EXPOSURE TO PARTICULATE MATTER IN FIRE STATIONS: PRELIMINARY RESULTS

K. Slezakova (1), F. Esteves (2, 3, 4, 5), B. Barros (6), J. Vaz (7), M. J. Alves (7), J. Madureira (2, 3, 4), S. Costa (2, 3, 4), M. Oliveira (6), A. Fernandes (8), J. P. Teixeira (2, 3, 4), S. Morais (6), M.C. Pereira (1)

(1) LEPABE, Faculdade de Engenharia da Universidade do Porto, Porto, Portugal, (2), Environmental Health Department, National Institute of Health, Porto, Portugal, (3) EPIUnit, Institute of Public Health, University of Porto, Porto, Portugal, (4) ITR, Porto, Portugal (5) Department of Public Health and Forensic Sciences, and Medical School, Faculty of Medicine, University of Porto, Porto, Portugal (6) REQUIMTE-LAQV, Instituto Superior de Engenharia do Instituto Politécnico do Porto, Porto, Portugal; (7) CIMO, Instituto Politécnico de Bragança, Bragança, Portugal, (8) UICISA: E, Politécnico de Bragança, Bragança, Portugal

slezakok@fe.up.pt

Firefighters are at increased risk for many types of health diseases (IARC, 2010). While most of the studies on this topic focus on exposures and their impacts due to the fire combats (Oliveira et al., 2017), firefighters spend large portions of their day-by-day shift within the fire stations, where they can be exposed to a variety of air pollutants, including particulate matter (PM), i.e., a known carcinogen. This work aimed to assess the levels of particulate matter (PM) at fire stations and to investigate the possible parameters that may influence the respective levels.

This study was conducted consecutively during 2 weeks in summer 2021 in the north of Portugal. Seven fire houses were included in this study, all of them located in rural areas of Bragança district. Sampling of different indoor (living rooms, rest areas, and etc.) and outdoor spaces was conducted concurrently in each station. Four different fractions, namely PM_1, $PM_{2.5}$, PM_4 and PM_{10} were continuously monitored by Dustrak™ Aerosol Monitor (model 8532, TSI Inc., Shoreview, USA) and by Lighthouse Handheld particle counter (model 3016 IAQ; Lighthouse Worldwide Solutions, Fremont, USA) using logging interval of 1 min.

Across all fire stations, indoor $PM_{2.5}$ and PM_{10} means ranged between 6.3 and 14.1 $\mu g/m^3$ (mean 8.7 $\mu g/m^3$) and from 7.5–16.1 $\mu g/m^3$ (10.5 $\mu g/m^3$), respectively. These results showed that indoor PM was well below the limits set by Portuguese legislation for public spaces (25 and 50 $\mu g/m^3$ for $PM_{2.5}$ and PM_{10}, respectively; Decreto-Lei 118/2013). Indoor $PM_{2.5}$ was mainly constituted of PM_1 (97%) but respirable ($PM_{2.5}$ and PM_4) fraction accounted for majority of indoor particles (82–88 %, respectively). Outdoor concentrations exhibited similar mean values (4.3 $\mu g/m^3$ for $PM_{2.5}$, 20.6 $\mu g/m^3$ for PM_{10}) but the individual means across all fire stations demonstrated different ranges: for $PM_{2.5}$ 2.3–7.7 $\mu g/m^3$ and 15.8–26.9 $\mu g/m^3$ for PM_{10}. Once again, the obtained levels fulfilled the existing guidelines for ambient air (Directive 2008/50/EC). Similarly to indoors, PM_1 constituted the large portion of $PM_{2.5}$ (up to 76%), but the contribution of coarse particles (*i.e.,* larger than 2.5 μm) in outdoor air was much larger than indoors (79% outdoors *vs.* 18–12% indoors), most likely resulting from resuspend dust.

The results of the study showed that human occupancy and the activities conducted indoors were the main indoor emission sources; ventilation was also associated with indoor PM. Whereas PM concentrations were relatively low, the chronic exposures, even in small quantities, require further assessment to determine the respective health risks. In addition, assessment of and co-exposure to other pollutants in these settings would be precious.

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