A spatial analysis of indoor air pollution from biomass fuel use in Kenya

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(1) **Motivation**: Indoor air pollution has become a serious health and environmental issue in Kenya due to continued use of biomass fuel mainly firewood for cooking and lighting. The country lost 310kha of tree cover from 2001 to 2017, a 9.3% decrease since 2000 (Global Forest Watch) and 14, 300 deaths yearly due to indoor air pollution, with pneumonia as the biggest killer associated with air pollution (WHO, 2009). In this research, we try to estimate the gridded spatial distribution of PM$_{2.5}$ in Kenya.

(2) **Method**: The target area is Kenya. Using household sources of energy data and gridded population count data, we created a firewood usage map (Figure 1(b) and a gridded population count map (Figure 2). Due to inadequate data on indoor air pollution, we used a reference mean PM$_{2.5}$ of 0.126 (WHO, 2011). Finally, we estimated the gridded mean PM$_{2.5}$ emission using the product of reference mean, number of population in the mth grid and % firewood use.

(3) **Results**: Biomass use is more predominant in rural areas (95.6%) than in urban areas. Majority of households using biomass fuels are located in the northern and western parts of Kenya as shown in Figure 1(b). It is found that the population count is directly related to the concentration of PM$_{2.5}$ emission. Regions with a high population count (such as western and central) have a high concentration of PM$_{2.5}$ emission, while regions with low population count (northern part) have low emission (Figure 2 and Figure 3).


(5) **References**: Global Forest Watch, Tree Cover Loss in Kenya.