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Environmental and health impacts of transportation and land use scenarios in 2061

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demonstrated neurocognitive health benefits for greenspace exposure among children. There is limited information on the role of residential greenspace exposure in the elderly on the risk of cognitive decline.

Methods: The Gingko Evaluation of Memory Study (GEMS) is a well-characterized cohort of U.S. adults aged 75 years or older evaluated for dementia. After geocoding participant residences, several greenspace metrics were combined to create a composite residential greenspace exposure. Normalized difference vegetative index (NDVI) values were combined with polygon and buffer based assessments of percent park overlap and linear distance to nearest park. The outcome was all-cause dementia evaluated prospectively over 8 years using neuropsychiatric evaluations, MRI, and consensus adjudication by study neurologists. Preliminary analyses of all-cause dementia utilized Cox proportional hazards regression, unadjusted and adjusted for potential confounders.

Results: Of 3069 GEMS participants 3048 were successfully geocoded. Preliminary analyses using Cox proportional hazards modeling showed that high residential greenness (~30% of the sample) was associated with reduced risk of dementia (HR=0.79, 95% CI: 0.74–0.83) in unadjusted models. With the model adjusted for demographic and behavioral characteristics, treatment arm, census tract median income, and Apolipoprotien E4 status, the association was partially attenuated (HR=0.92, 95% CI: 0.85–0.98), but remained statistically significant.

Conclusions: We observed a modest relationship between residential greenspace exposure and all-cause dementia among the elderly. Our findings will motivate additional longitudinal analyses in this cohort characterizing specific sub-types of dementia and assessing exposures at earlier times in the participant's life.

Associations between the onset of hypertension and diabetes, and exposure to fine particles from regional and industrial sources

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TPS 761: Health effects of pollution sources and components, Johan Friso Foyer, Floor 1, August 28, 2019, 3:00 PM - 4:30 PM

Background: Studies show associations between long-term exposure to regional fine particles (PM2.5) and the onset of hypertension (HT) and diabetes but few studies have assessed associations with PM2.5 from local industrial sources which may be large contributors of PM2.5 in some localities.

Objective: To estimate associations between exposure to PM2.5 from regional and from industrial sources in population-based cohorts of adults in Quebec, Canada, between 2000 and 2014.

Methods: Diabetes and HT open cohorts of adults 20+ years were built from administrative health databases; validated algorithms were used to ascertain cases. Regional PM2.5 levels and PM2.5 from industries were estimated at postal codes of residence of cohort members; the former from satellite images while the latter from the CALPUFF dispersion model based on information from the National Pollutant Release Inventory. We performed Cox models using age as the time axis, adjusted for gender, material and social deprivation and calendar year and stratified for age groups. Sensitivity analyses include multipollutant models and indirect adjustment for smoking.

Results: The cohorts comprise ~6,000,000 adults, 1,291,861 incident cases of HT and 569,912 cases of diabetes. From preliminary assessments, adjusted HRs per increase of an interquartile range (IQR) of regional PM2.5 were 1.037 (95%CI: 1.020-1.052) and 1.107 (1.108-1.130) for HT and diabetes respectively. Per increase of an IQR of PM2.5 from industrial sources, the HR for HT was 1.007 (95%CI: 1.003-1.010) and it was 1.009 (1.006-1.013) for diabetes. The IQR of PM2.5 from industrial sources (0.1 µg/m3) was lower than the IQR of regional PM2.5 (~4 µg/m) although extreme exposure values were present (e.g. yearly average of 20 µg/m3).

Conclusion: Residential exposure to PM2.5 from regional and industrial sources both appear to be associated with HT and diabetes. Whether these risks are independent from each other and from smoking is yet to be seen.

Environmental and health impacts of transportation and land use scenarios in 2061

Smargiassi A[1], *Plante C*[2], *Morency P*[2], *Hatzopoulou M*[3], *Morency C*[4], *Eluru N*[5], *Tetreault L*[2], *Goudreau S*[2]
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OPS 58: Predictors and impact of active travel, Room 210, Floor 2, August 28, 2019, 10:30 AM - 12:00 PM

Modeling impacts of land use and transportation over long-term horizons offers possibilities to assess effects of societal trends that may affect mobility like urban sprawl.

We defined two scenarios for 2061 for the Greater Montreal: a Business As Usual (BAU) and an Ideal scenario with urban densification and reductions in car share (76% to 62% in suburbs; 55% to 34% in urban areas). We aimed to compare numbers of trips and distances by transport mode, air pollution and health impacts of scenarios. Comparisons between urban areas and suburbs, between 2031 and 2061, and sensitivity analyses were performed.

We estimated the 2061 population in 87 municipalities using the 2008 Origin-Destination survey, the demographic model ES-3 and Quebec population projections for 2031 and 2061. 2031 trips (from a mode choice model) and distances were used to estimate those of 2061. Emissions of nitrogen dioxide (NO2) and carbon dioxide (CO2) were modelled with the US EPA MOVE model, and concentrations of NO2 using CALPUFF. Negative impacts of NO2, road traumas, and health benefits of active transportation were summarized with disability adjusted life years (DALY).

Walking and Public Transit (PT) use and corresponding distances walked in 2061 were >70% higher for the Ideal scenario vs the BAU, while car share and distances were <40% lower. NO2 levels were slightly lower in the Ideal scenario compared to the BAU, but always higher in the urban core. Impacts differed between urban areas and the suburbs but globally, the Ideal scenario reduced the impacts of the 2061 BAU by 34% DALY. % of car and PT trips were similar for the 2031 and 2061 BAU scenarios but kms travelled by car, CO2 and NO2 increased, due to increased populations.

Drastic urban sprawl impediment and measures to decrease car share appear necessary to substantially reduce impacts of transportation.

Exposure to industrial air pollutant emissions and asthma-related effects in children: A systematic review and meta-analysis

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TPS 683: Short-term health effects of air pollutants 2, Exhibition Hall, Ground floor, August 28, 2019, 3:00 PM - 4:30 PM

Objective: We conducted a systematic review to analyze the association between exposure to air pollution from industries and asthma-related outcomes in childhood.

Methods: We searched bibliographic databases and reference lists of relevant papers to identify studies examining the association between air pollution exposure to industrial point-sources and asthma-related outcomes in childhood, including: asthma, asthma-like symptoms, wheezing and bronchiolitis. We extracted key characteristics of each study