

A Study of Impact of Changing Fuel Practices on Organic Carbon and Elemental Carbon Levels in Indoor Air in Two States of India

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Abstract : India is a rural major country and majority of rural population is dependent on burning of biomass as fuel for domestic cooking on traditional stoves (Chullahs) and heating purposes. This results into indoor air pollution and ultimately affects health of the residents. Still, a very small fraction of rural population has been benefitted by the facilities of Liquefied Petroleum Gas (LPG) cylinders. Different regions of country follow different methods and use different type of biomass for cooking. So in order to study the differences in cooking practices and resulting indoor air pollution, this study was carried out in two rural areas of India viz. Budhwada, Madhya Pradesh and Baggi, Himachal Pradesh. Both the regions have significant differences in terms of topography, culture and daily practices. Budhwada lies in plain area and Baggi belongs to hilly terrain. The study of carbonaceous aerosols was carried out in four different houses of each village. The residents were asked to bring slight change in their practices by cooking only with biomass (BB) then with a mix of biomass and LPG (BL) and then finally only with LPG (LP). It was found that in BB, average values of organic carbon (OC) and elemental carbon (EC) were 28% and 44% lower in Budhwada than in Baggi whereas a reverse trend was found where OC and EC was respectively more by 56% and 26% with BL and by 54% and 29% with LP in Budhwada than in Baggi. Although, a significant reduction was found both in Budhwada (OC by 49% and EC by 34%) as well as in Baggi (OC by 84% and EC by 73%) when cooking was shifted from BB to LP. The OC/EC ratio was much higher for Budhwada (BB=9.9; BL=2.5; LP=6.1) than for Baggi (BB=1.7; BL=1.6; LP=1.3). The correlation in OC and EC was found to be excellent in Baggi ($r^2=0.93$) and relatively poor in Budhwada ($r^2=0.65$). A questionnaire filled by the residents suggested that they agree to the health benefits of using LPG over biomass burning but the challenges of supply of LPG and changing the prevailing tradition of cooking on Chullah are making it difficult for them to make this shift.

Keywords : biomass burning, elemental carbon, liquefied petroleum gas, organic carbon

Conference Title : ICACPNA 2019 : International Conference on Atmospheric Chemistry, Physics, Nucleation and Aerosols

Conference Location : Sydney, Australia

Conference Dates : January 30-31, 2019