. Another study said that about 80 % of women in India are affected by indoor air pollution. (9)

Rise in air pollution has direct co-relation with death. The ICMR study in Chennai on around 1,200 people showed an increase of 0.3 % to 0.6 % in mortality with rise in particulate matter pollution by  $10 \mu\text{g}/\text{m}^3$ .

The indoor air pollutants have potential health effects. The most affected groups are women and younger children, as they spend maximum time at home. The harmful health effects of formaldehyde range from being an acute irritant, reducing vital capacity, causing bronchitis, to being a carcinogen causing leukemia and lung cancer. (10) The use of fuel other than LPG was significantly associated with acute lower respiratory tract infection even after adjusting for other risk factors. In children with acute lower respiratory infection, 24.8% had pneumonia, 45.5% had severe pneumonia, and 29.7% had very severe disease. (11)

Particles with diameters below 10 microns (PM10), and particularly those less than 2.5 microns in diameter (PM2.5), can penetrate deeply into the lungs and appear to have the greatest potential for damaging health (12).

### **CONTROL MEASURES**

The Central Pollution Control Board, and public health research body, ICMR wanted the planning commission to agree for national indoor air pollution norms during the 12th five year plan.(1)Steps

have been taken by the government to curb indoor pollution., the National Biomass Cookstove Initiative (NBCI) of the Central government, which is now being implemented under the 'Unnat Chulha Abhiyan' targeted dissemination of 27.5 lakh improved cook stoves/chulhas in the remainder of the 12th Five Year Plan period.

#### **Universalisation of access to electricity-**

The present government is implementing its vision of 'Power to All' under the Deendayal Upadhyaya Gram Jyoti Yojana, Public awareness about the issue and the serious threat it poses to their health and wellbeing , Increase and adequate ventilation , Existing sources of pollution such as leaded paint and asbestos insulation may either be removed or encapsulated, Dehumidification to limit the growth of such bacteria, Indoor plants may be effective at removing some VOCs , use of exhaust fans, Seal cracks and openings in the basement, Environmentally Sustainable Designs for the commercial and residential heating, ventilation and air-conditioning (HVAC) industry, Use nonchemical if possible can be effective measures .

#### **CONCLUSION**

Indoor air pollution is a major global public health threat requiring greatly increased efforts in the areas of research and policy-making in developing countries as well as in developed countries as it is associated with increased morbidity and mortality. The education should help people in finding different ways of reducing exposures and the use of alternative cleaner sources of energy and increase their awareness about health effects of indoor air pollution. The guidelines are targeted at the public health professionals involved in preventing health risks of environmental exposures, as well as the specialists and authorities involved in the design and use of buildings, indoor materials and products.

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