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| Title: | Replacing the greater evil: Can legalizing decentralized waste burning in improved devices reduce waste burning emissions for improved air quality? |
| Authors: | Chaudhary, Pooja (/jspui/browse?type=author&value=Chaudhary%2C+Pooja) Singh, Raj (/jspui/browse?type=author&value=Singh%2C+Raj) Shabin, Muhammed (/jspui/browse?type=author&value=Shabin%2C+Muhammed) Sharma, Anita (/jspui/browse?type=author&value=Sharma%2C+Anita) Bhatt, Sachin (/jspui/browse?type=author&value=Bhatt%2C+Sachin) Sinha, Vinayak (/jspui/browse?type=author&value=Sinha%2C+Vinayak) Sinha, Baerbel (/jspui/browse?type=author&value=Sinha%2C+Baerbel) |
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| Abstract: | <p>Open waste burning emissions constitute a significant source of air pollution affecting human health in India. In regions where cleaner fuels have displaced solid biofuel usage, open waste burning is rapidly becoming one of the largest sources of airborne human class-I-carcinogens and particulate matter. As the establishment of waste management infrastructure in rural India is likely to take years, we explore whether health-relevant emissions can be reduced by legalizing the burning of dry non-biodegradable waste in improved devices. We measure the emission factors of 76 VOCs, CH₄, CO, and CO₂ from different types of waste burned in two different improved devices, a burn basket and a local water heater. Based on our experiments, we create four "what-if" intervention scenarios to assess the improvement of air quality due to the emission reductions that can be accomplished by four management strategies. We find that substituting the traditional, more polluting water heating fuels with dry plastic waste across rural India can reduce primary emissions (e.g., -29 Ggy⁻¹ for benzene) and ozone formation potential (-2960 Ggy⁻¹) from open waste burning. When dry waste is used in lieu of more polluting fuels, and its burning serves a purpose, the net class-I-carcinogen benzene emissions, would be halved compared to the present. The change in emissions for the class-I carcinogen 1,3-butadiene would become net negative. This happens because the emissions avoided when part of the solid biofuel currently used in rural India is replaced by plastic waste (4.1 (1.2–4.1) Ggy⁻¹) exceed the waste burning emissions of this compound (3 (1.2–3.7) Ggy⁻¹) by so much, that residential sector emission reductions offset all waste burning emissions including those of landfill fires. Our study demonstrates that India's air quality can be improved by permitting and promoting the use of dry packaging waste in lieu of traditional biofuels and by promoting improved burning devices.</p> |
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