EFFECTS OF INDOOR AIR POLLUTION ON CHILDREN UNDER 5

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Abstract

Indoor air pollution due to solid fuel combustion is a major health hazard. The most vulnerable populations are at the extremes of age - children and elderly. Objective of the research is to assess the effect of solid fuel combustion on childhood respiratory health, physical growth and development.

A prospective study was conducted in a mixed population. The study included 240 children under 5. Physical growth was assessed by measuring anthropometric indices based on the World Health Organization (WHO) guidelines and standards. Development was assessed using the Denver Development Screening Test. Exposure levels were defined according to the main type of fuel used for cooking at home: children residing in households using biomass fuel or kerosene as the main cooking fuel were classified as the "high exposure" group and children resident in households using liquefied petroleum gas (LPG) or electricity for cooking were classified as the "low exposure" group. Air quality levels of $PM_{2.5}$, CO and CO_2 were measured in a subsample of households.

Sixty percent of the children were classified as from the "high" exposure group and 40% as from the "low" exposure group; 54% of the children were male. Houses which used biomass fuel had significantly higher concentrations of CO (3.27 vs 1.49) and $PM_{2.5}$ (1.14 vs 0.31) as compared to houses using LPG and electricity for cooking but not CO_2 concentrations. The incidence of infection induced asthma (RR=1.77, 95% CI; 1.098 – 2.949) was significantly higher among children of the high exposure group than among children in the low exposure group, after adjusting for confounders. Children from the "high" exposure group had significantly lower mean z-scores for weight-for-height (-0.998 vs -0.636, p=0.047), height-for-age (-0.640 vs 0.008, p=0.004) and weight-for-age (-1.320 vs -0.435, p=0.001) as compared to children from the "low" exposure group

after adjusting for confounders. The high exposure group had a significantly higher number of suspects in the domains of language development (OR = 2.34, 95% CI – 1.32-4.13), social behavior and play (OR = 1.86, 95% CI – 1.09-3.16), and gross motor (OR = 2.50, 95% CI – 1.28-4.89) domains, compared to children of the low exposure group.

Indoor air pollution due to solid fuel combustion is a significant but modifiable risk factor for respiratory infections, poor growth and development of children in the early years of life.

Keywords: Indoor air pollution, solid fuel combustion, Respiratory Infections