

## Housing improvements for health and associated socio-economic outcomes: Evidence and implications for public health

**Review on which this evidence summary is based:**

Thomson, H., Thomas, S., Sellstrom, E., and Petticrew, M. (2013). **Housing improvements for health and associate socioeconomic outcomes (Review)**. *Cochrane Database of Systematic Reviews* 2013, Issue 2. Art. No:CD008657. DOI: 10.1002/14651858.CD008657.pub2.

### Review Focus

- P** All populations from any region of the world and from both industrialized and non-industrialized countries
- I** Improvements to the physical condition of housing (mobile housing not included, lead and radon removal not included)
- C** No intervention/no comparison
- O** *Primary Outcomes:* direct measure of health or mental and physical illness, general measures of self-reported wellbeing, and quality of life measures (health service use was not included in health outcomes)  
*Secondary Outcomes:* additional social and socio-economic outcomes (i.e. fuel costs, household income, measures of social contract, social exclusion, education, employment, time off work)

**Review Quality Rating:** 10 (strong) *Details on the methodological quality are available [here](#).*

### Considerations for Public Health Practice

#### Conclusions from Health Evidence

This high-quality systematic review was based on 39 studies (randomised control trials (RCTs); controlled before and after studies (CBAs); uncontrolled before and after studies (UBAs) including both quantitative (n=33) and qualitative (n=9) data. Data from higher quality studies only are summarized here.

Warmth and energy efficiency improvements were sometimes effective for improving general health, respiratory and mental health outcomes, household warmth and dampness, and possibly reduced time missed from work and school. These interventions did not appear to improve other illness symptoms.

Those living in poor housing, in cold climates, that also had existing health conditions benefited most from warmth and energy efficiency improvements. These interventions also resulted in increased usable space in the home, which may have led to reduced housing costs, increased privacy, improved household and family relationships, as well as increased use of the home for hospitality and studying. However, there was very limited data related to these outcomes.

Rehousing/retrofitting with or without neighborhood renewal appeared to be effective for improving general health and mental health outcomes, and not respiratory outcomes and illness symptoms.

#### General Implications

Findings suggest that public health should support the implementation of warmth and energy efficiency improvements in homes, particularly among those living in poor housing in cold climates, and that have existing health conditions as a means of improving general health, respiratory and mental health outcomes among adults and children, as well as reducing lost time from work and or school.

Warmth and energy efficiency improvements however, are not recommended as a means for improving other illness symptoms other than respiratory outcomes.

Findings also suggest that public health may consider supporting implementation of rehousing/retrofitting with or without neighborhood renewal as a means of improving general health and mental health outcomes. However, rehousing/retrofitting may not lead to health impacts in the short term, but improvements in socio-economic conditions may lead to longer term health benefits.

## Evidence and Implications

### What's the evidence?

- 1. Warmth and Energy Efficiency Improvements (n=11; 5 RCTs, 5 CBAs, 1 UBAs)** - reported at (3mo-3.5 yrs) following the intervention (included installation, upgrade, repair of central heating, installation of insulation or double glazing, or a combination of these).
- 1.1. General Health Impacts** (n=5; 3 RCTs, 2 CBAs):
- Two of the three RCTs reported statistically significant lower levels of "fair or poor health" (**OR 0.48** (0.31-0.74); and **OR:0.50**(0.38-0.68) for both trials
  - From 2 CBA studies, one study showed significant improvement in general health, **+2.57** (0.90 to 4.34)
- 1.2. Respiratory Health Impacts** (n=10;5RCTs,4CBAs,1UBA):
- RCTs showed positive effects for: Children: sleep disturbed by wheeze (**OR 0.56** (0.43-0.74)); speech disturbed by wheeze (**OR 0.59** (0.41-0.85)); and dry cough at night (**OR 0.52** (0.32-0.85))
  - Children & Adults: Cold and flu (**OR:0.54** (0.43-0.69))
  - Morning phlegm (**OR: 0.64** (0.52-0.78))
  - Mixed findings from non-experimental studies
- 1.3 Mental Health outcomes** (n = 7; 3 RCTs, 4 CBAs):
- One RCT reported statistically significant improvements in happiness, vitality, and role emotional while two others studies reported no improvement. Non-RCT reported non-statistically significant improvements in mental health outcomes.
- 1.4. Other Illness and Symptom Impacts** (n=6; 2 RCTs, 4 CBAs):
- Generally the evidence illustrated little to no statistically significant differences between intervention and control groups on a variety of other illnesses and symptoms.
- 1.4. Housing Condition Impacts** (n=9; 4 RCTs, 5 CBAs):
- Experimental studies showed mixed findings: 1RCT showed fewer reports of homes being cold (**OR: 0.06** (0.04-0.09)); reporting any mould (**OR: 0.24** (0.18-0.32)), condensation (**OR: 0.16** (0.11-0.22)); energy use (**OR:0.81**(0.72-0.91)); overall measures of warmth (1 RCT, **P<0.05**); damp (2 RCTs, **P<0.05**)
  - All non-experimental studies showed improvements in warmth and damp (**p< 0.05**).
- 1.5. Socio-economic and Equity Impacts** (n=5; 2 RCTs, 3 CBAs) including:
- Fewer days off school (2 RCTs; **OR: 0.79** (0.66-0.96) & **0.47**(0.27-0.8)) and work (1RCT; **OR: 0.62** (4.66-0.82)); children reduced taking days off due to asthma (1CBA; **OR: 7.27**(3.32-11.21))
  - Better able to host friends and relatives in homes: 'friends and relatives dissuaded staying overnight

### Implications for practice and policy

- 1. Warmth and Energy Efficiency Improvements**  
Based on the available evidence, public health practitioners should implement and/or support housing improvement interventions focusing on warmth and energy efficiency improvements, particularly among those living in poor housing and that have existing health conditions, as a means to improve general health, respiratory and mental health outcomes, warmth and dampness, and reducing time lost at work and school.

The evidence does not support the implementation of these interventions as a strategy to improve illness symptoms other than respiratory ones.

Public health should continue to study the impact of warmth and energy efficiency improvements on mental health.

<p>(OR: <b>0.42</b>, (0.26-0.70)); “dissuaded from visiting” (OR: <b>0.4</b>, (0.23-0.70)); ‘reduced levels of financial difficulty’ (OR: <b>0.77</b>, (0.6-0.99))</p> <ul style="list-style-type: none"> <li>Housing and welfare interventions increased mean number of welfare benefits (1CBA; <b>p &lt;0.0001</b>)</li> </ul>	
<p><b>2. Rehousing or retrofitting with/and without neighbourhood renewal (n=6; 6 CBAs)</b>  <u>Mixed findings</u>, with unclear benefits, although some evidence to suggest positive improvements in general health and mental health outcomes, and little to no impact on respiratory outcomes and other illness symptoms.</p>	<p><b>2. Rehousing or retrofitting with/and without neighbourhood renewal</b>  Public health may consider supporting implementation of rehousing or retrofitting interventions with or without neighborhood renewal as a strategy to improve general health and mental health outcomes. This intervention should not be implemented for the purpose of improving respiratory health and other illness symptoms.</p> <p>Public health <u>should continue</u> to study rehousing or retrofitting impact on mental health, housing conditions and neighbourhood, and on other illnesses/symptoms.</p>
<p><b>3. Provision of Basic Housing in Low or Middle Income Country (LMIC) (n=1; 1 CBA)</b>  <b>3.1. Other illness and symptoms impacts</b> (n=1; 1CBA):  Reduction in % triatomine serology (<b>P &lt; 0.02</b>) and number of houses with triatomine infestation (<b>P &lt; 0.000</b>) among houses that received insecticide only.  <u>No impact</u> was reported for interventions that focused on housing improvement only, or interventions that received both insecticide and housing improvement.</p>	<p><b>3. Provision from Basic Housing in LMIC</b>  Based on limited evidence, public health <u>should promote</u> insecticide use to reduce triatomine (kissing bug) infestation in LMICs rather than interventions focused on housing improvement. No LMIC studies of Grade A and B assessed general health, respiratory health, mental health and socio-economic and equity impacts; thus these outcomes should be evaluated.</p>
<p><b>4. Rehousing from slums (n=1; 1 CBA)</b>  <b>4.1 Housing condition impacts</b> (n=1;1 CBA):  <ul style="list-style-type: none"> <li>Housing satisfaction were observed for both intervention and control group with intervention group having a greater impact: ‘like apartment a lot’: <b>+55.3%, P &lt; 0.001 vs. +16.5%, P &lt; 0.001</b></li> </ul> <b>4.2 Socio-economic and equity impacts</b> (n=1;1 CBA):  <ul style="list-style-type: none"> <li>Improvements ‘places where children play are not safe’: <b>-39.8%, P &lt; 0.01</b>; ‘family often sit and talk’: <b>+11.1%, P &lt; 0.01</b>; ‘better off’ compared to 5 yrs. ago: <b>+19.0%, P &lt; 0.0001</b></li> </ul> <u>No impact</u> observed for space satisfaction under housing conditions, mental health outcomes, and other illness and symptom impacts.</p>	<p><b>4. Rehousing from slums</b>  Based on limited available evidence, public health practitioners <u>should implement</u> housing improvement interventions focused on rehousing from slums to improve satisfaction with living spaces and neighbourhoods. None of the LMIC studies of Grade A and B quality assessed general health, and respiratory health; thus, public health should evaluate and report on these outcomes in future.</p>
<p><b>Legend:</b> P – Population; I – Intervention; C – Comparison group; O – Outcomes; CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk  **For definitions see the <a href="http://www.healthevidence.org/glossary">healthevidence.org</a> glossary at <a href="http://www.healthevidence.org/glossary.aspx">http://www.healthevidence.org/glossary.aspx</a></p>	

### Why this issue is of interest to public health:

There is a large volume of evidence reporting strong associations between poor health and poor housing.<sup>1</sup> Housing is considered to be one of the factors of the social determinants of health, which influences one’s health status.<sup>2</sup> Poor housing has significant health impacts, increasing incidence of illnesses (i.e., heart disease and stroke) and premature death.<sup>3</sup> In a 2010 the World Health Organization meeting report on Housing, Health, and Climate Change, the WHO estimated that nearly 2 million people in developing countries die each year from indoor smoke due to biomass and coal in inefficient household stoves.<sup>4</sup> Furthermore, it has been demonstrated that indigenous people, in almost every region of the world, are faced with inadequate housing conditions.<sup>5</sup> Therefore, housing improvement interventions should be considered a public health priority.

1. Bonnefoy, X. (2007). Inadequate housing and health: An overview. *International Journal of Environment and Pollution*, 30(3/4): 411-429
2. Centres for Disease Control and Prevention. (2014). *Social Determinants of Health Maps*. Retrieved March 25, 2014 from [http://www.cdc.gov/dhdsp/maps/social\\_determinants\\_maps.htm](http://www.cdc.gov/dhdsp/maps/social_determinants_maps.htm)
3. Steve Barnes. (2013). *Poverty in a health issue: It's time to address housing and homelessness*. Retrieved March 25, 2014 from <http://www.wellesleyinstitute.com/news/poverty-is-a-health-issue-its-time-to-address-housing-and-homelessness/>
4. World Health Organization. (2010). International Workshop on Housing, Health and Climate Change. Developing guidance for health protection in the built environment. Mitigation and adaptation responses. Geneva, Switzerland: WHO. Retrieved from [http://www.who.int/hia/house\\_report.pdf?ua=1](http://www.who.int/hia/house_report.pdf?ua=1)
5. United Nations. (2005). *Indigenous peoples' right to adequate housing: A global overview*. Nairobi: United Nations Centre for Human Settlements. Retrieved from <http://ww2.unhabitat.org/programmes/housingrights/documents/HS-734.pdf>

Other quality reviews on this topic are available on [www.healthevidence.org](http://www.healthevidence.org).

### Suggested citation:

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*This evidence summary was written to condense the work of the authors of the review referenced on page one. The intent of this summary is to provide an overview of the findings and implications of the full review. For more information on individual studies included in the review, please see the review itself.*

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