

EFFECTIVENESS OF INTERVENTIONS IN IMPROVING INDOOR AND OUTDOOR AIR QUALITY: PRELIMINARY RESULTS FROM A RANDOMIZED TRIAL OF WOODSMOKE AND ASTHMA

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Background and Aims: We are conducting a randomized trial to examine the impact of simple interventions on woodsmoke-derived PM_{2.5} and symptoms in children with asthma. Pre- and post-intervention indoor and outdoor air sampling results from the Nez Perce reservation in Idaho and 2 western Montana communities are presented here.

Methods: Participating homes were randomized to receive a new EPA-certified woodstove, a stand-alone filtration unit or a filtration unit with a placebo filter. Indoor and outdoor sampling was conducted in 35 homes during the winters of 2008-11. Air sampling included pre- and post-intervention 48-hour continuous monitoring of PM_{2.5} mass in the common area and outside the home using DustTrak aerosol monitors (TSI).

Results: Overall mean(SD) indoor pre- and post-intervention PM_{2.5} concentrations were 46.8(40.4) and 27.9(21.6) µg/m³, respectively. Homes receiving the active filter intervention demonstrated a significantly greater percent reduction in indoor PM_{2.5} concentrations [60.0; 95% CI: 24.4, 95.7] relative to placebo homes, whereas homes receiving woodstoves saw only small, highly variable reductions [3.6; 95% CI: -30.4, 37.6]. Overall mean(SD) outdoor pre- and post-intervention PM_{2.5} concentrations were 41.4(24.9) and 35.5(21.1) µg/m³, respectively. Although modest reductions in mean outdoor PM_{2.5} [4.9(24.6) µg/m³] were observed post-intervention in woodstove homes, reductions did not vary significantly by intervention status.

Conclusions: Results from the first 3 study communities with pre- and post-intervention data indicate high effectiveness of active filtration units in improving indoor air quality. Further precision in estimates is anticipated with the addition of newly recruited homes in Montana and Alaska. Surprisingly, relative to placebo, the woodstove intervention had no significant overall impact on PM_{2.5} concentrations measured outside the home. Future work will evaluate ambient and meteorological data and home characteristics in examining intervention effectiveness in improving outdoor air quality.