

CROSS-SECTIONAL ANALYSIS OF THE ASSOCIATION BETWEEN PERSONAL EXPOSURE TO HOUSEHOLD AIR POLLUTION AND BLOOD PRESSURE IN ADULT WOMEN: EVIDENCE FROM THE MULTI-COUNTRY HOUSEHOLD AIR POLLUTION INTERVENTION NETWORK (HAPIN) TRIAL

ABSTRACT

Elevated blood pressure (BP) is a leading risk factor for the global burden of disease. Household air pollution (HAP), resulting from the burning of biomass fuels, may be an important cause of elevated BP in resource-poor communities. We examined the exposure-response relationship of personal exposures to HAP—fine particulate matter (PM_{2.5}), carbon monoxide (CO), and black carbon (BC)—with BP measures in women aged 40–79 years across four resource-poor settings in Guatemala, Peru, India and Rwanda. BP was obtained within a day of 24-h personal exposure measurements at baseline, when participants were using biomass for cooking. We used generalized additive models to characterize the shape of the association between BP and HAP, accounting for the interaction of personal exposures and age and adjusting for a priori identified confounders. A total of 418 women (mean age 52.2 ± 7.9 years) were included in this analysis. The interquartile range of exposures to PM_{2.5} was 42.9–139.5 µg/m³, BC was 6.4–16.1 µg/m³, and CO was 0.5–2.9 ppm. Both SBP and PP were positively associated with PM_{2.5} exposure in older aged women, achieving statistical significance around 60 years of age. The exact threshold varied by BP measure and PM_{2.5} exposures being compared. For example, SBP of women aged 65 years was on average 10.8 mm Hg (95% CI 1.0–20.6) higher at 232 µg/m³ of PM_{2.5} exposure (90th percentile) when compared to that of women of the same age with personal exposures of 10 µg/m³. PP in women aged 65 years was higher for exposures ≥90 µg/m³, with mean differences of 6.1 mm Hg (95% CI 1.8–10.5) and 9.2 mm Hg (95% CI 3.3–15.1) at 139 (75th percentile) and 232 µg/m³ (90th percentile) respectively, when compared to that of women of the same age with PM_{2.5} exposures of 10 µg/m³. Our findings suggest that reducing HAP exposures may help to reduce BP, particularly among older women.

Keywords:

Blood pressure, Household air pollution, Cardiovascular diseases, Low- and middle-income countries

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