Colorado Science and Engineering Fair

2025 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Effects of Climate Change on Allergens and Human Health

Finalist's Name: Allan Luo Yu

School and City: Fairview High School, Boulder

Sponsor's Name: Ryan Langendorf

Category: Earth & Environmental Sciences

Division: Senior (grades 9 - 12)

Abstract (250 words or less):

Climate change impacts cannot be understated. One such impact is increasing pollen production. Furthermore, pollen allergy is the most prevalent environmental allergy. Meanwhile, studies regarding climate change's effects on human health make direct links between climate change and human health. While possible, other factors influencing health should not be disregarded. Thus, this study explores the relationship between the effects of climate change on the production of pollen, which in turn, affects human health. In this study, climate and pollen data were utilized to make predictions into the future rather than the traditional climate reconstructions. They were obtained from the Eurasian Modern Pollen Dataset. To circumvent financial restraints, Google Trends search data categorized allergy/health data. Additionally, a structural equation model (SEM) was employed novelly in ecology to research a causal network of climate, pollen and allergy variables. Structural equation modeling allows us to explore individual relationships while accounting for other relationships within the network. Similarly, predictions account for these other relationships as well, factoring effects throughout the entire network to account for as much as possible even when making only one prediction. Results generally showed increases in pollen production as seasonal temperature increased, and varying results in pollen production as precipitation increased. These results were in agreement with current studies and beliefs: current studies generally find positive estimates for pollen as a function of temperature and/or precipitation. However, this study also accounts for precipitation in colder months—thus the negative estimates. Unfortunately, the model showed poor model fit (X^2 p-value < 0.05), likely resulting from unrobust data. Despite some findings being significant ($p < 0.05$), they still should be interpreted with skepticism because of model fit. Altogether, this study highlights the need for future research with better data.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**