



Investigation of Health Effects in Child Residents of Storm Damaged Housing and Temporary Housing along the US Gulf Coast

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Division of Environmental Hazards and Health Effects
Air Pollution and Respiratory Health Branch*

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Background



- Pediatricians observed increased reporting of upper respiratory illness among children who lived in FEMA-issued THU
- Conducted epidemiologic investigation in Hancock County, MS
- Measured formaldehyde concentrations in occupied THU



Study Goals



To determine an association between:

- Occupancy in storm damaged housing or FEMA-issued THUs
- Historic and ongoing exposures in the home

and the occurrence and severity of respiratory and dermal symptoms.



Objectives



- 1) Describe the clinical and demographic characteristics.
- 2) Characterize environmental and behavioral risk factors.
- 3) Develop recommendations for public health strategies and messages.



Participant Selection: Data Source



*National Emergency Management Information System
(NEMIS)*

Database that includes all individuals who requested and/or received aid from FEMA after Hurricanes Katrina and Rita

Example entries:

- Incident activities
- Preliminary damage assessments



Participant Selection: Proposed Criteria



INCLUSION

- Aged 0-12 years
- Have ever had primary residence in a FEMA-issued THU and/or in storm damaged housing.
- Reside in AL, MS, LA, or TX at time of recruitment.
- Reside in a household with a parent/guardian who is ≥ 18 years.

EXCLUSION

- Household never returned to, or never resided in, a storm damaged house AND was never issued a FEMA THU.
- Parent/guardian refusal to have child provide blood or urine samples.
- Child unable to provide blood or urine.
- Household does not have a parent/guardian ≥ 18 years.



Study Design



- Cohort study
- Approximately 4200 children
- Six years in length, with an option to continue for an additional six years
- Assess health and environmental exposures twice annually



Assessments



Questionnaire

- Baseline
- Health-based
- Mental health

Medical

- Well-child exam
- Pulmonary function testing (FEV₁, FVC)
- Sampling for biomarker analysis

Environmental

- Home visual inspection
- Air sample collection

Biomarker	Specimen collected	Number of specimens/ participant
Total serum and allergen- specific IgE	Serum	6
Cotinine	Serum	12
Formaldehyde	Blood and urine	12
VOCs (e.g., benzene, toluene)	Blood	12
Phthalates	Urine	12
COHb	Blood	12
Lead	Blood	6
Exhaled nitric oxide (eNO)	Exhaled breath	12

Indoor air quality measurement	Sampling method	Total number of measurements/ participant
<i>Air sampling (one week integrated sample)</i>		
Formaldehyde and other VOCs	Passive tube or badge	12
NO ₂	Passive badge	12
<i>Dust sampling (sampled during home visit)</i>		
Mold	Vacuumed sample	12
Endotoxin	Vacuumed sample	12
Allergens (Cat, dog, cockroach, dust mite)	Vacuumed sample	12
Lead	Vacuumed sample	12
<i>Indoor climate assessment (one week integrated sample)</i>		
Air exchange rate	Tracer gas, adsorbent tube sampler	12
Temperature	Data logger	12
Relative humidity	Data logger	12



Proposed Calendar



April 2008–June 2008	Expert panel review and IRB review
July 2008–December 2008	OMB review
January 2009–December 2014	<ul style="list-style-type: none">-Participant recruitment-Data collection-Data analysis (ongoing)
January 2015–December 2016	Final data analysis and publication