Enterprise

National Center for HEALTHY HOUSING

Improving Indoor Air Quality in Affordable Housing

What the Research Tells Us
& Recommended Interventions

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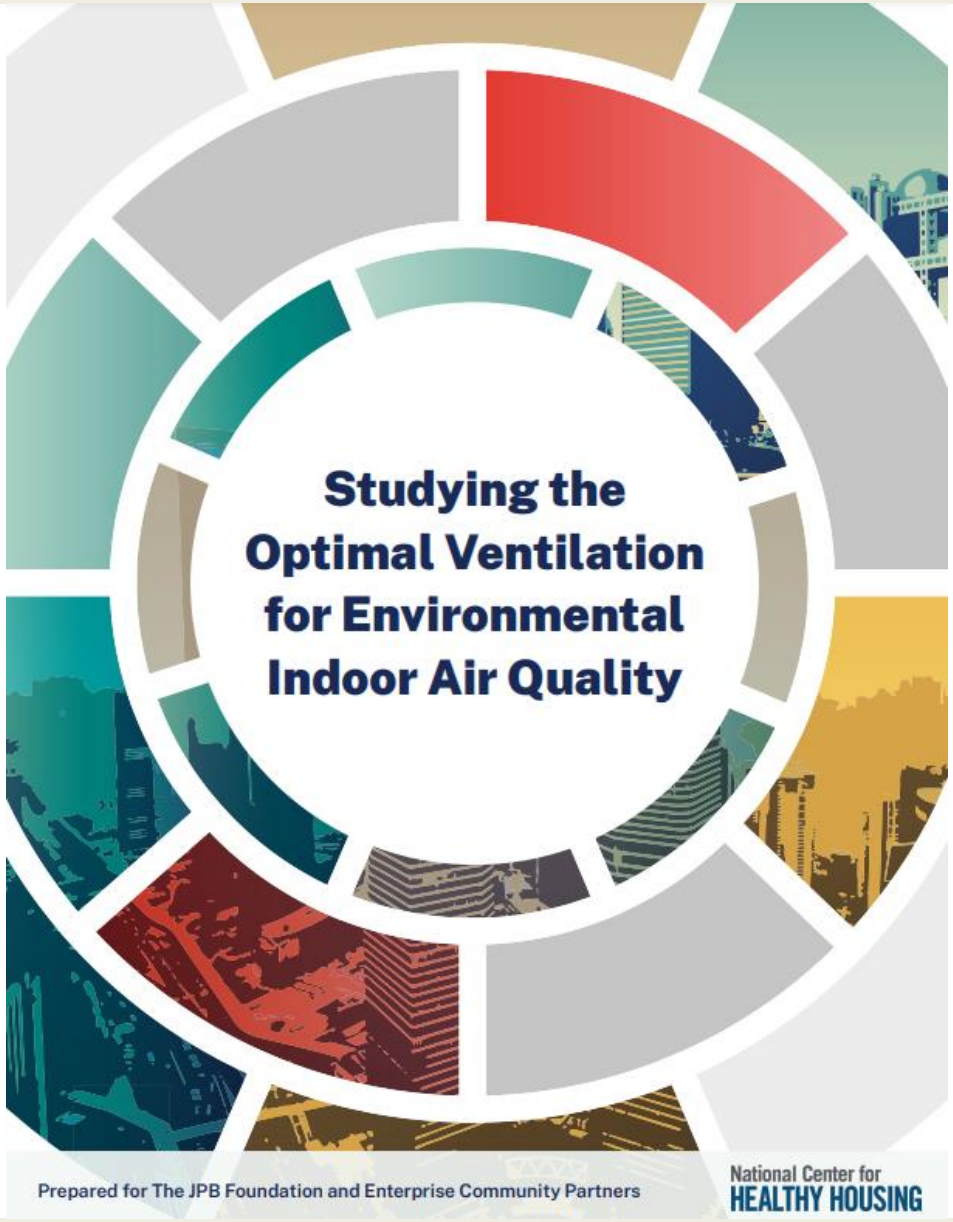

https://www.enterprisecommunity.org/resources/studying-optimal-ventilation-environmental-indoor-air-quality

Introduction & Study Overview

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Panel Discussion

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STUDY OVERVIEW

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Study Goals and Partnerships

This work is grounded in the understanding that improvements to the indoor environment can be an important mechanism for addressing health disparities among low-income populations.

- The study measured the impact of continuous mechanical ventilation on indoor air quality.
- Study funding provided by The JPB Foundation, Wells Fargo, and the Kresge Foundation.
- Research partners include Icahn School of Medicine at Mount Sinai Hospital and University of Illinois Chicago.

Study Approach

The study:

1. Focused on multifamily affordable housing rehabilitated using green practices
2. Compared housing that was designed to comply with the industry-leading ASHRAE standard with those that did not
3. Included 160 housing units across 12 developments in New York City and Chicago

Data Collection Activities

Data collection included 3 visits to each participant over an 8-month period, with compensation for participant time.

1. Ventilation testing (once shortly after enrollment)
2. Visual assessment of property and home
3. Resident interview
4. Environmental sampling over a 4-day period in main living area

STUDY OVERVIEW

Overview of Study Findings

1. Dwellings in the study group (with continuous mechanical ventilation) had significantly lower levels of particulate matter and carbon dioxide.

2. Dwellings with continuous mechanical ventilation in the kitchen had significantly lower levels of carbon monoxide and formaldehyde.

3. Nitrogen dioxide levels – a combustion byproduct of gas stoves – were equivalent in the study and comparison groups homes.

Study Findings

Major Observation #1. Dwellings in the study group (with continuous mechanical ventilation) had significantly lower levels of particulate matter and carbon dioxide.

1. Dwellings in the study group had 21% lower levels of fine particulate matter ($PM_{2.5}$) than dwellings in the comparison group. Exposure to higher levels of $PM_{2.5}$ is associated with increased chances of respiratory and cardiovascular disease and exacerbation (i.e., asthma attacks).

2. Continuous mechanical exhaust ventilation reduced $PM_{2.5}$ levels in homes with and without tobacco smoking. Homes with tobacco smoke had higher $PM_{2.5}$ levels.

3. Dwellings in the study group had 13% lower levels of carbon dioxide (CO_2) than dwellings in the comparison group. Exposure to higher levels of CO_2 is associated with reduced decision-making performance. CO_2 is also used a marker for indoor air quality.

Study Findings

Major Observation #2. Dwellings with continuous mechanical ventilation **in the kitchen** had significantly lower levels of carbon monoxide and formaldehyde.

1. Dwellings with continuous kitchen exhaust had 47% lower levels of carbon monoxide (CO) than dwellings without it. Note: Levels of CO in all homes were well below a threshold that would trigger a CO alarm.

2. Dwellings with continuous kitchen exhaust had 29% lower levels of formaldehyde than dwellings without it.

Study Findings

Major Observation #3. Nitrogen dioxide levels – a combustion byproduct of gas stoves – were equivalent in the study and comparison groups homes.

1. The hypothesis that nitrogen dioxide (NO_2) would be lower in study group units than comparison group units was not observed.

2. Dwellings with continuous kitchen exhaust did not have lower NO_2 levels.

Systems Change Recommendations

1. Incorporate ASHRAE Standard 62.2 for both moderate and substantial rehabilitation in all green building standards, certification process, local building codes, and subsidy and tax credit requirements.

2. Ensure housing rehabilitation financing programs include the cost of installing mechanical ventilation.

3. Simplify ASHRAE Standard 62.2 so that affordable housing owners, developers, and engineers are able to understand and achieve compliance.

4. Establish enforceable residential standards for indoor air contaminants.

STUDY RECOMMENDATIONS

Building Recommendations

1. Replace gas stoves with electric induction stoves.
2. Eliminate or reduce indoor contaminant sources.
3. Adopt smoke-free housing policies.
4. Improve maintenance of ventilation systems.

Education Recommendations

1. Educate occupants on ventilation and how to operate existing ventilation systems.
2. Provide technical assistance to building owners, property managers, developers, and financing institutions to expand adoption of ASHRAE Standard 62.2.
3. Invest in public education about the benefits of healthy indoor air quality.

PANEL DISCUSSION

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Thank You!

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