

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
- Advantages: *inexpensive, large sample size increases sensitivity*
- Limitation: *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)*

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)

PHASE 2: Lung Function Testing

- Lung function testing in Windsor elementary schools
- Target population = all children in grades 4, 5, 6 (ages 9 -13 years) residing in Windsor
- Tests: *Spirometry, Exhaled nitric oxide, Exhaled Breath Condensate(20%)*
- Performed by Registered Respiratory Therapists and their assistants. Testing time approx 30min.



•Advantages: *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



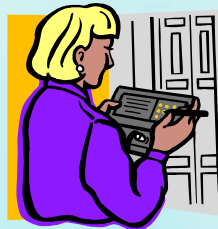
Lung Function Testing - Process for each wave of schools:

- Drop-off of consent forms in schools
- Children are instructed to bring form home to parents.



- Parents reminded via phone.
- Two week period given to parents to complete consent form and return to school.

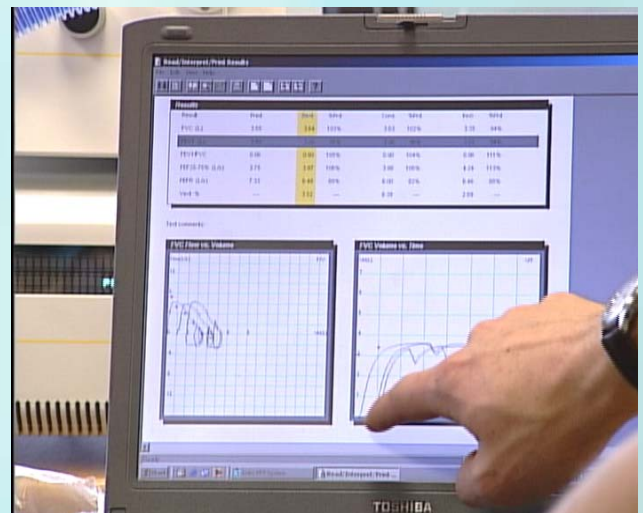
- 2-3 days after collection of consent forms Respiratory technologists enter schools for testing.



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.



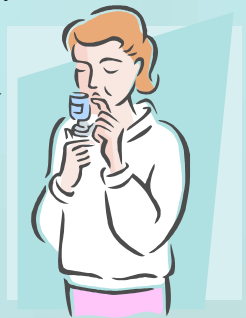
Lung Function Testing

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
- Obstacles: matching consent forms to tests (*multiple children on one form*), uncertain consent forms (*everything/nothing filled out*), scanning of consent forms (*Arabic version reversed*).
- Next step: 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

- ⑩ Assess acute effects of air pollution on lung health in asthmatic children
- ⑩ Repeated measures; daily measurements of air pollution & lung health
- ⑩ Follow approx. 200 asthmatic children for one month, selected from phase 1 questionnaire, ages 9-14, grades 4-8
- ⑩ At School: *Lung function testing, once weekly for 4 weeks*
 - At Home: *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.



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

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

? Copies of consent forms brought to school on first day of testing

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*

Windsor Children's Respiratory Health Study

Questionnaire Fall 2004

- 20,000 children
- Grades 1 to 8
- Personal info (e.g. age, address)
- Risk factor information: (e.g. current & past health, housing characteristics, family history)

Lung Function Testing February to June 2005

- 7,500 children
- Grades 4 to 6
- Spirometry
- Exhaled nitric oxide
- Exhaled breath condensate
- Current & past health
- Respiratory medications

Panel Studies Fall/winter 2005

- Approx. 200 children
- Grades 4 to 8
- Followed for 30 days
- Morning and evening :
- Peak flow measures
- Daily symptom diary



Thank- you!