Background & Objectives

- The temporal and spatial scale of PM$_{2.5}$ exposure assessment may impact the magnitude of association with mortality at low mass concentrations.

Data

- 2001-2011 Canadian Census Health and Environment Cohort (N=2.4 million).
- PM$_{2.5}$: Satellite AOD/GEOS-CHEM/Geographically-weighted regression.
- NO$_2$: National land use regression model.
- O$_3$: National model (Environment Canada).

Methods

- Cox proportional hazards models.
- PM$_{2.5}$ exposures assigned at three spatial scales (1 km$^2$, 5 km$^2$, 10 km$^2$) and three temporal scales (1-year, 5-year, 8-years).
- Different spatial scales (i.e. 1 km$^2$ vs. 10 km$^2$) were examined based on age, employment status, and urban/rural location.
- Examined sensitivity of PM$_{2.5}$-mortality associations to inclusion of oxidant gases.

Results

### Sensitivity to Spatial and Temporal Scale of Exposure Assessment

#### Nonaccidental Mortality

![Nonaccidental Mortality](image1)

#### Lung Cancer Mortality

![Lung Cancer Mortality](image2)

#### Cardiovascular Mortality

![Cardiovascular Mortality](image3)

#### Respiratory Mortality

![Respiratory Mortality](image4)

Conclusions

- PM$_{2.5}$ mortality associations are sensitive to the spatial and temporal scale of exposure assessment as well as oxidant gases.
- Respiratory outcomes were most sensitive to the spatial scale of exposure assessment.
- Overall, these results support a relationship between long-term exposure to PM$_{2.5}$ and mortality at low mass concentrations.

Background & Objectives

- Canadian immigrants have lower mortality risks than the native-born population, but little is known about the impact of ambient air pollution exposure on their long-term health.
- Objective: To assess the risk of non-accidental and cause-specific mortality to the Canadian immigrant population with exposure to PM$_{2.5}$ compared to the non-immigrant population.

Data

- 2001-2016 Canadian Census Health and Environment Cohort (CanCHEC, N=3.5 million) linked to longitudinal mortality and air pollution exposure via annual residential postal code histories.
- PM$_{2.5}$: Satellite AOD/GEOS-CHEM/Geographically-weighted regression.

Methods

- Cox proportional hazards models used to estimate PM$_{2.5}$ exposure and cause-specific mortality relationship.
- Examined models comparing Canada-born (CB) non-immigrants to all foreign-born (FB) immigrants or stratified by year immigrated.
- Assessed mortality risk by year immigrated with increasing PM$_{2.5}$ exposure.

Results

Table 1: Cohort size and PM$_{2.5}$ exposure levels

<table>
<thead>
<tr>
<th>Year Immigrated</th>
<th>Non-immigrants (100,000)</th>
<th>CB (10,000)</th>
<th>FB (10,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970-1979</td>
<td>9.13 (2.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980-1989</td>
<td>10.13 (2.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990-1999</td>
<td>11.13 (2.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-2009</td>
<td>12.13 (2.5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusions

- Despite overall lower mortality risk, immigrants were more sensitive to PM$_{2.5}$ compared to non-immigrants for CVD-related causes of death.
- Trend in mortality advantage was not consistent across immigrant cohorts with increasing PM$_{2.5}$ exposure.
- Immigrant cohort differences over time present challenges to disentangle the PM$_{2.5}$ health effects on mortality from other risk factors.