



Role of Socio-Economic Parameters in the Mitigation of Indoor Carbonaceous Aerosols in a Rural Village of India

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Solid Biomass Fuel (SBF) burning is majorly responsible for the indoor air pollution and high disease burden in rural areas of India. This study has made an effort to find out the association of carbonaceous aerosol (CA) emissions with the socio-economic factors in the households of a rural village, Baggi in Himachal Pradesh, India. Also, the emissions of Organic Carbon (OC) and Elemental Carbon (EC) were evaluated for different types and combination of fuel combustion for cooking and heating purposes. Enhanced average concentrations of OC ($240 \mu\text{g}/\text{m}^3$) and EC ($118.4 \mu\text{g}/\text{m}^3$) were found with sole biomass burning (wood) on the Chullah (traditional low-budget cookstoves) due to inefficient and incomplete combustion. Although, a stark reduction of 53% in OC and 41% in EC was noticed when a combination of biomass and Liquefied Petroleum Fuel (LPG) was used for cooking. With LPG, the concentrations of OC and EC significantly declined to as low as $38.1 \mu\text{g}/\text{m}^3$ and $31.6 \mu\text{g}/\text{m}^3$ respectively. Also, an excellent inter-relationship was identified between the socio-economic parameters such as the kitchen's ventilation, education, financial status, etc. and CA emissions. In the house with very good ventilation (2 wide windows), the total CA emissions were as low as $86.7 \mu\text{g}/\text{m}^3$. Also, the family members were educated and financially affluent. On the other hand, the total CA emissions were escalated by a significant 75.9% where the ventilation facility was extremely poor (small window and slit in the roof), the family was limitedly educated, and financial status lied below poverty line. On an average, the women in this village were found to spend 5 hours per day in the kitchen area. The socio-economic parameters are necessarily important towards the mitigation indoor air pollution and hence carbonaceous aerosols.