Assessing the health and social effects on residents following housing improvement: a protocol for a systematic review of intervention studies

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Hilary Thomson & Mark Petticrew

MRC Social & Public Health Sciences Unit
4 Lilybank Gardens
Glasgow
G12 8RZ

Tel: 0141-357-3949
e-mail: hilary@msoc.mrc.gla.ac.uk
BACKGROUND

Poor housing is both an indicator of poverty and has been a common target for interventions to improve public health and reduce health inequalities. (Gauldie, 1974) Although housing still has a prime place on the health inequalities agenda, it is also of wider importance, since small health impacts on individuals can have large effects at the population level.

Hundreds of studies have investigated the health of populations and their housing conditions, resulting in a body of evidence which displays strong associations between poor health and poor housing. (Wilkinson, 1999; Wilkinson et al., 1998; Macintyre et al., 2003; Bonnefoy et al., 2003; Revie & Howieson, 1999; Hopton & Hunt, 1996; Hunt, 1990; Martin et al., 1987; Fuller-Thomson et al., 2000; Holmes & Tuckett, 2000; Humfrey et al., 1996; Peat et al., 1998; Raw & Hamilton, 1995; Wilkinson, 1999) Despite this, there remains some ambiguity about the strength of evidence and also the nature of the link between poor housing and poor health. (Dunn & Hayes, 2000; Howden-Chapman, 2002; Thiele, 2002) The main physical or biohazards associated with housing may only be able to explain a small variation in health status. (Peat et al., 1998; Raw, 2001; Humfrey et al., 1996) Owing partly to this lack of conclusive evidence, it has been suggested that investment in housing may have a stronger justification on the basis of amenity and energy conservation rather than on health grounds. (Strachan, 1989)

Recent ideological shifts have led to an increasing interest from policy makers in measuring the health impacts of social interventions (such as social housing) and in gathering evidence to shape policy and in determining effective ways of improving health. (Acheson, 1998; Blunkett, 2000; Macintyre et al., 2001; Truman et al., 2000; WHO, 1999) The lack of conclusive research findings has obvious implications for providing clear and helpful research based information to policymakers. In the field of housing this was demonstrated in a speech by a former British Minister for Health saying, “My officials tell me it’s hard to prove that better housing improves people’s health.” (Frank Dobson, in a speech to the National Housing Federation in 1997. Dobson, 1997) Rigorously conducted systematic reviews which focus on a specific research question can assist in providing clear syntheses of large bodies of research. Such reviews, therefore, are a suitable way of responding to the calls from policy
makers for policy relevant research evidence by providing digestible summaries of research. In addition, such reviews can point to gaps in knowledge and inform the development of research which is designed to address policy makers requirements.

Assessing the effectiveness of housing improvement to improve health

Much of the existing research investigating the links between housing and health has been cross-sectional. These studies have often demonstrated strong independent associations between housing conditions and health; however the lack of control for confounders means that their results remain open to debate and interpretation. (Wilkinson, 1999) In addition reports of links between poor housing, deprivation and ill health may have only a limited role in informing specific policy decisions around the nature of investment or housing improvement required to improve health. (Maclennan & More, 1999; Thunhurst, 1993)

Experimental studies of the health impacts of housing would provide stronger evidence. However, the experimental approach to housing research has been criticised for being reductionist, and ignoring the multi-factorial nature of causality in housing, deprivation and health. (Hunt, 1993) In addition to this objection, there are substantial methodological, pragmatic and ethical obstacles to the conduct of trials in this field. The key issues are outlined below. Principles of social justice dictate that it would be unethical to withhold an available benefit, such as improved housing, from those deemed eligible simply for the purposes of research. Thus randomisation may only be justifiable where there is a natural delay or waiting list in distributing the housing improvement to eligible participants; (Thomson et al., 2004) such studies are rare. It is most often impossible to blind participants or assessors to the allocation to intervention group or control group, resulting in high levels of recall bias. (Rothman & Greenland, 1998). In cases where randomisation is not possible identifying a suitable control group which is similar both socio-demographically and in terms of the eligibility for a housing improvement is difficult. There may be a time delay between exposure to a housing hazard and emergence of health effect. Furthermore, housing improvements are often accompanied by wider neighbourhood improvements and it is therefore difficult to attribute changes in outcomes to housing improvement alone.
Although experimental and quasi-experimental trials of housing improvement may still be possible, the issues raised above may partly explain why trials of housing improvements, randomised or not, have rarely been conducted. In light of these problems and the current lack of data from randomised trials, it would appear that data from small uncontrolled studies may also be considered valuable to establish the nature and extent of possible health impacts following housing improvement.

Despite the large amount of cross-sectional evidence linking poor housing to poor health, there remains uncertainty about the potential for investment in housing improvement to generate health improvements. Reading randomly through the conflicting results of both cross-sectional and intervention studies may only lead to confusion and uncertainty and may have prevented the development of housing policy to improve the health and lives of those in poor housing. It is, therefore, appropriate and timely to conduct a comprehensive, systematic review of the current level of best evidence of the health effects of housing improvement programmes.

**Previous reviews**

In 2000 the authors of this review protocol carried out a similar systematic review of studies of housing improvement; this is the only international review, systematic or non-systematic, of housing improvement which has been identified. (Thomson et al., 2001) The review conducted in 2000 included all quantitative studies, of any design, of housing improvement which took a measure of health, illness or wellbeing; 18 completed studies and 14 ongoing studies were identified. Of the 18 studies, 8 were identified from electronic databases including database of unpublished literature. The remaining 10 studies were identified through personal communication, conference attendance and hand searching bibliographies of books. Of these 10 studies, 8 were conducted in the UK and 2 in the USA. (Thomson et al., 2002) Although this distribution between studies in the UK and the USA is reflects the distribution of study locations identified through the electronic databases it is possible that unpublished studies from beyond the UK were missed and this may have introduced some bias into the review.
Many of the ongoing studies identified are now due for completion and an update this review is required. Extra efforts to identify unpublished studies carried out beyond the UK will be made.

**REVIEW AIMS**

To assess the health and social impacts on residents following housing improvement.

To make methodological recommendations regarding future research needs in the area.

**Timeframe for review**

The review will commence in 2005, this will allow for some of the ongoing studies identified to be incorporated into the review.

- **April 2005** NHS Centre for Reviews and Dissemination (York) to carry out database searching
- **May 2005** Final reports from previously identified ongoing studies obtained
- **June 2005** Identified citations screened by two independent reviewers and abstracts obtained
- **July 2005** Each study appraised for eligibility by two independent reviewers.
- **September 2005** Data extracted from studies
- **October 2005** Included studies appraised for methodological quality by two independent reviewers
- **March 2006** Final report prepared

**METHODS**

**Searching**


**Other sources of information**

Key journals and bibliographies of all reports, papers and text books reviewed will be hand-searched for further intervention studies or systematic reviews regarding housing and health.

An e-mail will be circulated to all subscribers of the UK Housing Studies Association newsletter and the Health Action Zone discussion group requesting information of unpublished and ongoing studies relevant to the review. Relevant e-mail discussion lists outside the UK will also be identified and requests for study details posted. In addition a printed request for study details will be printed in the newsletter. Project managers at The Joseph Rowntree Foundation will be asked to inform the reviewers of any relevant ongoing or completed work.

Academics from across the industrialised world and with expertise in the area of housing and health will be consulted about hitherto, unidentified studies relevant to the review.

An internet search will be carried out using an internet search engine, the following sites already identified will be searched:

*Scottish Poverty Information Unit*
http://spiu.gcal.ac.uk/home.html

*Housing Corporation Innovation & Good Practice and Research Database*
http://cig.bre.co.uk/igp.html

*The Joseph Rowntree Foundation*
http://www.jrf.org.uk/

*Projects funded by the joint DH/DETR/MRC research programmes on air pollution*
Housing and health research may be based in health departments, academic or health authority, housing departments of higher education, local authorities or housing associations, social policy or local enterprise companies. The reviewers are committed to uncover previous and ongoing work within these groups and will devote search time to this end. In addition to searching the database of ‘grey’ literature, this will involve phone calls to follow up any information suggesting a completed or ongoing evaluation of housing improvements which has included a measure of health, wellbeing or social impacts.

**Inclusion and exclusion criteria**

**Study design**
Prospective, retrospective, controlled, uncontrolled, randomised and non-randomised studies of the health and social effects of housing improvements. Cross-sectional studies that do not investigate the effects of housing improvement will not be included i.e. cross sectional surveys reporting associations between housing conditions and health.

**Participants**
Households of any age range or family type will be included.
Interventions
All physical house types which are static (i.e. not caravans or house boats) will be included, this may include residential establishments providing permanent accommodation and sheltered housing. Housing interventions will be defined as rehousing and any physical change to housing infrastructure, for example heating installation, insulation, double glazing and general refurbishment where aspects of the housing fabric is improved. Physical improvements tailored to meet the needs of the resident will be included, e.g. Medical Priority Housing. Where these improvements are limited exclusively to provision of indoor furniture or equipment, (such as vacuuming, mattresses, and air purifiers) these will be excluded. Studies which provide no specific information on the nature or extent of the physical housing improvement and/or focus on non-physical aspects of being re-housed will be excluded. For example, a study may report the health effects of former residents of supported living quarters being relocated to live independently. It may be mentioned that the physical quality of the new housing is superior to previous accommodation but details of what the actual physical improvements are may be omitted as the intervention of interest to such a study is primarily the move to independent living. Such a study would be excluded.

Environmental studies of the adverse effects of lead, urea formaldehyde foam, air quality, allergens or radon will not be included. These studies assess the impact of exposure to the potential hazard rather than impact of housing improvement. In addition, evidence of the harmful effects of radon, lead and asbestos is now accepted. (Wilkinson, 1999)

Outcomes
Outcome measures will include any measure of health or mental and physical illness, general measures of self-reported wellbeing, quality of life measures. Reports of related impacts on social and socio-economic outcomes among study population will also be extracted for the review.
Assessment of methodological quality

As already mentioned randomised studies have rarely been carried out within the field of housing improvement. In the previous systematic review out of 18 studies identified none was a randomised trial and six were prospective controlled trials. It is expected, therefore, that few randomised studies will be identified for this review and that most included studies will have used other study designs. For this reason it is important that assessments of study quality are adapted to allow for study designs other than randomised studies. Randomised studies will be assessed and graded by adequacy of concealment of randomisation according to the criteria developed by the Cochrane Collaboration, as outlined below:

Adequacy of concealment- A- adequate concealment (e.g. sequentially numbered, sealed, opaque envelopes, centralised randomisation done by someone other than provider of intervention or assessor), B- uncertainty about level of concealment of allocation, C- inadequate concealment, D- allocation concealment not used. Other criteria will also be used to assess study quality for both randomised and non-randomised studies, these are described below:

Minimal selection bias- What was the response rate from the original population? Was the control group adequately matched to the intervention group? Were key confounders adequately controlled for in the analysis?

Minimal performance bias- Were there other important interventions experienced across the intervention group or the control group that might have affected outcomes (e.g. wider neighbourhood change)- if ‘Yes’ have these been adequately described and accounted for in the study design, analysis and/or conclusions? Was exposure to the intervention measured and reported adequately across the study sample?

Minimal attrition bias- Was follow-up of all study participants complete by the end of the study?

Minimal detection bias- Were the assessors blind to allocation? Were the participants blind to their allocation?

Data abstraction & data management

At least two reviewers will independently screen all abstracts identified by the searches. Two reviewers will critically appraise the included studies. Data will abstracted by two reviewers and compared to ensure consistency. Data abstracted will be entered onto a data abstraction form which will include the following:
location and date of study, study design, study population, initial and final sample size, response rates, sampling method, details of control group (if appropriate), details of type of housing improvement, data and statistical tests on impacts assessed (changes in outcomes assessed before and after the housing improvement), sub-group analyses presented. Where relevant data are presented but statistical measures of change or significance are not provided in the original paper, these will be calculated where possible (e.g. new p values calculated using the relevant sample sizes).

**Data synthesis**

Effect sizes from studies will be calculated for all prospective controlled studies identified. Where data for similar outcomes following similar housing improvements are available these effect sizes will be pooled. Heterogeneity will be assessed using chi-square and I-square. If appropriate a meta-analysis of effect sizes will be conducted, otherwise the use of a random effects model will be considered. Where effect sizes are not amenable to pooling due to extreme heterogeneity, a forest plot will be used to illustrate the range of effect sizes. Results of experimental and quasi-experimental studies will be analysed separately.

In order to present a clear demonstration of what studies have been identified, how these studies compare to better quality studies and why they have not been included in the final assessment a narrative description of all studies, regardless of study design, will be included in the final review. This information should also help to point to how future research design within this field could be improved.

**DISSEMINATION**

A paper will be submitted to an international peer reviewed public health journal for publication and for presentation at national and international public health conferences. A summary of the report will be circulated to housing practitioners and policy makers using local and international dissemination networks identified.

**Conflict of interest:** The authors of this protocol have previously carried out a systematic review of the health impacts of housing improvement.
Appendix I- Search Strategy

1. explode "Housing"/ all subheadings
2. housing in ti ab
3. living environment* in ti ab
4. living condition* in ti ab
5. living quarter* in ti ab
6. dwelling* in ti ab
7. owner occupie* in ti ab
8. tenant* in ti ab
9. homeowner* in ti ab
10. landlord* in ti ab
11. rehous* in ti ab
12. flats in ti ab
13. bungalow* in ti ab
14. multistor* in ti ab
15. multi-stor* in ti ab
16. high-rise* in ti ab
17. highrise* in ti ab
18. bedsit* in ti ab
19. bed-sit* in ti ab
20. apartment* in ti ab
21. tower block* in ti ab
22. overcrowd* in ti ab with homes in ti ab
23. crowding in ti ab with homes in ti ab
24. refurbish* in ti ab with homes in ti ab
25. insulat* in ti ab with homes in ti ab
26. ventilat* in ti ab with homes in ti ab
27. (retrofit* or retro-fit) in ti ab with homes in ti ab
28. heating in ti ab with homes in ti ab
29. damp in ti ab with homes in ti ab
30. (mold or moldy or mould or mouldy) in ti ab with homes in ti ab
31. (sanitation or sanitary)in ti ab with homes in ti ab
32. (mites or rats or mice or cockroaches or vermin or fleas) in ti ab with homes in ti ab
33. "room-ventilation"/ all subheadings
34. #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33
35. explode "research"/ all subheadings
36. "policy"/ all subheadings
37. explode "types-of-study"/ all subheadings
38. quasi-experimental in ti ab
39. (program or programme or research or policy or policies) in ti ab
40. (trials or random* or controlled or study or intervention*) in ti ab
41. #35 or #36 or #37 or #38 or #39 or #40
42. explode "animal"/ all subheadings
43. explode "human"/ all subheadings
44. #42 not (#42 and #43)
#34 and #41

#45 not #44

reduce* or increas* or decrea* or evaluat* or change* or changing or intervention* or grow*

#46 and #47

explode "health"/ all subheadings

mental* in ti ab

health* in ti ab

symptom* in ti ab

wellbeing in ti ab

psychological in ti ab

illness* in ti ab

explode "respiratory-tract-disease"/ all subheadings

asthma in ti ab

depression in ti ab

explode "menta*l-disease"/ all subheadings

alcoholism in ti ab

#49 or #50 or #51 or #52 or #53 or #54 or #55 or #56 or #57 or #58 or #59 or #60

* #48 and #61
References


Blunkett, D. (2000), 'Influence or irrelevance: can social science improve government', Secretary of states ESRC lecture speech 2nd February.


Howden-Chapman, P. (2002), 'Housing and inequalities in health', *J Epidemiol Community Health*, 56, 9, 645-646.


WHO (1999), 'Gothenburg consensus paper: Health impact assessment, main concepts and suggested approach', Brussels, European Centre for Health Policy.

Wilkinson, D. (1999), 'Poor housing and ill health: a summary of the research evidence', Edinburgh, Scottish Office Central Research Unit.