Title of the thesis: Public perception of environmental quality: Improving quantitative analysis of statistical data in epidemiological studies

Abstract

Several aspects of human health and well-being are influenced by the environment. Air pollution, noise pollution, water contamination, toxic metals and many other environmental factors may impose several risks for public health by initiating, promoting, sustaining and stimulating a number of health outcomes. The quality of the environment and its impacts on communities' health consist in a growing source of public and government concern and therefore, are being widely investigated in epidemiological studies. These studies are usually designed so that potential errors are minimized and high-quality conclusions on the association between an environmental exposure and a particular health outcome can be drawn. However, given specific characteristics of environmental epidemiology investigations (e.g. environmental factors are usually human-made, being modifiable, complex and variable in both temporal and spatial aspects), a broad spectrum of methodological issues are commonly encountered within this field.

Therefore, the main objective of this thesis is to address some of these methodological issues by providing alternatives to improve quantitative analysis in epidemiological research and, for some of the cases, investigating the impacts that these issues may have on health effect estimates and the interpretation of epidemiological results. For this purpose, the thesis is based on two distinct case studies: the first one refers to non-urban communities of Denmark living nearby agricultural and livestock farming activities; while the second case study analyzes urban populations living in the capital city of Switzerland, being constantly exposed to noise and air pollution from traffic sources.

The following methodological issues are hereby confronted throughout the thesis: 1) misclassification of environmental exposures; 2) spatio-temporal variability of air pollutant concentrations; 3) uncertainties derived from the use of distance-based surrogates of exposure; 4) exposure to a complex mixture of multiple components; 5) co-exposure to traffic-related noise and air pollution; 6) collection of high-quality health data using questionnaires; and 7) analysis of complex environmental epidemiology data. Overall, this thesis provides a broad overview of statistical challenges in environmental epidemiology, which can be of great interest to researchers working with environmental health effects, regardless of the exposure source and geographic setting of the study.