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### Top-down estimation of emissions from open waste burning in Nepal

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Haphazard, open burning of municipal solid waste (MSW) is one of the most toxic sources of air pollution and is of growing concern in cities across South Asia. Recently, it was implicated as a major cause for soiling the Taj Mahal and impairing the health for Agra residents. Whereas a bottom-up approach for MSW burning estimation was successful in Delhi and Agra, similar methods have proven challenging in Nepal for a variety of reasons. Although the robust estimates of the MSW generation rate in Nepal have been documented by various studies, yet emission estimates from MSW burning remain highly uncertain. In this study, we attempt to calculate a top-down estimate of MSW burning in Nepal by obtaining best estimates for the amounts of MSW that are recycled, landfilled, and dumped illegally, and then calculating the burned MSW mass by difference. After multiplying the derived MSW burning rate by emission factors obtained from local (Nepal ambient monitoring and source testing experiment), regional and global, we obtain the most robust estimates of national emissions from MSW open burning for the base year 2011 and projected its emissions between 2005 and 2016. Substantial emissions of PM<sub>2.5</sub> (6.3 Gg), CO (71.8 Gg), NMVOC (12.7 Gg), PM<sub>10</sub> (6.8 Gg), CH<sub>4</sub> (3.4 Gg), BC (2.8 Gg), OC (65.5 Gg), NO<sub>2</sub> (0.9 Gg), NO (1.3 Gg), SO<sub>2</sub> (0.4 Gg), CO<sub>2</sub> (1358 Gg), and NH<sub>3</sub> (0.6 Gg) are estimated from this unregulated sector during the 2011 calendar year. Open burning of MSW especially during the winter months when the mixing height is lowest could lead to acute and chronic respiratory disease, burning eyes, headaches, nausea, fatigue, dizziness and an allergic hypersensitivity if the dose is high enough.

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