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Title: “Free to Breathe, Free to Teach:” Indoor Air Quality in Schools and Respiratory Health of Teachers.

Study Objective: To investigate the effects of relative humidity and other indoor air quality factors (IAQ) on the respiratory health of teachers.

Why focus on schools?

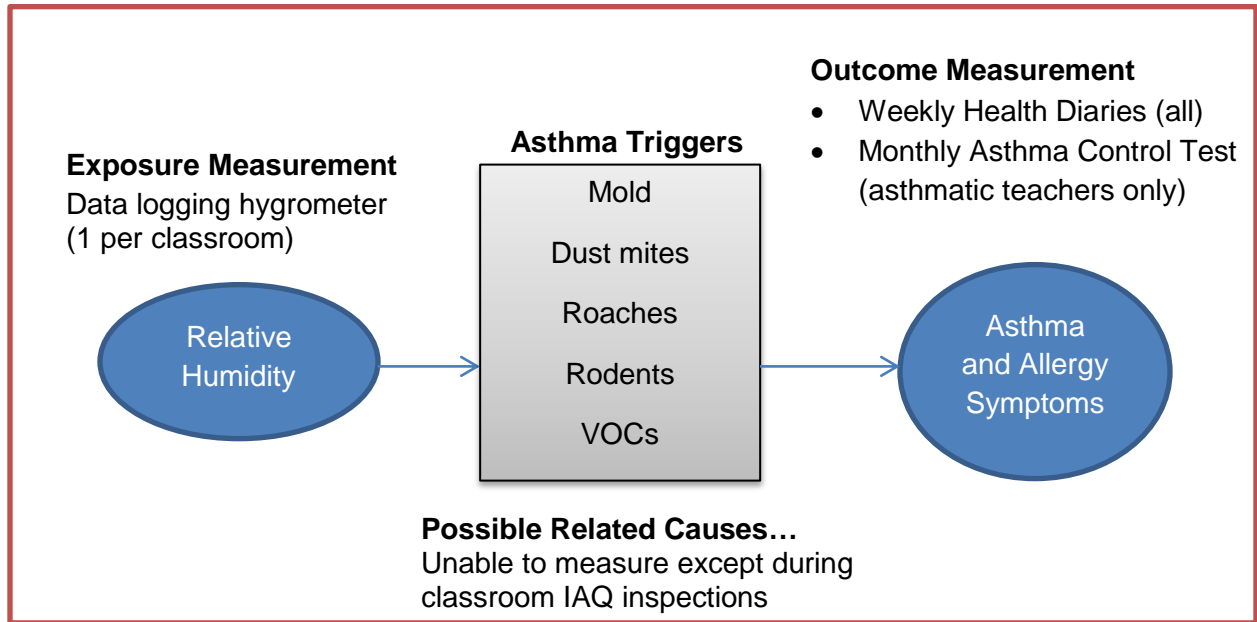


- *High occupancy, multiple pollutant sources, and low maintenance and custodial funds often lead to IAQ problems in schools (Indoor Air Quality 1995).*
- *A 2004 survey of 267 North Carolina (NC) schools found that 35% of responding schools had recent flooding, 49% reported visible mold, and >70% reported seeing roaches or evidence of rodents, and/ or smelling mold or mildew (unpublished data from survey described in Mirabelli, et al 2006).*
- *Asthma is one of the leading causes of school absences nationwide. During the 2009-2010 school year, there were 32,023 asthma-related counseling sessions provided to individual students by school nurses in NC (Meyer 2011).*

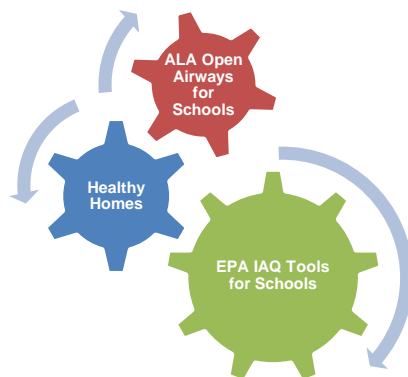
Why study teachers' health?

- *National Health and Nutrition Examination Survey (NHANES) data (2000-2004) revealed that teachers had the second highest asthma prevalence [13.1% (7.8-21.2)] of any occupational group surveyed, second only to miners (McHugh, et al 2010).*
- *A study of occupational disease surveillance in 4 states found that 9% of work-related asthma cases were educational services employees, 68.7% of whom were newly diagnosed with asthma (Mazurek, et al 2008).*
- *Teacher absences have not been well studied in health research; however, sick teachers may be absent more often. Teachers suffering at work from asthma or allergies may have trouble concentrating and be less productive.*
- *Teachers also spend long hours at school and may work in the same classroom for several years. Therefore we expect their potential exposure periods to be longer than those of students.*

Methods: Teachers were enrolled after completing baseline surveys on demographics, health and work history, and home environment. IAQ walkthrough inspections were conducted in classrooms of participating teachers and in common areas, using the Tools for Schools inspection checklist.



Educational Programs to Raise IAQ Awareness among Building Occupants



Preliminary Results of “Free to Breathe, Free to Teach”

	Phase 1	Phase 2
Number of Schools	4	6
Number of Participants	38	89
Time of Follow-up	Oct.-Dec. 2010	Feb. – Jun. 2011
Classroom Average Relative Humidity (%)	35.9 (SD=13.85)	44.2 (SD=11.95)
Classroom Average Temperature (°F)	70.5 (SD=3.29)	71.7 (SD=3.07)
Asthma Prevalence (%)	20.5	11.2
Allergy (Any Type) Prevalence (%)	58.0	48.9

Lessons Learned:

1. Clearly state the eligibility criteria so that healthy subjects understand that they are also eligible to participate.
2. Monitor data quality and participation throughout the data collection period using web-based surveys and regular hygrometer data uploads.
3. Participating teachers did not have time for lengthy training on the surveys. Repeat the instructions clearly and using many formats to accommodate different learning styles.
4. Personal contact was essential to participant recruitment and retention.
5. Involve administrators, custodians, maintenance workers, and teachers in outreach and training for the maximum impact on indoor air quality and research success.

Future Directions:

We will determine

- Which indoor air quality factors predict a school's ability to keep relative humidity levels within the ideal range of 30-50%?
- Is there an association between relative humidity levels (above or below the ideal range) and teachers' respiratory symptoms?

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