

## **Solid biomass fuel: Indoor air pollution and health effects**

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Indoor air pollution in developing world from biomass smoke is considered to be a significant source of public health hazard, particularly to the poor and vulnerable women and children. About 50 % of the world's population is estimated to use solid bio-fuels like animal dung, crop residues, wood and coal for cooking daily meals and heating homes. Exposure from bio-mass smoke is estimated to cause a global death toll of 2.5 million every year equivalent to 4 to 5 % of total global deaths. In fact, the emerging data from recent studies indicate that risk-wise, it ranks only below malnutrition and poor quality of water / sanitation. However, health hazards of housewives have been traditionally underestimated in the developing countries. It is considered as a social responsibility of the women. The work of housewives can be categorised as hazardous occupation as they might be exposed to volatile organic compounds and polycyclic aromatic hydrocarbons everyday. There are evidences that indoor air pollution may increase the risk of respiratory tract infections and lung cancer among housewives.

The census 2001 report In Nepal shows that 80 % of households depend upon solid bio-fuels for domestic uses. Total death from pneumonia alone is reported to be 4429 during the last 12 months preceding 2001 census (4.14 % of the total deaths). Similarly, the total deaths from asthma / bronchitis are reported to be 7170 (6.71% of the total deaths). According to Nepal Demography and Health survey, 2001, the prevalence of Acute Respiratory Infection for children below 5 years old is found to be 23 %. The below 5 years population is 12.1 % of the total population. A national level study done in Nepal showed that indoor air pollution was found to be the highest in kitchens having traditional clay stoves and using solid biomass fuels (PM10 level 2418  $\mu\text{g}/\text{m}^3$ ) compared to kitchens using cleaner fuels (PM10 level 792  $\mu\text{g}/\text{m}^3$ ). The kitchens using improved stoves (traditional clay stoves constructed with some changes in geometrics with vents) and biogas fuel looked cleaner compared to those using traditional ones. The health responses recorded for all the respondents exposed to various levels of indoor air pollution during cooking time seemed to support fully with the state of exposure conditions to which each group of individuals is subjected. Statistically significant Odds Ratio with 95% confidence interval

was detected for chronic respiratory diseases among the biomass fuel users. Similarly, high prevalence of acute respiratory infection among children was associated with the use of unprocessed biomass fuels. The principal pollutant, smoke particulate originates from partly combusted biomass. The ensuing smoke exposure conditions are unacceptable by any human standards and therefore, severe health effect attributable to indoor kitchen air seems indisputable.

A wide range of interventions are available to reduce indoor air pollution, for instance, changes in energy technology, such as, switching from bio-mass fuels to cleaner fuels like kerosene, liquid petroleum gas, biogas, solar energy; improving the design and construction of locally made traditional stoves by the use of chimney, fume hoods; and changes in the living environment such as, improving the state of kitchen ventilation and raising awareness among the local people about the seriousness of the kitchen air pollution and building up participatory approach in the efforts made to reduce indoor air pollution. Electricity as a source of cooking fuel may not be an good option considering its unavailability and cost factors.

Good quality housing is a key element for healthy living. Poor housing can lead to many health problems, and is associated with various infectious diseases, stress and depression. Followings are the recommendations for the improvement of housing as well as indoor air quality in our settings:

The concept of kitchen as an independent unit of the house is not in existence in Nepal. The separate unit for kitchen with the standard dimension based on fuel use should be recommended in practice.

The awareness on health effects of indoor air pollution is lacking. So awareness-raising activities on effect of indoor air pollution on human health must be promoted.

Use of environment friendly fuel must be promoted and considered as the best alternative for reducing indoor air pollution in houses.

Adequate home ventilation is important. Ventilation may be improved by constructing houses with

sufficient number of windows particularly in cooking areas. Houses can be constructed using bricks with holes drilled through them (air bricks), which allows fresh air to circulate within the house. Ventilation in kitchen and other rooms can also be improved by incorporating mechanical devices like exhaust fans.

#### **Reference**

1. Shrestha IL, Joshi SK, Devkota S et al. Situation Analysis of Indoor Air Pollution and Development of Guidelines for Indoor Air Quality Assessment and House Building for Health. WHO / Nepal Health Research Council, July 2004