Title : Ambient PM2.5-bound Polycyclic Aromatic Hydrocarbons (PAHs) in Border Area of Nan Province, Thailand.

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Major : Environmental Science

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ABSTRACT

Fine particles smaller than 2.5 micrometers (PM2.5) are a significant air pollutant in Northern Thailand, particularly in border areas impacted by biomass burning activities. Polycyclic aromatic hydrocarbons (PAHs) are carcinogenic substances from incomplete combustion and often contaminate in Particulate matter 2.5 (PM2.5). This work aims to measure PM2.5 concentrations in different areas of Nan province. To determine PM2.5-bound PAHs and health risks assessment. PM2.5 samples for 24 hours were collected in Ban Nam Liang School (BN), Ban Kiew Chan School (BK), and Muang Li Kindergarten School (ML), Nan province, Thailand in 2024 during smoke haze season (SH) from March to April and non-smoke haze season (NSH) from November to December. 16-PAHs were analyzed by Gas Chromatography-Mass Spectrometry (GC-MS). PM2.5 samples during the SH season were higher than in NSH season in 2024. The average PM2.5 concentration during SH season in BN (76.54 $\mu g/m^3$) was higher than in ML (73.05 $\mu g/m^3$) and KN (72.45 $\mu g/m^3$). Total PAHs (tPAHs) in BN, ML and BK were 1.204 ng/m^3, 1.051 ng/m^3, 0.602 ng/m^3, respectively during SH. Additionally, carcinogenic PAHS (cPAHs) concentrations were higher than non-carcinogenic PAHS (ncPAHs). High concentration of cPAHs was found in BN 0.921 ng/m^3, while in ML was 0.839 ng/m^3 and in BK was 0.461 ng/m^3. Benzo[b]fluoranthene (BbF) and Indeno[1,2,3-cd]pyrene (IND) were found to be a dominant compound in Nan Province. These findings highlight the significant impact of biomass burning on air pollution and

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human health in Northern Thailand's border regions. Effective air quality management and community-based initiatives are urgently needed to address the risks associated with PM2.5 and its toxic components during the smoke haze season.

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