

Healthy Environments and Consumer Safety Branch

Windsor Children's Respiratory Health Study Air Health Effects Division, Health Canada

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Purpose: To determine the adverse health effects of ambient air pollution in Windsor on children's lung health.

Background:

- •January 2003 Canada –US Border Air Quality Strategy (BAQS) announced by Environment Canada and US Environmental Protection Agency
- •WCRHS conducted as part of joint Pilot Project: Great Lakes Basin Airshed Management Framework

Rationale

- Why Windsor?
 - point sources (industry),
 - mobile sources (diesel trucks and vehicles)
 - high levels of particulate air pollution
 - high levels of ragweed exposure.



• Children appear to be a vulnerable population to the effects of air pollution

Exposure assessment conducted independently:

- 50 sites in Windsor during four seasons
- Variety of air pollution measures included.

An estimate of the average level of air pollution at a child's residential and school address will be produced.



Three parts to this study:

- Phase 1: Cross-sectional Questionnaire
- Phase 2: Lung Function testing and outdoor monitoring
- Phase 3: Panel study and outdoor monitoring

PHASE 1: Cross-sectional Questionnaire

- Questionnaire distributed to children in all Windsor Elementary schools, Grades 1-8, ages 6-14.
- Standardized questions developed and previously tested by American Thoracic Society (ATS).
 - Risk factors for respiratory disease (i.e.: cigarette smoking, indoor exposure to allergens, family history of lung disease).
- Collection of personal information and consent for future contact
- <u>Advantages</u>: *inexpensive*, *large sample size increases sensitivity*
- <u>Limitation</u>: *subjective reporting, measures prevalence not incidence, temporal relationship (cannot determine causal relationship because both health outcome and air pollution measured at same point in time)*

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Cross-sectional Questionnaire

Progress to date:

• Distribution and collection of questionnaires complete; 2 distributions required

Response rate = approx. 65% (50% after first distribution)

= 13,132 completed questionnaires

/ 20,159 total student enrolment in

Windsor

- Preliminary health results available? community forum
- Future: correlate health data with ambient air pollution concentrations (spatial monitoring sites and NAPS data)

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PHASE 2: Lung Function Testing

Target population = all children in grades

Lung function testing in Windsor

4, 5, 6 (ages 9 -13 years) residing in

Exhaled Breath Condensate (20%)

Performed by Registered Respiratory

Therapists and their assistants. Testing time

Tests: Spirometry, Exhaled nitric oxide,

elementary schools

Windsor

approx 30min.

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<image>

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•<u>Advantages</u>: objective measures, experimental tests (EBC, eNO) provide new information

•Limitations: response rate low despite media attention and reminders to parents, temporal relationship, measure of prevalence



Lung Function Testing

- Waves of five schools at a time (randomly chosen) total of 59 schools in Windsor region
- Consent forms distributed through schools ask for:
 - parental consent
 - current health status
 - medication use of child.
- Available in Arabic, Chinese, French and English



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Lung Function Testing - Process for each wave of schools:

•Drop-off of consent forms in schools

•Children are instructed to bring form home to parents.





•2-3 days after collection of consent forms Respiratory technologists enter schools for testing. •Parents reminded via phone.

•Two week period given to parents to complete consent form and return to school.



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Lung Function Testing

Communication of results:

- •Abnormal spirometry results sent directly to parents via mail with recommendation to consult physician for interpretation.
- •For normal spirometry results parent/guardian is responsible for contacting Ontario Centre for Environmental Health themselves (971-3663).

•Interaction with Windsor community.



Lung Function Testing

Progress to date:

- Testing complete, # children tested=2,640 out of a total 8,325 consent forms distributed , response rate approx 30%
- Currently reviewing data
- <u>Obstacles</u>: matching consent forms to tests *(multiple children on one form),* uncertain consent forms *(everything/nothing filled out),* scanning of consent forms *(Arabic version reversed).*
- <u>Next step</u>: sending letters to parents with abnormal test results
- Linking health and air pollution data (50 spatial monitoring sites, NAPS data and additional monitoring near schools: SO₂, PM_{2.5})

PHASE 3: Panel Study

- Assess acute effects of air pollution on lung health in asthmatic children
- Repeated measures; daily measurements of air pollution & lung health
- Follow approx. 200 asthmatic children for one month, selected from phase 1 questionnaire, ages 9-14, grades 4-8
- <u>At School</u>: Lung function testing, once weekly for 4 weeks
- <u>At Home</u>: *Peak flow measurements twice per day. Record peak flow results, daily medication use and time spent outdoors in diary*
- 2 testing waves ; approx 100 kids in each. Each wave followed up for one month. Schools and children randomly selected for each wave.



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Panel Study: Logistics

1. Call to participant by therapist or assistant: verbal consent.



- 2. **Home Visit**: obtain written consent, peak flow meter and diary instruction. Baseline questionnaire
- **3. Peak Flows:** All children in same wave begin peak flow measurements on same day



- 4. **Lung Function**: All children tested in schools 1/wk, try for same day & time each week
- ? Copies of consent forms brought to school on first day of testing

5. Simultaneous Ambient Monitoring (PM_{2.5}, BC, SO₂): 15 outdoor sites. Locations determined from GIS analysis of spatial monitoring data. HE

Panel Study:

Progress to date:

- Began testing Oct 11, 2005
- Projected end date: Dec 11th, 2005
- Link health data to air pollution
 - 50 spatial monitoring sites
 - NAPS data
 - Independent ambient monitoring data



