EDITORIAL

Use of solid fuel and Chronic Obstructive Pulmonary Disease (COPD)

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In Pakistan 72 percent population is using solid fuel for cooking and heating. Annually 51760 Acute Lower Respiratory Infections (ALRI) in the age group below 5 years of age and 18980 COPD deaths in > 30 years old and 2,057,400 Disability-Adjusted Life Year (DALYS) loss can be attributed to the toxic effects of inefficient burning of solid fuel. The deaths and DALYs loss amounts to 4.6 percentage of national burden of disease¹.

Chronic Obstructive Pulmonary Disease (COPD) is a preventable and treatable disease. It is not fully reversible and usually a progressive Disease². COPD is associated with significant mortality and morbidity. The proportion of deaths due to non-communicable disease is projected to rise from 59% in 2002 to 69% and COPD will be the 4th commonest cause of death, moving up from its present 5th position, worldwide by 2030³. The increase in COPD related morbidity and mortality is linked to the persistent risk factors such as cigarette smoke, occupational dust and chemicals, environmental tobacco smoke, poor socio-economic status, childhood respiratory tract infections (RTIs), aging population and indoor and out door pollution ². In 2000, indoor air pollution was responsible for more than 1.5 million deaths and 2.7% of the global burden of disease. Indoor air pollution disproportionately affects women and children who spend the most time near the domestic hearth⁴,⁵.

Worldwide, more than three billion people depend on solid fuels, including biomass (wood, dung and crop residues) and coal, for cooking and heating and it has emerged as one of the ten most important threats to public health⁶. The inefficient burning of solid fuels on an open fire or traditional stove indoors creates a dangerous cocktail of hundreds of pollutants, primarily carbon monoxide and small particles, but also nitrogen oxides, benzene, butadiene, formaldehyde, polyaromatic hydrocarbons and many other health-damaging chemicals. Where coal is used, additional contaminants such as sulfur, arsenic and fluorine may also be present in the air⁷. Typical 24-hour levels of PM10 in biomass-using homes in Africa, Asia or Latin America range from 300 to 3000 micrograms per cubic meter (μg/m3). Peaks during cooking may be as high as 10,000 μg/m3 compared to the United States Environmental Protection Agency standard for annual mean PM10 levels in outdoor air of 50 μg/m3⁸.

Exposure to indoor air pollution from solid fuels has been linked to many different diseases. Animal toxicology studies show that wood smoke exposure can disrupt cellular membranes, depress macrophage activity, destroy ciliated
and secretory respiratory epithelial cells and cause aberrations in biochemical enzyme levels\textsuperscript{9}. Lab rats exposed to 750ug/m\textsuperscript{3} wood smoke concentration experienced an immediate 25\% reduction in pulmonary bacterial clearance. Certain lung functions were reduced by 23\% and 61\% after 1.5 and 2.5 hours respectively\textsuperscript{10}. A recent review concluded that there is strong evidence for indoor air pollution as a cause of pneumonia and other acute lower respiratory infections (ALRI) among children under five years of age\textsuperscript{11,12}.

With regards to wood smoke and COPD, there are a few studies from different countries. A medical evaluation of Mexican women who regularly cook over open wood fires revealed ravaged lungs and pulmonary arterial hypertension, more severe than tobacco-related chronic obstructed pulmonary disease\textsuperscript{13}. The study from Spain demonstrated for the first time that wood smoke may be an underestimated risk factor for COPD. Using case–control methodology, the investigators were able to demonstrate wood or charcoal smoke not only to be associated with COPD after compensating for smoking, but the data also suggested a dose response pattern. The strongest association was found after exposure to a combination of pollution from wood and charcoal combustion which more or less tripled the odds ratio from those of the individual components up to 4.5\textsuperscript{14,15}. Globally, it was estimated that 42\% (37—47\%) of the COPD disease burden could be attributed to the environment\textsuperscript{16}.

A wide range of interventions are available to reduce indoor air pollution and associated health effects. Interventions can be classified according to the level at which they are effective: a) Interventions on the source of pollution by switching from solid fuels (biomass, coal) to cleaner and more efficient fuels and energy technologies such as: liquid petroleum gas (LPG), biogas, producer gas, electricity and solar power; b) Interventions to the living environment in poor rural communities such as improved stoves, improved ventilation of the cooking and living area through chimneys, smoke hoods (with flues), enlarged and repositioned windows (cooking window) can lead to lower emission\textsuperscript{17}; c) Changes in user behavior through health education can also play a role in reducing pollution and exposure levels\textsuperscript{18}.

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