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Learning on the relationships between respiratory disease and the use of traditional stoves in Bangladesh households

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Learning on the relationships between respiratory disease and the use of traditional stoves in Bangladesh households

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Abstract: More than 4 million people die prematurely every year by diseases related to indoor air pollution produced by solid fuels used in cooking (WHO, 2016, Jones 1999), fifty thousand of them in Bangladesh (News Medical, 2012), being women and children the most affected. Risk of pneumonia is high due to the irritants, toxins and carcinogens released into air by the incomplete combustion of solid fuels (biomass) used in traditional stoves (WHO 2016), which produce PM10 (particulate matter, small enough ($\leq 10\mu\text{m}$) to get into lungs). An open data base from the World Bank (WHO, 2016) (Dasgupta et al 2006) describing a sample of households in Bangladesh, including socioeconomic characteristics, cooking habits and experimental measurements of PM10 is analyzed to a global understanding.

Results of APriori show that most data come from the Narayanganj region, with predominant use of a single mud stove. PCA helped to identify that high PM10 associates with [6am-11am] and [4pm-9pm] in families with less incomes, kitchens connected to living area and no ventilation and using more types of fuels in primary stove. Clustering elicits 4 profiles: i) urban areas with high income; gas stoves and lowest PM10 levels. ii) peri-urban areas, high incomes, 1 or 2 fuels and secondary stove (gas or kerosene based). iii) mud-traditional stove with 2 to 3 types of fuels, but they cook outdoors and have low PM10 emissions. iv) lowest incomes (4000 takas), no secondary stove and use 2 to 3 fuels; high PM10 values, stoves are changed only for health reasons; single class with a 5% of severe breathing problems. Understanding the patterns with higher risk of respiratory diseases or domestic incidents might help foster decision making elements supporting public policy making and/or the implementation of projects/plans aimed to increase the wellbeing in Bangladesh.

Keywords: preprocessing, data mining, postprocessing, indoor air pollution, Bangladesh, respiratory diseases

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