A Multi-Pollutant Air Quality Health Index (AQHI) Based on Short-Term Respiratory Effects in Stockholm

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AQHI BASED ON ASTHMA EMERGENCY DEPARTMENT VISITS INDICATES THE OVERALL DAILY RISKS OF EXPOSURE TO NO_X, O_3, PM_{10} AND BIRCH POLLEN

Background

The AQHI is intended for public information regarding the expected health risks associated with current or forecasted concentrations of pollutants and pollen.

Methods

The AQHI is based on daily emergency department visits for asthma (AEDV) and urban background concentrations of NOx, O3, PM10 and birch pollen in Stockholm. The index is calculated as:

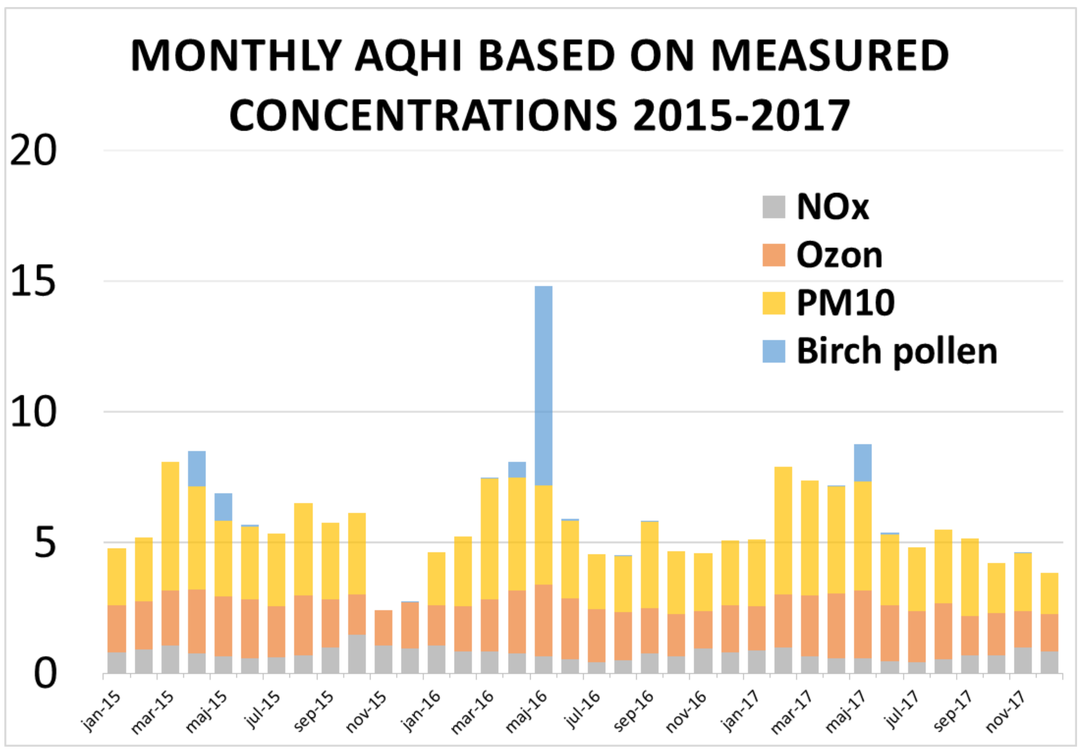
$$AQHI = \sum_{i=1\ldots p} 100\left(e^{\beta X_i} - 1\right)$$

where the beta-coefficient (βi) represents the increase in AEDV per unit increase of each individual air pollutant and pollen (Xi) per cubic meter. The coefficients are based on all age groups, and the exposure window is lag01 (mean of same day and yesterday).

% increase in AEDV per 10 units m^{-3}	
NO_x	0.5 (95% CI: -1.2–2.2)
O_3	0.3 (95% CI: -1.4–2.0)
PM_{10}	2.5 (95% CI: 0.3–4.8)
Birch pollen	0.26 (95% CI: 0.18–0.34)

Results

- Total monthly mean AQHI (% increase in AEDV) during 2015–2017 varied between 4 and 9%, with a peak value of 15%.
- Simultaneously high levels of pollen, O_3 and PM_{10} makes AQHI peak during spring early summer.
- NOx exhibits an even distribution throughout the year, except for a decrease during the summer due to less traffic.
- The mean risk contributions during the study period were 3%, 2%, 0.8% and 0.3% for PM_{10}, O_3, NO_x and pollen.



Olstrup et al,. 2019
Int J Environ Res Public Health, 16, 105-129.

This project was partly funded by ERA-PLANET (www.era-planet.eu), trans-national project SMURBS (www.smurbs.eu) (Grant Agreement n. 689443) under the EU Horizon 2020 Framework Programme, and partly by the city of Stockholm, as part of the strategy for developing the city's digitization and information services.

Poster presented at the
31st annual conference of the International Society for Environmental Epidemiology, Utrecht, The Netherlands, 2019