COMMUTE BEHAVIOR ASSESSMENT, SIMULATION OF COMMUTE PATTERNS AND EXPOSURE TO AIR POLLUTION IN THE REGION OF BASEL, SWITZERLAND

Martina S. Ragettli,*) Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland*
Harish C. Phuleria, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland*
Charlotte Braun-Fahrländer, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland*
Laura Perez, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland*
Nino Künzli, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland*
L.-J. Sally Liu, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland, University of Washington, Seattle, USA*

Background and Aims: Our aim is to develop a multi-modal commute model which is able to simulate both travel patterns and commute exposure to traffic-related air pollution in the region of Basel. This study is part of the project "Transportation, Air Pollution, and Physical Activities (TAPAS)"; a 6-city integrated health risk assessment program of active travel policies.
Methods: Firstly, travel patterns are simulated by means of a Geographic Information System (GIS) model using extensive information from the Swiss 2005 Microcensus database, which provides temporally and spatially resolved data on travel behavior. Secondly, environmental parameters of the built environment and personal factors that may influence adults' choice of active and passive transportation modes are investigated on a route scale. Finally, exposure to air pollution is estimated by combining the commute patterns with predictions from air pollution models. Exposure in different commute modes and microenvironments are validated with personal measurements of $PM_{2.5}$ and ultrafine particles (UFP) (10-300nm) in three different seasons for typical commute routes. Simulating variations of commute patterns will allow us to test scenarios of change in commute behavior on exposure distribution.
Results: The proportion of active transport on the total distance of trips to work within the study area is 29.2%. Our first results of 24-hours personal $PM_{2.5}$ measurements reveal significantly higher exposures during commuting than outdoor urban background exposure levels. Average commute exposure to $PM_{2.5}$ (59.7±35.0 µg/m^3) was about three-fold higher than average daily $PM_{2.5}$ exposure (21.3±18.6 µg/m^3). UFP measurements similarly show higher exposures during commuting as well as indoor cooking events.
Conclusions: Preliminary results indicate significantly higher air pollution exposures during commuting in Basel. Results will be further examined and commuter exposure will be quantified. Thus, the study will contribute to a better understanding of population's commute behavior and exposure to harmful air pollutants during daily commuting.