

Indoor/outdoor ratio and percent distribution behaviours of PAHs in Rome, Italy

P.Romagnoli ¹, C.Balducci ¹, M.Perilli¹, A.Cecinato ¹, M.Gherardi ², M.P.Gatto ²

¹Institute of Atmospheric Pollution Research, National Research Council, Monterotondo Stazione, Rome, 00015, Italy

²Department of Occupational Hygiene, Research Sector, INAIL Research (Italian Workers' Compensation Authority), Monte PorzioCatone, Rome, 00040, Italy

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Presenting author e-mail: romagnoli@iia.cnr.it

In the frame of the Life+ EXPAH project, PAHs were monitored to assess the exposition experienced by population to airborne toxicants. Measurements were carried out both indoors and outdoors at schools, homes and offices. Two weeks in-field campaigns were made from late November 2011 up to July 2012 in Rome.

Our concern was focused on carcinogenic/mutagenic PAHs (benz[a]anthracene BaA, benzo[b/j/k]fluoranthenes BbjfF, benzo[a]pyrene BaP, indeno[1,2,3-cd]pyrene IP, dibenz[a,h]anthracene DBA and benzo[ghi]perylene), as well as on perylene PE and benzo[e]pyrene BeP.

The method for PAHs monitoring in the airborne particulates was optimized for indoor environments using low-volume sampling and daily sample gathering (weekly frequency). Besides neat concentrations, attention was paid to two topics, namely:

- the indoor/outdoor concentration ratio; and
- the percent profile of PAH congeners investigated.

Indeed, pollution is not restricted to open air; on the contrary, air toxicants not only can move to indoors but also can be released by indigenous sources like heating, cooking, and tobacco smoking. The blend of sources can change dramatically and PAH composition is influenced by air reactivity. Thus, this study could provide suitable insights on source impact and nature.

Results

Table 1 shows the average indoor/outdoor concentration ratios observed at the target sites. They were <1.0 but higher than expected supposing outdoor sources as predominant. All ratios were higher in the warm season suggesting a lower impact of indigenous sources and/or reduced penetration of pollutants from outdoors. As for percent distribution, differences were observed site to site and with the season; e.g., the BbjfF/BkF ratio and the relative abundances of BPs and PE were highly influenced by year time (see Fig. 1).

Table 1. Average indoor/outdoor concentration ratios observed in this study (Rome, 2011-12)

	winter	summer
houses	0.64	0.79
offices	0.56	0.59
schools	0.72	0.84
<i>Mean value</i>	<i>0.64</i>	<i>0.74</i>

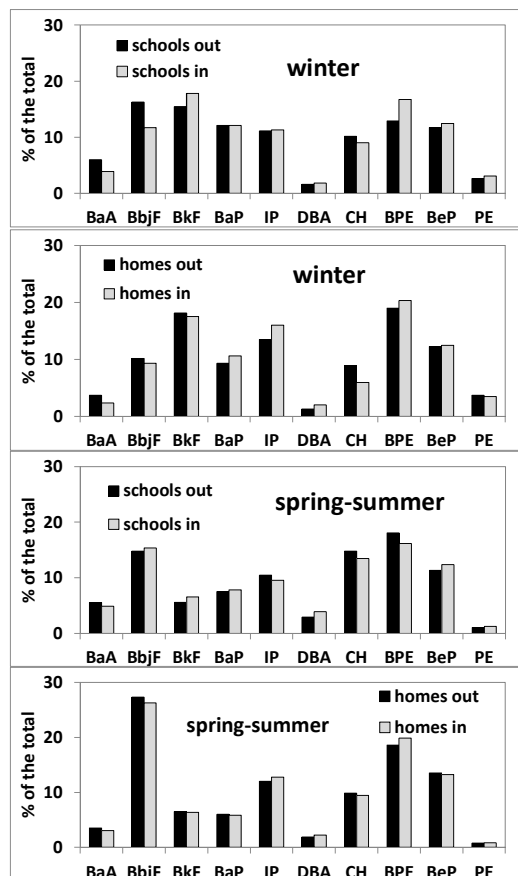


Figure 1. Indoor and outdoor PAH percentages.

Conclusions

The PAH indoor/outdoor concentration ratios and percent distributions in Rome change with site and year time, which modified the congener contribution to ambient toxicity.

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