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Co-Promotor:**Prof. Dr. An Van Nieuwenhuysse**

Department of Food, Medicine and Consumer Safety
Scientific Institute of Public Health, Brussels

PhD in Medical Sciences
2015-2016

INVITATION to the Public defence of

Koen SIMONS

To obtain the academic degree of '**DOCTOR IN MEDICAL SCIENCES**'

"Bruxair – Short-term health effects of air pollution in the Brussels Capital Region, 2004-2011: an epidemiological time series approach".

Tuesday 14 June 2016

Auditorium **Vanden Driessche**, 17:00
Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

How to reach the campus Jette:

<http://www.vub.ac.be/english/infoabout/campuses>



Vrije Universiteit Brussel

Summary of the dissertation

Air pollution levels have decreased significantly over the previous decades, yet increasing evidence reveals that air pollution remains harmful even at current levels. These levels tend to be higher in densely urbanised zones; in cities. As such, almost everybody is exposed to outdoor air pollution. The health outcomes include the full spectrum from mortality via hospital admissions to sub-clinical effects. Adverse health effects occur both as a result from short term exposure (on the order of days) and from sustained exposure (multiple years).

In the BruxAir project, short term effects of air pollution on health were investigated by means of administrative data: the InterMutualistic Agency keeps a record of all prescription-based purchases for residents of Brussels (and the rest of Belgium). The date and quantity of sales were linked to personal characteristics (age, sex, place of residence) and to exposure measurements (daily, 4x4km² resolution). The aggregated data were analysed with time series methodologies.

The objectives of the study were to (1) evaluate the use of the purchase of respiratory medication sales as a proxy for the adverse health effects, (2) optimize the statistical methodology, (3) estimate the relative risks and (4) estimate the cost saving potential.

Results include (1) purchase is indeed a sensitive indicator, (2) ensembles and compartment methods are promising methods to deal with these classes of problems, (3) significant relative risks are found, in particular for NO₂ (a known proxy for traffic-related pollution) and for grasses (the plant pollen that people are most commonly sensitized to) and (4) an annual cost saving potential of €73k per 10% decrease in NO₂ concentrations in the Brussels Capital Region, counting only the sales of reimbursable respiratory medications for asthma and/or chronic obstructive pulmonary disease.

Curriculum Vitae

Koen Simons was born in Brasschaat on the 30th of May 1984. He graduated from the University of Ghent with a Master of Science in Physics in 2006. Between 2010 and 2016 he worked as a statistician for the unit Health and Environment in the Scientific Institute of Public Health - Brussels. In 2012 he obtained a Master of Science in Statistics (Biometrics) from the Catholic University of Leuven. His research interests include measurement error and ensemble learning.