1.192 A PROBABILISTIC APPROACH FOR ESTIMATING SOLID-FUEL BURNING EMISSIONS IN LOW-INCOME SETTLEMENTS A CASE IN KWADELA.

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Abstract:

Relevant emission estimates remain one of the biggest uncertainties in air quality assessment. Emissions from distributed sources, like those from solid fuel burning households, represents a particular challenge. The variability observed in low income areas presents a challenge to reduce to a single emission estimates for a particular population. Estimating emissions using a probabilistic approach accounts for fuel use and burning device operation variability. This generates results that better represent the real world situation and improves air quality modelling. The study presents a methodology that quantifies emissions with their associated uncertainties using field derived emission factors. KwaDela low income residential area will be used as a case study to estimate fine particulate matter emissions from domestic burning of solid fuels. A Monte Carlo simulation model will be used to estimate uncertainty in the total fine PM emissions estimate at 95 % confidence interval and to show their diurnal emission distribution profiles. High emissions were recorded in winter, owing to more burning events per household, a greater average amount of fuel used and a larger number of households burning compared to summer. Total PM emitted from domestic burning per winter day in kwaDela ranges between 33.7 kg to 70.1 kg, with an average of 51.4 kg and a standard deviation of ± 5.3 kg. Summer emissions range between 16.6 kg and 35.5 kg, with an average of 25.1 kg and a standard deviation of ± 2.5 kg. This study informs efforts to better quantify emissions in order to design and implement air quality improvement projects in South Africa.

Keywords: Monte Carlo simulation, Particulate matter emissions, Residential area, Uncertainty