# Biological air contamination in Elderly Care Centers – GERIA Project


## Authors

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Indoor Air Quality (IAQ) affects health particularly in susceptible individuals such as elderly. It has been estimated that older persons spend about 19-20 hours per day indoors and many of them spend all of their time indoors in Elderly Care Centers (ECCs). Older persons may be particularly at risk of detrimental effects from pollutants, even at low concentrations, due to their common and multiple underlying chronic diseases that increases their susceptibility. For residents of ECCs, IAQ is a special concern and a critical component of their health and quality of life.

This study aim to assess the impact of indoor biological agents in 17 ECCs located in Porto. It was conducted during summer and winter, from October 2011 to November 2012, at a total of 109 areas within dining rooms, drawing rooms, medical offices and bedrooms (including the bedridden). Outdoor air samples were also collected in order to compare with indoor results. Air sampling was carried out with a microbiological air sampler (Merck MAS-100) and using *Tryptic Soy Agar* for bacteria and *Malt Extract Agar* for fungi. NIOSH 0800 Method was followed. The results obtained were compared with the current Portuguese reference value of 500 CFU/$m^3$.

In the winter season median bacteria concentration exceeded the reference value in 3 ECCs, while fungi concentration was only above this value in 1 ECC. The main fungi species found indoors were *Cladosporium* spp. (76%) in summer and *Penicillum* spp. (47%) in winter. Outdoor, *Cladosporium* spp. had the prevalence both in summer (71%) and winter (65%). Analyzing by area, the median value of all studied areas are in agreement with 500 CFU/$m^3$ and the concentrations found, both bacteria and fungi, are very similar in summer and winter assessment. Maximum values for bacteria were 2282 CFU/$m^3$ in drawing rooms, 1414 CFU/$m^3$ in dining rooms and 1052 CFU/$m^3$ in bedridden, all at summer time. Regarding maximum values of fungi concentration, these were found also in dining rooms (2812 CFU/$m^3$) and bedrooms (1218 CFU/$m^3$). *Aspergillus fumigatus* was found in dining rooms (5%), bedrooms (8%) and bedridden (8%). Nevertheless, in one ECC, in summer season, this specie was predominant in most of the evaluated areas. This specie is known to cause invasive lung infections in susceptible and immunodeficiency individuals as elderly. Another species known to be pathogenic were found, such as

*Fusarium* spp. in drawing rooms (4%), and *Aspergillus niger* in bedridden (15%).

Although in the overall rate, median values of bacteria and fungi found in ECCs indoor air meets portuguese reference level for these contaminants, some concern is raised by the presence of pathogenic microorganisms. Simple measures, like opening windows and doors to promote air exchange and renewal could show effectiveness in improvement of IAQ.

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