

Aeroallergens and Immunological Preparedness for Future Climate Scenarios: Implications for Public Health Promotion (ALL-IMPRESS)



One of the first and the most significant health consequences of climate change in Finland will be the increase in pollen allergies and the worsening of allergic symptom. This will have substantial impacts on economy and well-being. A more detailed research on factors behind pollen allergenicity and their interconnections is needed but currently lacking in relation to Finnish climate projections.

The mechanisms by which climate change influences aeroallergens and the incidence and severity of allergies are complex. Whilst CO₂ enhances pollen production, air pollutants, such as PM and ozone, increase the release of allergenic proteins from pollen grains and their symptom-inducing potential. Atmospheric circulation and changing wind patterns affect pollen dispersion and rupture and expose populations to novel allergens. Recent studies suggest increasing trends in season length and pollen amounts of birch. Grasses (Poaceae) are the second most important source of airborne allergens in Finland. Their significance to allergic people will increase, contrary to general global scenarios, since grasses are expected to thrive even better in future Finnish climate, where temperatures are higher, but draughts do not limit flowering. New allergenic invasive plants such as ragweed may increase the exposure to aeroallergens. Ragweed (common ragweed, *Ambrosia artemisiifolia*) pollen already spreads to Finland via long-distance transport and the seeds are coming with corn import but the local climate does not yet support its reproduction.

This project aims to disentangle allergen burden in future Finland and, additionally, to identify and analyze the opportunities for the adaptation to and mitigation of the aeroallergen-related diseases and associated costs. The project will introduce and apply a novel way to interconnect time series data that have remained scattered so far and combine those with advanced measurement and experimental set-ups and future scenario modelling. In short: We will generate a first long-term data describing how meteorological factors are reflected to the pollen and spore concentrations and release of allergens, and how they

associate with the health care use and costs. This information will be complemented by developing novel and validated methods for aeroallergen research. These methods will be applied to study how pollen and its allergenicity will change in different climate projections. All data will be included in a series of model predictions for aeroallergens spread, timing, and aggressiveness. Based on the information collected and analysed in the project, we will make an assessment of how the allergen climate will change over the next decades and what are the potential public health interventions and adaptation measures. The project has great potential for translation of results into practice, including the development of tools needed for more accurate preparation for the avoidance, alleviation and management of allergic disease burden and symptoms. Dissemination of new findings will be secured by active communication with parties of Finnish Allergy Program, Finnish Asthma and Allergy Foundation, health care professionals and decision-makers throughout the study.

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