Children's exposure to indoor air: the case of the Childminders homes

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The majority of children's time is spent indoors i.e. at home or at school. In the last decades an increased number of parents choose their children to be taken care of by childminders in their homes, providing this way a more friendly, "home-like" and quite flexible environment for them. Scientific evidence has shown that exposure to indoor air pollution in schools and kindergartens can contribute to short and long-term health problems including asthma, allergic reactions and respiratory tract infections. Based on this evidence, the aim of this study was to investigate the children's exposure to indoor air, taking also into account the emerging need to assess the risk in this particular context: the childminders home environment.

The current study was conducted in eight licensed childminders listed in Ermesinde, Porto. The levels of CO_2 and CO, were measured as well as PM_{10}, air temperature and relative humidity. Indoor samplers were placed in representative locations according to technical note NT-SCE-02, 2009. Environmental parameters were collected in real time, using direct reading equipment. In order to analyse the perception of childminders about children symptoms a questionnaire was given following the instructions of the environmental questionnaire developed by the International Study of Asthma and Allergies in Childhood. The values of the monitored parameters were compared with Decree-Law No. 79/2006 of April 4th and Decree-Law No. 80/2006 of April 4th.

In each home, eight activity rooms and eight rest rooms were assessed. The results showed that the average CO_2 concentrations ranged between 851 mg/m^3 and 2597 mg/m^3 in activity rooms and between 1175 mg/m^3 and 3197 mg/m^3 in rest rooms. It was verified that 31 % of the evaluated spaces exceeded the reference value (1800 mg/m^3). In general, rest rooms had higher average CO_2 concentration which can be associated with insufficient ventilation rate. The average CO concentrations ranged between 3.0 mg/m^3 and 5.7 mg/m^3 in activity rooms where as in rest rooms the levels ranged between 3.0 mg/m^3 and 4.8 mg/m^3. These results were below the reference value (12.5 mg/m^3), suggesting the absence of internal sources of this agent. The PM_{10} concentrations obtained were also below the reference value (0.15 mg/m^3).

Results concerning air temperature revealed values between 16.7 °C and 25.2 °C in activity rooms and 19.0 °C to 25.7 °C in rest rooms. In this case, 63% of the evaluated spaces exceeded the reference value (20ºC). In terms of relative humidity, values varied between 51.4% and 70.9% in activity rooms and between 55.8% and 79.4% in rest rooms. All spaces exceeded the reference value (50%). Regarding the perceived symptoms, most of the childminders reported that the majority of children showed no symptoms related to respiratory diseases.

In conclusion, this preliminary survey provided useful data for both risk assessment and risk management related to children's exposure to indoor air pollution. Further studies with a larger number of participants and measurement of other important IAQ indicators as a presence of microorganisms and VOC concentration should be designed in the future.