

Indoor Air Quality and Health Hazards of Rural Women



Management

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ABSTRACT

Air Quality is generally described as a combination of the physical & chemical that make air a healthful resource for man, animals & plants. It enables man to continue his domestic, social, industrial & recreational activities. The physical & chemical characteristic of air is constantly changing. Natural forces are responsible for physical changes, while chemical changes are caused mainly by the human activities. Indoor air quality (IAQ) is a term which refers to the air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants. Indoor air quality can be affected by gases (including carbonmonoxide, radon,volatile), particulates, microbial contaminants(mold, bacteria), or any mass or energy stressor that can induce adverse health conditions. Rural women spend the majority of their time indoors, where they face significant health risks due to repeated exposure to air pollutants in their homes. Exposure to these pollutants can lead to numerous immediate and long-term health problems.

In rural areas of India, the most important indoor air pollutants are combustion products of unprocessed solid biomass fuels used by the poor rural folk for domestic cooking. Approximately half of the world's population and up to 90% of rural households in developing countries still rely on unprocessed biomass fuels such as wood, dung and crop residues (Bruce et al., 2000). A recent report of the world Health Organization (WHO, 2005) asserts the rule of 1000 which states that a pollutant released indoors is one thousand times more likely to reach peoples lung than a pollutant released outdoors. It has been estimated that about half a million women and children die each year from indoor air pollution in India (Smith et al., 2000).

The major responsibilities of farm women are to cook for the family. They use conventional source of energy such as wood and coal in their kitchen. About 97 % of the energy used in rural kitchens is generated by cow-dung, coal, woods and crop residues, oil and natural gas, they all are fossil fuel. The by-product of burning of wood and coal are nothing but poisonous gases such as CO, CH₄, SO₂, NOx etc. The kind, quality and concentration of these pollutants depend on the type of fuel being used. For eg., the smoke coming out from smoke chulhas in rural kitchen contains these poisonous gases making it unfit for breathing. Indoor air pollution is becoming a great health risk, particularly true in case of rural women as she spent a considerable amount of time in kitchens. Kitchens are probably the most high risk area in most rural homes. A pollutants released indoor is a thousand times more likely to reach the lung than a pollutants released outdoors. A rural women who spend 1/3rd of her life span in unventilated/poor ventilated kitchen in cooking food for family members and constantly inhale poisonous gases. All such gases injurious to her health.

The prime factors affecting human health are:

1. Nature of the pollutants
2. Concentration of the pollutants
3. Duration of exposure
4. Stage of health of the receptor
5. Age group of the receptor

Sources of Indoor pollutants:

Sources of indoor air pollutants can originate within any relatively enclosed structure (for example, a single family dwelling); of course, problematic pollutants can be drawn indoors from outdoor sources. Since indoor air is recycled over and over, it can trap and accumulate pollutants. Ill effects may arise after just a single exposure as well as repeated exposure, and can run the range from irritation of the eyes, nose, and throat, to headaches, dizziness, and fatigue (Mann et al., 2004). These effects

are usually short-term and treatable—sometimes simply eliminating the exposure to the source of the pollution is treatment enough.

Major sources of indoor air pollutants

| Indoor pollutant | Major sources |
|--|---|
| Carbon monoxide | Fuel combustion |
| Fine particles | Fuel combustion, cleaning, fumes from cooking oil |
| Nitrogen oxides | Fuel combustion |
| Sulfur oxides | Coal combustion |
| Arsenic and fluorine | Coal combustion |
| Volatile and semi-volatile organic compounds | Fuel combustion, fumes from cooking, |

Health hazard faced by rural women:

Women play a significant role in household activities. The major health effects among women due to air pollution indoors in kitchen. In recent years a large number of studies of health impact of suspended particulate air pollution have been undertaken in developing countries (Khandpal et al., 1995). Studies have shown that long time exposure to biomass combustion results in chronic obstructive lung diseases, heart diseases, acute respiratory infections, low birth weight, eye disorder, conjunctivitis, blindness and cancer. Specifically, children carried on their mothers' back as they cook using smoky stoves contracted pneumococcal infections 2.5 times higher than non-exposed one (Gupta 1998). Several studies found strong links between chronic lung diseases in women and exposure to smoke from open cook stoves due to high concentration of

NO₂ and SO₂.





The occurrence of respiratory and pulmonary diseases is the most common outcome of the indoor air pollutants. Women in rural areas of developing countries are exposed often to high levels of pollutants from biomass combustion that is associated with a range of respiratory symptoms. It has been estimated that more than half world's households cook their food on the unprocessed solid fuels that typically release at least 50 times more noxious pollutants than gas (Smith 2003).

In particular, the new data reveal related to indoor air pollution exposure and cardiovascular diseases, such as strokes and ischaemic heart disease, as well as between air pollution and cancer. This is in addition to air pollution's role in the development of respiratory diseases, including acute respiratory infections and chronic obstructive pulmonary diseases.

Cleaning up the air we breathe prevents noncommunicable diseases as well as reduces disease risks among women and vulnerable groups, including children and the elderly," says Dr Flavia Bustreo, WHO Assistant Director-General Family, Women and Children's Health. "Poor women and children pay a heavy price from indoor air pollution since they spend more time at home breathing in smoke and soot from leaky coal and wood cook stoves."

Indoor air pollution-caused deaths – breakdown by disease:

- 34% - stroke;
- 26% - ischaemic heart disease;
- 22% - COPD;
- 12% - acute lower respiratory infections in children; and
- 6% - lung cancer.

The new estimates are based on the latest WHO mortality data from 2012 as well as evidence of health risks from air pollution exposures.

Another set of health problems associated with to health hazards of rural women:

1. Eye irritation
2. Nose and throat irritation
3. Irritation of the respiratory tract
4. Gases like hydrogen sulphide, ammonia and mercaptans cause odour nuisance even at low concentrations.
5. Increase in mortality rate and morbidity rate.
6. A variety of particulates particularly pollens, initiate asthmatic attacks.
7. Chronic pulmonary disease like bronchitis and asthma are aggravated by a high concentration of SO₂ and NO₂ particulate matter.
8. Carbon monoxide combines with hemoglobin in blood and

consequently increases stress on those suffering from cardiovascular and pulmonary diseases.

9. Hydrogen fluoride causes disease of the bone.
10. Carcinogenic agents cause cancer.
11. Dust particles cause respiratory diseases. Diseases like silicosis, asbestosis, etc. result from specific dusts.

Remedies for Preventing Indoor Air Pollution

Basic approaches to eliminate indoor air pollution include:

- source control (a preventive technique; for example, banning smoking in public areas) and source isolation (when source cannot be removed; for instance, separate venting of bathrooms); and
- **Educating the public:** Public education is valuable in preventing illnesses resulting from combustion of biomass fuels to ensure awareness of the long-term health effects of indoor air pollution. Also, awareness campaigns should be organized in schools and villages so that the most vulnerable populations (that is, the elderly, women and children) can be targeted.
- **Choice of fuel:** The choice of fuel for domestic energy can be associated with such factors as availability of fuel, affordability and habit of the user. Around 50% of people in developing nations rely on coal and biomass for energy requirements.
- **Cooking stove:** Incomplete combustion due to inadequate design of the stove leads to enormous emissions. Efforts should be made to modify stove designs to make them fuel efficient and provide them with a ventilation mechanism (e.g. chimney) to remove pollutants from the indoor environment.
- **Ventilation:** Ventilation ensures mixing of the outside air with indoor environment to reduce accumulation of indoor pollutants.
- **Elimination of the sources of microbial contaminants:** Regular clean-up and repair of all areas where water leakage has occurred including floors, roofs and drains helps to ensure removal of microbial habitats. Feathered pets should be restricted to less occupied parts of the home. Washing cats and dogs can reduce allergen levels for a few days.

Conclusions:

Indoor air pollution caused by burning traditional fuels such as dung, wood and crop residues causes considerable damage to the health of particularly women and children(Gokani et al.,2000).

Finally, there is enough evidence to accept that indoor air pollution in India is responsible for a high degree of morbidity and mortality warranting immediate steps for intervention(Bruce et al.,2005). The first and the most important step in the prevention of illnesses resulting from the use of biomass fuels is to educate the public, administrators and politicians to ensure their commitment for the improvement of public health. There is utmost requirement to collect better and systematic information about actual exposure levels experienced by households in different districts and climatic zones and develop a model for predicting the exposure levels based on fuel use and other household data therein (exposure atlas) to protect the health of children, women and elderly persons.

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