Perspectives on the integrated assessment methodology and interdisciplinary working within ATOPICA
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Key influences on the risk of allergic disease

- Climate
- Pollen
- Land cover
- Behaviour
- Social
- Interventions
- Air quality
- Biology

Exposure

Allergic disease

Increasing uncertainty

Socioeconomic factors and policy
Interdisciplinary working

The ATOPICA team:
- Climate scientists
- Plant and pollen experts
- Clinicians
- Statisticians
- Media and communications

Some of the challenges:
- Language/jargon
- Collecting ‘real time’ data
- Integrating very different types of data
  - Different time scales
  - Different spatial scales

Aeroroallergen  Scenario
Epigenetics  Projection
Atopic  RCP
IgE  SSP
eCRF  CHIMERE
ISAAC  PM10
To what extent can we extrapolate?

E.g., Clinical studies

- The largest uncertainty is extrapolating from small areas and 2012-2014 diaries
  - Confounders:
    - Population distribution
    - Societal behaviour
    - Time spent outdoors
    - etc

For this reason, the dose-response curve used in the European assessment was derived from the literature covering 20 different countries.
Assumptions: extrapolation

- All empirical relationships can be extrapolated and hold for the future

- Pollen and presence observations and potential distributions provide a reliable indication of the actual number of ambrosia plants

- Climate/pollen/air quality measured at nearest site are representative of conditions experienced by exposed individuals

- Empirical relationships:
  - Ambrosia life-cycle model including germination rates, seed dispersal rate, plant phenology, biomass production and pollen release
  - Bias correction used in air quality modelling
  - Dose-response relationship
Assumptions: data biases & sampling

- Questionnaire/diary respondents have perfect recall
- No systematic biases in data sets (pollen, air quality, climate, genetic samples, serum samples, skin prick tests)
- Sampling is unbiased (clinical cohorts, location of climate/pollen/air quality monitoring stations)
Assumptions: uncertainty

- The different variants provide some indication/reflection of the wider uncertainty range:
- Two climate and two transport/air quality models (RegCM & WRF/CHIMERE)
- Four assumptions on ragweed pollen invasion (Reference, Rapid, Slow, None)
- Two RCPs (Representative Concentration Pathways – RCP4.5 & RCP8.5)

Implications for climate mitigation
“Uncertainties about future vulnerability, exposure and responses of interlinked human and natural systems are large (high confidence). This motivates exploration of a wide range of socioeconomic futures in assessments of risks.”

Health in the Shared Socioeconomic Pathways
Ebi et al., 2013: *Int. J. Environ. Res. Public Health*

SSP1: Sustainability
SSP2: Middle of the road
SSP3: Fragmentation
SSP4: Inequality
SSP5: Conventional development

*We have assumed some things don’t change (population, land use, intervention, behaviour etc) – but some narratives could be developed.....*
Key messages concerning uncertainty

- We have been transparent about the assumptions underlying our analyses and the fact that all stages of the integrated assessment are subject to uncertainties.

- Despite these assumptions and uncertainties we are confident that our key messages our robust.

- One of the most important of these messages is that, without a major reduction in greenhouse gas emissions, the number of individuals with symptoms of ambrosia allergy is likely to more than double by the middle of the century.
Further analysis, & more data, would allow us to better understand & disentangle the underlying processes & factors & to make more detailed & quantitative assessments:

- More pollen & plant observations/monitoring
- More climate & air quality simulations
- More years of cohort data
- ...........................................