

# Villawood East Master Plan

## HIA Literature Review

May 2013



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## Contents

1	Introduction	1
2	Method	2
	Scope	2
	Search strategy	2
	Evidence classification	3
	<i>Quality of studies</i>	3
	<i>Strength of evidence</i>	3
	Search criteria	4
	Search record	5
	Selection of grey literature	6
	Selection of previous HIAs	6
3	Discussion	7
	Interpretation	7
	What do systematic reviews tell us?	7
	<i>General</i>	7
	<i>Mental health</i>	8
	<i>Social cohesion</i>	9
	<i>Access to services</i>	9
	<i>Access to good quality space/urban design</i>	10
	What do other literature sources add?	10
	<i>General</i>	10
	<i>Mental health</i>	11
	<i>Social cohesion</i>	12
	<i>Access to services</i>	14
	<i>Access to good quality space/urban design</i>	14
	What is the evidence for effects on vulnerable groups?	14
	<i>General</i>	14
	<i>Mental health</i>	15
	<i>Social cohesion</i>	16
	<i>Access to services</i>	16
	<i>Access to good quality space/urban design</i>	17
	What is the experience from previous Health Impact Assessments?	17
	<i>HIA summaries (additional detail is provided in appendices)</i>	17
4	Appendix A: Literature Summaries	22
	Interpretation	22
	Section A: Evidence from systematic reviews	22
	Section B: Evidence from other published literature	35
	Section C: Evidence from previous HIAs of housing developments	47
5	Appendix B: Conceptual models	58
6	Appendix C: Summary of key findings	61
7	List of references	63

## Tables and Figures

Table 1	Quality of studies rankings and definitions	3
Table 2	Strength of evidence ranking and scoring system	4
Table 3	Recommendation grade rankings and definitions	4
Table 4	Search terms used	5
Table 5	Summary database search record	5
Table 6	Summary of key findings and vulnerable populations	61
Figure 1	Model of housing, housing change and health	58
Figure 2	Model of higher density housing and health	59
Figure 3	Pathways between housing and health	60

## 1 Introduction

This literature review was commissioned by the Centre for Health Equity training Research and Evaluation (CHETRE) as part of a Health Impact Assessment (HIA) on the Master Plan being developed for the Villawood East housing estate in South Western Sydney, NSW, Australia. The review was undertaken by Ben Cave Associates.

Villawood East is a public housing estate in Western Sydney, established during the early 1950s and in need of improvement. The housing is of a low standard and requires upgrading. It is considered unsuitable for the current and future population and although the greenspace is a highly valued community asset, it is not currently utilised to its potential. The Master Plan is being developed to guide the potential regeneration of the estate. The Master Plan contains options for development that includes improving housing quality and urban design, increasing housing density, reducing concentrations of public housing, improving access to services and high quality urban design and green space. As part of the Master planning process a HIA has been carried out. The literature review was commissioned specifically for the HIA with the intention of it informing this HIA and also providing an evidence base for future work.

The review covers three categories of evidence: scientific evidence from systematic reviews; evidence from other published literature sources (including grey literature); and the health impacts identified during previous similar HIAs. The review is structured around the themes of general health impacts, mental health, social cohesion, access to services and access to good quality space/urban design. A special focus is given to effects on vulnerable groups.

## 2 Method

### Scope

The review focused on the potential health effects that may result from the implementation of regeneration in the Villawood East Estate, including changing housing density and a shift in the proportions of private and public housing. The scope excluded the decanting or enabling process and the wider implications of state wide master planning.

It is noted that this focus inevitably results in a greater emphasis on the generally positive health outcomes associated with improved housing conditions and does not go into detail on the generally adverse health outcomes associated with displacing deprived populations (either due to relocation or through new accommodation becoming less affordable).

The review was divided into four topics, namely:

- mental health;
- social cohesion;
- access to services; and
- access to good quality space/urban design.

Within each of these topics consideration was given to certain population groups. These included:

- people currently living in Villawood East;
- the elderly;
- children;
- single parents;
- single men with complex needs (including ex-offenders); and
- people living with multiple issues.

The review provides information on these population groups where this was identified in the article under review. We did not seek to comprehensively cover all population groups for all issues.

### Search strategy

We searched the following databases:

- PubMed;
- NHS Evidence;
- Cochrane Library;
- AMED;
- CINAHL;
- HMIC;
- Embase;
- Medline; and
- PsycINFO.

In addition a more general search of grey literature was made particularly around the health effects associated with the built environment.

The review was undertaken in two stages. Stage one involved an initial high level scan of the literature to identify the level of evidence in each topic. The aim of Stage one was to identify recent systematic reviews in each topic. Stage two involved a more detailed search of databases and sources.

Stages one and two aimed to identify approximately 10 relevant peer reviewed articles per topic. Where appropriate the reference lists of selected high quality recent studies were reviewed and selected citations followed up.

## Evidence classification

In reviewing sources of information to include, the following hierarchical evidence classification system was used based on the quality of the study design:

- systematic reviews;
- individual randomised controlled trials;
- quasi-experimental studies;
- controlled observational studies;
- observational studies without control group; and
- grey literature.

## Quality of studies

We have classified the quality of the studies in this review according to the Scottish Intercollegiate Guidelines Network (SIGN) methodology.<sup>1</sup> SIGN work in collaboration with the National Institute of Clinical Excellence (NICE) to develop evidence based clinical practice guidelines for the National Health Service (NHS).

SIGN has in part based its assessments on the MERGE (Method for Evaluating Research and Guideline Evidence) checklists developed by the New South Wales Department of Health.<sup>2</sup>

This review does not include a full systematic assessment of study quality, rather a professional judgement was made in relation to perceived levels of bias and probabilities of causal relationships. This was based on a rapid assessment of each source's methodology. Scorings are therefore indicative rather than definitive. Table 1 sets out the rankings and definitions used in scoring study quality.

The SIGN methodology is tailored towards the development of evidence-based clinical guidelines. It is not developed for reviewing sociological papers that, for example, examine the ways in which particular concepts such as social exclusion are constructed. These studies have not been classified according to the SIGN methodology.

Table 1 Quality of studies rankings and definitions

Ranking	Definition
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias.
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias.
1-	Meta-analyses, systematic reviews, or RCTs with a high risk of bias.
2++	High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal.
2+	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal.
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.
3	Non-analytic studies, e.g. case reports, case series.
4	Expert opinion

Source: Annex B: SIGN<sup>1</sup>

## Strength of evidence

The strength of evidence reported for each source has been scored using a simplified version of the Cochrane GRADE approach.<sup>3</sup> This scoring reflects how complete the scientific literature is in relation to an issue, not the quality of the reporting review study. There are four ratings: 'high', 'moderate', 'low' and 'very low'.

'High' signifies the strongest evidence and 'very low' the weakest. Where appropriate a range of ratings have been

used. Scorings for strength of evidence used professional judgement based on an assessment of the overall quality and weight of evidence reported in the selected systematic reviews or evidence summaries. This review has not exhaustively examined the primary sources for each population, intervention or outcome subcategory within each topic. Scorings are therefore indicative rather than definitive. Factors taken into consideration in scoring the strength of evidence are listed in Table 2.

Table 2 Strength of evidence ranking and scoring system

Ranking	Definition
High	High quality studies identifying that the strength of evidence is moderate, low or very low.
Moderate	Limitations in the design and implementation of available studies suggesting high likelihood of bias.
Low	Indirectness of evidence (indirect population, intervention, control, outcomes). Unexplained heterogeneity or inconsistency of results (including problems with subgroup analyses).
Very low	Imprecision of results (wide confidence intervals). High probability of publication bias.

Table 3 Recommendation grade rankings and definitions

Ranking	Definition
A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results.
B	A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 1++ or 1+.
C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 2++.
D	Evidence level 3 or 4; or extrapolated evidence from studies rated as 2+.

## Search criteria

The search was not restricted to a definitive list of pre-agreed search terms. The review took an iterative approach. Stage 1 used search terms based on the topic titles. Stage 2 expanded this list based on key terms used in the literature identified during Stage 1.

Medical Subject Headings (MeSH) is a system used by the U.S. National Library of Medicine to give uniformity and consistency to the indexing and cataloguing of biomedical literature<sup>†</sup>. Terms are arranged in a hierarchical manner called a MeSH Tree Structure. MeSH is an effective means of identifying the most appropriate search terms to use, particularly when accessing MEDLINE/PubMed.

In addition to the MeSHs other subsidiary search terms based on the project scope were used to refine results. These search terms were limited to titles, abstracts or described publication type.

<sup>†</sup> See <http://www.nlm.nih.gov/pubs/factsheets/mesh.html>

Table 4 Search terms used

	Search terms used	Code	Review stage
1	Residence Characteristics	MeSH	1 & 2
2	Housing	MeSH	1 & 2
3	Housing for the Elderly	MeSH	1 & 2
4	Public Housing	MeSH	1 & 2
5	Independent Living	MeSH	1 & 2
6	Residential Mobility	MeSH	1 & 2
7	Health	ti,ab	1 & 2
8	Mental health	ti,ab	1 & 2
9	Social cohesion	ti,ab	1 & 2
10	Access to service*	ti,ab	1 & 2
11	Regeneration	ti,ab	1 & 2
12	Dwelling*	ti,ab	2
13	Bedsit* or bed sit*	ti,ab	2
14	New South Wales or NSW	ti,ab	2
15	Australia*	ti,ab	2
16	Built environment*	ti,ab	2
17	Socio-economic or socio economic or socioeconomic	ti,ab	2
18	Green space*	ti,ab	2
19	Urban design	ti,ab	2
20	Systematic review	pt	1 & 2
21	Meta analysis	pt	2
22	Randomized controlled trial	pt	2
23	Clinical trial	pt	2
24	Journal article	pt	2

Key: MeSH: Medical Subject Heading; ti: title; ab: abstract; pt: publication type; \*: truncation

The following database filters were used:

- publication data range of 2002 - 2012 (i.e. the last 10 years);
- English language;
- human species studies;
- where abstracts available; and
- where full text available.

### Search record

As this review does not follow a full systematic approach only summary search records are presented for the total number of sources included at each stage.

Table 5 Summary database search record

Database portal	Stage	Total Number		
		Titles reviewed	Abstracts or full text reviewed <sup>§</sup>	Included
PubMed	1	138	32	25
PubMed, NHS Evidence and WHO		67	38	10
HIA Gateway WHIASU UCLA HIA-CLIC Health Impact Projects HIA Connect	2	51	43	10

<sup>§</sup> Full text of three reviews unavailable.

### Selection of grey literature

In addition to the grey literature sources identified during stage 2 using the above search method, CHETRE supplied a selection of additional sources based on their own review of Australian grey literature.

- Ruming KJ, Mee KJ, McGuirk PM. Questioning the rhetoric of social mix: courteous community or hidden hostility?<sup>4</sup>
- Darcy M. De-concentration of disadvantage and mixed income housing: a critical discourse approach.<sup>5</sup>
- Darcy, M. and Gwyther, G. 'There goes the neighbourhood ...': recasting 'neighbourhood effects' and 'disadvantaged places' using collaborative 'emergence' methodology.<sup>6</sup>
- Randolph B, Ruming KJ, Murray D. Unpacking social exclusion in Western Sydney: exploring the role of place and tenure.<sup>7</sup>
- Arthurson, Kathy. Neighbourhood effects and social mix policies, Australian efforts at urban renewal.<sup>8</sup>
- Giles-Corti, B., Ryan, K., and Foster, S. Increasing density in Australia: maximising the health benefits and minimising harm. Evidence review.<sup>9</sup>
- Hulse, K. et al. At home and in place? The role of housing in social inclusion.<sup>10</sup>
- Pawson, H., Davison, G., and Wiesel, I. Addressing concentrations of disadvantage: policy, practice and literature review.<sup>11</sup>
- Haigh, F., Ng Chok, H., and Harris, P. Housing density and health: a review of the literature and Health Impact Assessments.<sup>12</sup>

### Selection of previous HIAs

Published HIAs were reviewed from the following online resources:

- HIA Gateway [http://www.apho.org.uk/default.aspx?QN=P\\_HIA](http://www.apho.org.uk/default.aspx?QN=P_HIA)
- Health Impact Projects <http://www.healthimpactproject.org/resources#reports>
- UCLA HIA-CLIC <http://www.hiaguide.org/hias>
- HIA Connect [http://www.hiaconnect.edu.au/completed\\_hia.htm](http://www.hiaconnect.edu.au/completed_hia.htm)
- WHIASU <http://www.wales.nhs.uk/sites3/page.cfm?orgid=522&pid=10108>

The following ten HIAs were selected in collaboration with CHETRE based on their relevance to the Villawood development:

- Marsh Farm Central Area Regeneration Masterplanning HIA, 2009.<sup>13</sup>
- San Francisco Public Housing Redevelopment HIA, 2009.<sup>14</sup>
- Regeneration of Kipling & Blackmore on the South Acton Estate MWIA, 2008.<sup>15</sup>
- HIA of social housing redevelopment in Devonport, 2008.<sup>16</sup>
- A sustainable new community at Sherford HIA, 2007.<sup>17</sup>
- Dove Gardens HIA, Derry, 2005.<sup>18</sup>
- Highway 99 Sub-Area Plan HIA, 2008.<sup>19</sup>
- Better Homes Better Health, HIA of Sheffield's Housing Strategy, 2008.<sup>20</sup>
- 29th St./ San Pedro St. Area Health Impact Assessment, 2009.<sup>21</sup>
- San Francisco Housing Authority Flooring Policy HIA, 2009.<sup>22</sup>

### 3 Discussion

#### Interpretation

The following sections set out the results of the literature review. The discussion has been divided into four sections based on the type of evidence that is presented. The first section sets out the evidence from systematic reviews of the scientific literature. This is the strongest evidence. The second notes evidence from other sources, which although less robust, may provide some insight on topics where there is not review level evidence. The third section examines the experiences of previous HIAs of housing development or regeneration. The final section notes vulnerable populations that have been identified in the literature.

In addition to the referenced citation within the discussion there is also a note of the publication year, and indication of the study's quality and a coded link to a tabulated summary of the review, study or report, which is found in the appendices. For example [1+] indicates the study is 1+ (a well-conducted meta-analysis, systematic review, or RCTs with a low risk of bias).

The evidence in each section has been further subdivided in to discussions of:

- general health effects of housing improvement;
- improvements that have specific import for mental health;
- improvements that address issues of social cohesion; and
- improvements that concern access to space or urban design.

In some cases issues will overlap between these categories, they are therefore not mutually exclusive.

#### What do systematic reviews tell us?

##### General

In the WHO publication *Environmental Burden of Disease associated with Inadequate Housing* Braubach et al<sup>23</sup> [1+] provide the most up-to-date wide-ranging review of the health impacts associated with housing. Braubach et al note that the link between poor housing and poor health is well established. Many cross-sectional studies have reported consistent and statistically significant associations between poor housing conditions and poor health.

Braubach et al identify that there is 'high' strength evidence that improved warmth in the home may produce long-term positive socioeconomic health benefits, such as less time off work/school, and increased social and educational opportunities. Sauni et al<sup>24</sup> [1+] identify mould infestation as a problem in houses, apartment buildings, office buildings and schools. Sauni et al found 'moderate' strength evidence that remediation of mould in houses decreases asthma-related symptoms and decreases respiratory infections. The evidence suggest that mould damaged houses should be remediated to decrease asthma-related symptoms. Such remediation methods may vary from complete rebuilding to improving heating and ventilation. Fisk et al<sup>25</sup> [1+] support this view with 'high' strength evidence that residential dampness and mould are associated with increases in both respiratory infections and bronchitis. The review also notes that dampness and mould in buildings is consistently associated with asthma exacerbation. The study concludes that preventing or remediating dampness and mould in residences may substantially reduce the burden of respiratory infections on healthcare services. Gibson et al<sup>26</sup> [1++] and Thomson et al<sup>27</sup> [1+] also find strong evidence that warmth and energy efficiency interventions have positive impacts on health, although they note that the evidence on other improvements to housing conditions remains unclear.

Beyond the fabric of houses themselves, the community context can also be an important determinant of health. Miller et al<sup>28</sup> [2++] and Anderson et al<sup>29</sup> [1+] report that the physical, social, and economic environments of local communities affect residents' health and exacerbate health disparities. These reviews note that lack of affordable housing has been linked to:

- decreased spending on health and health care;

- delays in seeking preventive and routine medical care;
- medication non-adherence; and
- increased emergency department utilisation.

The reviews also finds that higher utility bills (e.g. following redevelopment) can place an additional burden on lower-income families, forcing trade-offs among housing, heating, food, medical care, and other basic needs. Lack of affordable housing can also undermine the benefits of a stable family home, as families are forced to move frequently, live with other families in overcrowded conditions, or experience periods of homelessness. Such disruption may affect schooling, health care, and social networks.

Addressing housing problems that affect whole communities can be problematic. Gibson et al<sup>26</sup> [1++] find that there is 'low' strength evidence to support the use of area effects interventions designed to improve high poverty areas. The review notes that whilst focusing investment on deprived areas to improve area characteristics or internal housing conditions may assist all of the residents and thus be more cost-effective than identifying and targeting individuals, any positive effects may be hard to detect as they are diluted by benefiting many who were not disadvantaged. Gibson et al recommend that multiple level housing interventions (i.e. those that simultaneously target individuals, households, housing and neighbourhoods) are most likely to be successful.

The Villawood development sits within a policy context that aims to facilitate de-concentration of public housing, increase tenure mix and social diversity and provide additional affordable housing for low and moderate income families. However Gibson et al<sup>26</sup> [1++] note that there is a significant evidence gap in the scientific literature with regards to housing interventions that alter housing tenure. Consequently the health implications of changing the mix of tenure types (e.g. from state leases to private ownership) on a housing development are unknown. Some potential for positive effects is hinted at in Anderson et al<sup>29</sup> [1+], where there was 'moderate' strength evidence that the use of tenant-based rental assistance programs (which subsidize the cost of housing secured by low-income households within the private rental market through the use of vouchers or direct cash subsidies) are effective in improving household safety (reduced exposure to crime and neighbourhood social disorder). However Anderson et al note that there was only 'very low' strength evidence on the effectiveness of mixed-income housing (publicly subsidised multifamily rental housing developments) in improving family health and safety while providing affordable housing.

In the recent WHO review, the conclusion drawn by Braubach et al for general health impacts associated with housing is that although poor housing, poverty, and poor health are inextricably linked, housing improvements alone may be insufficient to lead to measurable health improvements, especially in the short term.<sup>23</sup> Furthermore, although a possibility, there is very limited evidenced that improved housing has long-term health impacts or prevents poor health in future generations.

##### Mental health

In terms of specific impacts on mental health that are associated with housing improvements, Truong et al<sup>30</sup> [1+] found 'moderate' strength evidence of an overall association between mental health and neighbourhood characteristics, after adjusting for individual factors. More specifically Braubach et al<sup>23</sup> [1+] provide 'moderate' strength evidence that although it is unlikely that housing itself will precipitate serious mental disorder, there are two ways in which housing may contribute to mental health:

- One, it can directly affect chronic stress which is known to affect nonclinical symptoms of anxiety, depression, and hostility and frustration.
- Two, poor quality housing may be an additional risk factor that often co-varies with poverty and thus is associated with other physical (e.g. pollution or toxins) and social (e.g. family instability or violence) risk factors. The review notes that exposure to multiple risk factors dramatically escalates the probability of psychological distress.

There is limited causal evidence that particular types of housing give rise to mental health problems; however Braubach et al identify that living in multiple family housing or on the upper floors of high rise buildings is associated with greater mental health problems. Whilst the review identifies that such effects are likely to be larger

for women with young children, the review is clear that there are methodological problems with quantification of mental health impacts at population level.

Other community attributes may also act to mediate mental health. McCormack<sup>31</sup> et al [2++] found 'moderate' strength evidence that access to nearby parks and natural settings is associated with improved mental health and reduced anxiety. Whilst Kim et al<sup>32</sup> [2++] found 'moderate' strength evidence for an association between high levels of neighbourhood social disorder and depression. Although specific remediating interventions were not apparent in the literature, Kim et al found 'low' strength evidence that higher neighbourhood-level socio-economic status may protect against depression. Supporting this association between mental health and socio-economic position, Rehkopf et al<sup>33</sup> [1+] found 'moderate' strength evidence that suicide rates increase as socio-economic levels in an area decrease. Furthermore results did not vary significantly by gender and the highest area suicide rates were associated with the residents living below the poverty level (or similar measures of economic deprivation). Rehkopf et al conclude that these findings are consistent with a contextual explanation where area suicide rates are driven by social and economic isolation of neighbourhoods with higher levels of deprivation. The findings suggest that in order to alleviate depression and reduce suicide rates, regeneration should target the most deprived areas with interventions that bolster, not only housing quality, but also socio-economic drivers (such as employment).

In the recent WHO review, Braubach et al<sup>23</sup> conclude that although mental health outcomes are often hard to quantify in practice, mental health should be included as a separate outcome in assessing the health impacts of housing. This is consistent with the approach being adopted in the Villawood HIA.

### *Social cohesion*

The literature on social cohesion is complex. The term itself has different definitions and there is debate surrounding ways to measure its outcomes.

However Carter et al<sup>34</sup> [1+] find 'moderate' strength evidence that high social capital (as measured by 'low social disorder' or a 'high level of belief in the capabilities of the community to collectively achieve social and political outcomes') protect against increased obesity. As obesity is a major and still growing public health challenge, residential development that optimise opportunities to reduce social disorder (e.g. through street lighting and layout) and promote community participation (e.g. through successful engagement and consultation events) could make an important contribution to wider strategies aimed at tackling obesity.

Although there is mixed evidence to support the view that favourable psychosocial environments are linked to better health, Egan et al<sup>35</sup> [1++] found 'moderate' strength evidence that some favourable psychosocial environments are associated with better health outcomes. In particular the review notes that effective social support or large social networks are associated with lower risk of coronary heart disease and cancer (particularly breast cancer). Egan et al<sup>35</sup> also found that poor psychosocial environments (including exposure to community violence, anti-social behaviour, or discrimination) may reduce health outcomes and contribute to health inequalities.

In conclusion, health improvements from residential planning can be achieved not only from aspects of build quality, but also by designing community layouts and land use mixes that promote positive social interactions.

### *Access to services*

Residential developments should not be considered in isolation, Miller et al<sup>28</sup> [2++] provide 'moderate' strength evidence that access to goods and services within one's community can promote and sustain health. Specifically the review reports that:

- The presence of sidewalks and crosswalks, bike paths, playing fields, parks, shopping accessible on foot, and public transportation, along with the perception that it is safe to be outside, contribute substantially to the average amount of regular physical activity that residents of a neighbourhood achieve.
- Education and employment opportunities influence health by providing the means to achieve an

adequate standard of living now and in the future.

- Neighbourhoods with better access to supermarkets and other retail outlets with minimally processed foods tend to eat a healthier diet than their counterparts in neighbourhoods with less access to these goods.
- The density of fast food outlets and preponderance of energy-dense foods in convenience stores and other small markets has been linked with higher prevalence of obesity and higher BMI. Similarly, liquor stores are more likely to be located in low-income and more heavily minority communities and their greater density is associated with adverse community-level consequences.

Miller et al<sup>28</sup> conclude that parks, green spaces and recreational facilities, high-quality schools, competitively priced supermarkets and other commercial services, and zoning that keeps industrial sites and pollutants at a distance from residential areas contribute to an environment that is conducive to the achievement and maintenance of good health. These local assets reduce adverse environmental exposures, promote opportunities for self-development, and allow individuals and families to engage in health-promoting activities.

### *Access to good quality space/urban design*

The quality of housing design and surrounding space is a key issue that will be relevant to all the previous areas of discussion. However in terms of specific spatial or design characteristics of housing that improve health outcomes the literature is unable to provide a robust evidence base. For example Braubach et al<sup>23</sup> [1+] note that with respect to noise impacts, although effective measures to reduce noise may reduce disturbance and annoyance, there is little evidence of health impacts associated with such changes in exposure in a housing context.

With respect to broader design interventions in the surrounding use of space and integration with other land uses, there is more support from the literature. McCormack et al<sup>31</sup> [2++] note that physical activity participation provides mental and physical health benefits and can also reduce the risk of many chronic diseases. The review finds 'moderate' strength evidence that the built environment can both enable and limit physical activity participation. Specifically, neighbourhood characteristics such as the proximity and mix of land uses, pedestrian connectivity, aesthetics and interesting scenery, and traffic and personal safety are important correlates of physical activity. Physical activity opportunities are not however confined to green space, Renalds et al<sup>36</sup> [2++] found 'moderate' strength evidence that neighbourhoods that are characterized as more walkable, either leisure-oriented or destination-driven, are associated with increased physical activity, increased social capital, fewer overweight people, lower reports of depression, and less reported alcohol abuse. This evidence suggests that designing the layout of residential developments to incorporate a mix of desirable leisure, retail and employment opportunities may improve residents' health.

Despite some evidence that the wider setting of a residential development can affect health outcomes, the overall conclusion from Braubach et al<sup>23</sup> in the WHO review is that there is little evidence of improvements or deteriorations in health (physical or mental) associated with major improvements to housing and the outdoor housing environment as a result of programmes of housing-led renewal.

### *What do other literature sources add?*

#### *General*

In a report for the WHO Thompson et al<sup>37</sup> [4], finds 'moderate' strength evidence that the housing health issues which remain despite strict building regulations are hazards linked to:

- poor air quality;
- inadequate heat;
- dampness;
- radon;
- trips and falls;
- noise;
- house dust mites;

- tobacco smoke; and
- fires.

The report found that the most important housing issues for health related to maintaining appropriate indoor temperatures and reducing mould and dust mite allergens.

Although clear health benefits are identified in the systematic review arising from improved warmth in homes, Milner et al<sup>38</sup> [2+] raises the issue of also maintaining adequate ventilation. The article makes the point that homes are becoming increasingly airtight under moves designed to provide thermal comfort and to reduce energy consumption. Furthermore changes in the lifestyles of an aging population is causing people are spending ever greater proportions of their time indoors. Milner et al argue that in order to reduce concentrations of harmful indoor air pollutants, there is a need to strike a balance between improving building energy efficiency and maintaining adequate ventilation. The article notes that indoor air pollutants may be combustion related (e.g. PM10 and PM2.5, CO, NOX and VOC) or may include other indoor pollutants (such as mould, radon and chemicals from household products).

Collaborative work systematically reviewing UK policy interventions within government reports Petticrew and Thomson<sup>39</sup> [2+] identify that despite significant public investment in urban regeneration programmes there is little evidence (in either systematic or non-systematic reviews) to demonstrate impacts on socioeconomic or health outcomes. However the report advocates that the absence of impact data does not provide grounds for inaction, but rather that urban regeneration decisions must be based on the “best available evidence”. The report concludes that the available evidence suggests that regeneration programmes may lead to some small positive impacts on health and socioeconomic circumstances, though adverse impacts are also a possibility. This view is consistent with work by Thompson et al for the WHO<sup>37</sup> [4], which found ‘moderate’ strength evidence that although housing improvement has the potential to generate health improvement, this cannot be considered separately from other changes that residents may experience as part of housing improvement, such as increased housing costs, relocation and more general neighbourhood changes. Some of these may have additional health impacts, either negative or positive. More recent work by Petticrew et al<sup>40</sup> [2+] confirms the difficulties in linking housing interventions to measurable changes in health outcomes. In their controlled observational study for the Scottish Housing Health and Regeneration Project (SHARP) they note ‘moderate’ strength evidence that whilst social housing renewal may bring positive psychosocial benefits to tenants; such benefits may not be accompanied by significant changes in health, at least in the short term. Consequently although there are well-documented associations between poor housing and poor health, housing investment may not be a major tool for improving health and reducing health inequalities.

In a report based on finding a pragmatic way to make best use the limited available scientific evidence linking health and housing during HIAs, Thomson et al<sup>41</sup> [2003,2+++] present ‘low’ strength evidence that home ownership is associated with improved health. However the report warns that the trend does not hold for those people who are living on the margins of home ownership where mortgage arrears increase insecurity and are detrimental to mental health. This tentative evidence supports the scoping of the Villawood HIA to include consideration of the impacts of housing affordability following a change in the ratio of public/private housing ownership. Thompson et al also advance ‘low’ strength evidence for links between health and house type (e.g. flat or house). The limited evidence is insufficient to confirm causal relationships; however there are associations between flat dwelling and stressful living conditions such as increased social isolation, crime, reduced privacy and reduced opportunities for safe play for children. Such evidence, weak as it is, should be considered in any decision to increase housing density in Villawood using blocks of flats. These messages on the associations of health with home ownership and housing type are also reported by Douglas et al<sup>42</sup> [4] in a guide for HIAs of housing improvements. That guide includes a literature review of all studies which have monitored health change following housing improvement between 1930 and 2000.

### Mental health

In a controlled observational study Bond et al<sup>43</sup> [2+] found ‘low’ strength evidence that the residential and environmental aspects of people’s houses and neighbourhoods were significantly associated with positive mental wellbeing. Key residential issues were whether:

- an area was perceived to have a good reputation by its resident; or
- if residents were satisfied with their house and landlord; or if residents felt that both their home and the neighbourhood contribute to a sense of doing well.

Key environmental issues were:

- living in a house (rather than a flat);
- having a home in good repair;
- living in an area perceived as having attractive buildings; and
- living in an attractive, quiet and peaceful environment.

Douglas et al<sup>42</sup> [4] in a guide for HIAs of housing improvements find ‘high’ strength evidence that regeneration and medical priority rehousing improve mental health. The guidance also notes that there is no evidence that mental health improvements arise following improved energy efficiency interventions.

### Social cohesion

We look first at some of the ‘grey literature’ on social exclusion and social capital. These studies are predominantly sociological and they look at the ways in which the terms are constructed and at the implications of these findings for public policy and research. We then look at some of the findings from the review.

Darcy shows us that the term social exclusion suggests a boundary and focuses attention on those outside it rather than on the features of society which systematically generate widespread poverty and disadvantage.<sup>5</sup> Darcy quotes from the study of the redevelopment of Minto Public Housing Estate.<sup>44</sup> This found that the unit of scale employed to describe and analyse disadvantage in the community obscures differences between areas. It recommended that future research on housing estates should employ smaller geographic areas than whole estates as their units of analysis. Darcy<sup>5</sup> also observed that little is known about the fate of people who have to move out of areas as a result of regeneration. The research solution to this would be to establish a longitudinal study of residents involved in all stages of a regeneration scheme.<sup>45</sup> A service-based approach would involve establishing links with areas into which residents move and also developing good information on the needs of people moving into and out of housing developments.

Randolph et al<sup>7</sup> find that the incidence of multiple social exclusion differentiates the experience of social exclusion in areas of public housing. Policy proscriptions to address exclusion [in these areas in western Sydney] need to address the compounding difficulties that poor accessibility and high levels of income poverty generate for these communities.

Arthurson<sup>8</sup> questions the aspirations for integration and social cohesion given that the target groups entering social housing are no longer predominantly low income working families but mostly people on government pensions often with complex social and behavioural issues, including ex-prisoners, drug addicts and people with mental health issues being rehabilitated in the community.

Arthurson<sup>8</sup> notes that communication technology such as mobile phones, the internet and social media, along with more general motor vehicle access means that for many residents life is no longer bound to the specific geographical space of the neighbourhood in the way that it was in the past. Arthurson does not substantiate this claim for the effect of communication technology nor does she extend it to the whole population: the National Travel Survey in Great Britain found that members of car-owning households made 39% more trips than people living in non-car-owning households, and travelled over twice as far per year.<sup>46</sup> Is there a similar finding for Australia? What do people who live in non-car owning households miss out on by making 39% less trips? Pawson et al<sup>11</sup> also discuss the importance of mobility. They state that the notion of place-based disadvantage has been challenged by the idea that individuals who are sufficiently mobile can avoid many of the negative outcomes associated with living in a disadvantaged place.<sup>47, p34</sup> It is therefore important, when measuring place-based disadvantage, to also recognise and measure various forms of mobility that are available to individuals as balancing factors. Research, and indeed impact assessments, could focus on:

- the extent to which interventions succeeded in maximising local policy coordination;
- how far resources were used effectively;
- what factors could help address the negative consequences of locational disadvantage for disadvantaged people; and
- which demographic groups could and should be targeted for programs and interventions.

Pawson et al<sup>11</sup> observe that there is currently a policy zeitgeist around public participation. They recommend establishing the extent to which disadvantaged communities have been actively involved in shaping interventions and establishing what gap there is (if any) in the level of public service provision between disadvantaged places and their wealthier neighbours.

Coutts et al<sup>48</sup> looked at indicators for social capital. Social capital is a complex concept which must be understood as a combination of both structural and cognitive elements in a community. These elements reinforce each other to generate the stream of outcomes that has been associated with the concept. Thus, the structures of social capital (ie social networks) must not be disassociated from the cognitive elements (ie trust, attitudes, etc). It is the cognitive elements which are more commonly measured by surveys. A multi-level approach to social capital measurement enables the distinction between the effects of context and those of social capital. Coutts et al<sup>48</sup> also note the distinction between bonding and bridging social capital whereby bonding social capital refers to the relations within homogeneous groups. These are the strong ties that connect family members, neighbours, and close friends and colleagues. Bridging social capital refers to heterogeneous relations, ones that exist between groups: these are the weak ties, including formal or informal social interactions that link people and communities of different ethnic, occupational and socio-economic backgrounds. Bonding and bridging social capital are inter-related and can at different times and in different contexts be seen as either protective or harmful to health. Any intervention to strengthen social capital within communities is likely to be associated with both risks and benefits to different groups.

Hulse et al<sup>10</sup> also pick up the importance of examining the people who are involved in the housing development and the wider context within which the development is taking place. They state that the most effective programs are those that have a dual focus on people and also on the wider systemic processes that maintain inequality. Yet they caution that maintaining a dual focus requires sufficient resources streams and political commitment. Area-based interventions alone are incapable of addressing the wider systemic problems that arise from fiscal policies that sustain economic inequality. Any effective 'narrowing of the gap' requires sustained investment in locations that are disadvantaged, for example, economic development to generate jobs as well as strategies to equip people for, and connect with, work.

In an Australian controlled observational study Kelaher et al<sup>49</sup> [2+] examined a neighbourhood renewal intervention that used cooperation between local agencies, government and residents (50% resident membership) to:

- increase community pride and participation;
- enhance housing and environment;
- improve employment, learning and local economic activity;
- decrease levels of crime and improve personal safety;
- better health and wellbeing; and
- increase access to services and improve government responsiveness.

The study demonstrates a neighbourhood renewal intervention can be particularly effective in improving health and life satisfaction among disadvantaged people living in the target areas if there is effective cooperation between stakeholders. However the intervention was less effective at reaching immigrants from non-English speaking countries, people educated below year 10 and the unemployed. These shortcomings may be particularly relevant to the Villawood context where there are a high proportion of residents from non-English speaking backgrounds.

Thomson et al<sup>41</sup> [2003,2+ ] find 'low' strength evidence for the following health impacts associated with social

cohesion during programmes of housing improvement:

- Moving house can be a stressful, health damaging life event, particularly in the field of social housing where there are limited opportunities to negotiate with the housing authority. The review notes that housing relocation can also be associated with loss of community, uprooting of social networks and unsatisfied social aspiration that may counteract satisfaction with improved housing.
- Housing regeneration projects can lead to displacement of original residents, which may result in misleading shifts in routine social and health statistics.
- Socioeconomic characteristics of a neighbourhood may have an effect on a person's health status. The review notes that health improvements are likely where employment, education and social integration opportunities increase alongside housing.

In guidance on HIAs for housing improvements Douglas et al<sup>42</sup> [4] suggest that there is 'moderate' strength evidence that although health effects are unknown, there are associations between housing improvements and:

- increased community involvement;
- social support; sense of belonging and feeling of safety;
- reduced fear of crime; and
- sense of isolation.

The guidance also notes that moving and relocation can lead to loss of social networks, stress and uncertainty and lack of control over changes and living circumstances. Furthermore, original residents may be displaced and not benefit from the housing improvement; or residents in neighbouring areas not part of a regeneration program may feel excluded resulting in community divisions between improved and non-improved areas.

#### Access to services

Thomson et al<sup>37</sup> [4] find 'moderate' strength evidence that good access to waste storage is an important requirement to reduce domestic infestation that pose potential health hazards e.g. cockroaches, rats and mice. Design considerations should therefore ensure that adequate provision is made for waste management, particularly in high density housing.

#### Access to good quality space/urban design

In an article in the Lancet Rao et al<sup>50</sup> [4] identify 'low' strength evidence that creating streets, green spaces, and neighbourhoods that encourage more walking or cycling and opportunities for informal social interaction, are associated with improved physical activity and mental health. Furthermore, incorporate clear signposting, good acoustics and natural lighting into building design may reduce stress.

Douglas et al<sup>42</sup> [4] suggest in their review supporting HIA guidance that interventions targeting house dust mite and allergens exposure do not improve health or reduce asthma symptoms.

#### What is the evidence for effects on vulnerable groups?

##### General

There is 'moderate' evidence from Braubach et al<sup>23</sup> [1+] in their systematic review that those people living in poor housing are most likely to be socioeconomically deprived and have long-standing illness. Vulnerable groups such as the sick, the elderly, and the unemployed, are among those most likely to live in poor housing and also tend to spend large amounts of time in their homes exposed to potentially hazardous environments. The review found 'high' strength evidence that improvements in provision of affordable warmth can lead to respiratory health improvement in the short term. The greatest potential for health improvements is for those with existing respiratory illness who are living in houses that are difficult and costly to heat. Douglas et al<sup>42</sup> [4] report 'moderate' strength evidence that the elderly are at particular risk of indoor air quality and extremes of temperature. Furthermore Braubach et al<sup>23</sup> found 'moderate' strength evidence that housing adaptations to promote

independent living and rehousing to meet medical or mobility needs can have health benefits for residents.

Metcalfe et al<sup>51</sup> [1+] provide 'high' strength evidence using both descriptive analysis and meta-analysis that women who live in low income neighbourhoods are significantly more likely to have a low birthweight infant. The study strongly suggests that neighbourhoods play a significant role in birth outcomes, although further research is required to determine the mechanisms.

Miller et al<sup>28</sup> [1+] provide 'moderate' strength evidence that communities with large concentrations of low-income and minority residents are especially likely to be exposed to high concentrations of pollutants and are less protected by zoning from the siting of dumps and bus depots and proximity to highways. The review notes that children are particularly sensitive to unhealthy conditions in neighbourhoods; as even low levels of pollution can increase morbidity and mortality. Children are also sensitive to indoor exposures such as lead, dust mites, mould and radon. Approximately 40% of children diagnosed with asthma have had home exposures implicated in the diagnosis.

Gibson et al<sup>26</sup> [1++] provided 'moderate' strength evidence that moving people from high to low poverty neighbourhoods can improve mental health, reduce obesity and impact positively on some wider determinants of health, such as respondents' experience of social disorder. The review concludes that housing interventions that are carefully targeted at those in greatest need may hold the most promise for improving health.

In an article on housing disparities, Hood et al<sup>52</sup> [4] argues that aspects of the built environment can add to the burden of illness among ethnic minority populations and low-income communities. Hood et al suggest that the practice of housing the poor in discreet areas of a city with few amenities is linked to obesity and adverse mental health outcomes. Furthermore the article suggests that housing in such areas is typically dilapidated, with increased exposures to:

- lead;
- asthma triggers (such as mould, moisture, dust mites, and rodents); and
- mental health stressors such as violence and social isolation.

### *Mental health*

Mansell et al<sup>53</sup> [2++] found 'moderate' strength evidence that dispersed community-based housing is superior to clustered housing on the majority of quality of life indicators for adults with intellectual disabilities. The only exception being that there are some benefits to village communities for people with less severe disabilities. Consideration should be given during the planning of residential developments to providing appropriate community based accommodation opportunities for adults with intellectual disabilities. Kozma et al<sup>54</sup> [2++] noted that the presence of people with intellectual disabilities in the community, their participation in community-based activities, and use of community facilities are often seen as one of the core indicators of their social integration. The review found 'moderate' strength evidence that people with mental health conditions in small scale community-based residences or in semi-independent or supported living arrangements have a better objective quality of life than do people in large, congregate settings. The review suggests that residential developments should consult with local mental health services on how aspects of housing provision and urban design can support people with mental health conditions and their carers within the community.

Kyle et al<sup>55</sup> [1+] noted that individuals with severe and persistent mental illness (SPMI) identify housing as an important factor in achieving and maintaining their health. The review found 'high' strength evidence that providing housing to formerly homeless persons with SPMI reduces hospital admissions and reduces days hospitalised. The evidence suggests that 95% of housing costs can be offset by the reduced use of hospital services. For previously homeless people with SPMI, the key issue for improving health outcomes is length of time in housing rather than type of housing. For individuals with SPMI not identified as being homeless, the review found 'low' strength evidence that housing interventions that improve the housing circumstances of individuals with SPMI, may reduce psychiatric symptoms and increase wellbeing. Kyle et al conclude that people with SPMI should be offered housing that is:

- not contingent on psychiatric treatment compliance or sobriety;

- offers an unlimited length of stay;
- has low numbers of residents;
- is of good quality; and
- provides individuals with their own rooms.

Sellström et al<sup>56</sup> [1+] found 'moderate' strength evidence of a 10% increased risk of having a low birth-weight infant (a significant determinant of child health) if the mother lived in a disadvantaged neighbourhood. The review notes that low-income mothers with limited education tend to have lower birth-weight infants. Sellström et al also found 'moderate' strength evidence that behavioural problems among children were more common in poor neighbourhoods, and within these communities more prevalent amongst families of low socioeconomic status. Sellström et al conclude that neighbourhood socioeconomic status and social climate have small to moderate effects on child health outcomes, i.e. birth weight, injuries, behavioural problems, and child maltreatment. The evidence suggests that health risks to children can be reduced by targeting underprivileged neighbourhoods, particularly families with few resources. Jolleyman et al<sup>57</sup> [1+] found 'moderate' strength evidence that children who experienced high levels of relocation (repeated changes in housing) were associated with increased indirect aggression, property offences and behavioural problems requiring psychological help. For adolescence outcomes shifted to earlier initiation of drug use, earlier onset of depression and, among adolescent girls, an increased risk of both premarital sexual behaviour and teenage pregnancy. The review's findings suggest that consideration should be given to creating stable residential environments for children and adolescents. This may include appropriate access to parental employment opportunities as well as an affordable family housing.

### *Social cohesion*

In examining how psychosocial environments affect health, Egan et al<sup>35</sup> [1++] found 'moderate' strength evidence that social support (from spouses at home and from social networks in the wider community) or participation in local activities are associated with better health amongst elderly populations. The review also found that fewer social resources at a community level can be associated with increased likelihood of child maltreatment at home, which may increase risks of bi-polar disorder in later life. The review suggests that in planning housing developments consideration should be given to optimising opportunities for social support and social networks, e.g. through appropriate housing mix, layout and integration of services and amenities.

### *Access to services*

Rosso et al<sup>58</sup> [1+] found 'low' strength evidence that transportation systems, land use patterns, and urban design can impact mobility in older adults. The review concludes that to promote physical activity (walking) in older adults, developments should give consideration to reducing car commuters; increasing paths and trails; providing retail and employment opportunities close to residential areas; and include traffic safety measures for pedestrians.

Lovasi et al<sup>59</sup> [1+] found that disadvantaged groups in the US tend to live in worse environments with respect to food stores, places to exercise, aesthetic problems, and traffic or crime-related safety. The review found 'moderate' strength evidence that proximity to convenience stores is associated with higher body mass index in adolescents as well as fewer health food choices and poorer quality produce. Low income areas tend to have more convenience stores and fewer supermarkets. Supermarkets are generally associated with greater fruit and vegetable consumption. Papas et al<sup>60</sup> [2++] also found 'moderate' strength evidence (primarily from US studies) that access to affordable, healthy foods, is constrained within low-income communities, thus partially explaining the higher rates of obesity seen in low-income communities. However the review notes that studies (not systematic reviews) from Australia<sup>61-63</sup> have found weak or no association between neighbourhood-level socioeconomic factors and food availability. The review also found 'low' strength evidence that for older people perceived 'availability of services for seniors' and 'neighbourliness' increased physical activity in home-dwelling persons aged 65 years or older. The review suggests that to promote healthy eating and physical activity, residential developments should: have access to affordable, healthy food; facilitate access to services for older people; and adopt development layouts that encourage positive interactions with neighbours.

Jolleyman et al<sup>57</sup> [1+] found 'low' strength evidence that children and adolescents exposed to high levels of relocation experienced reduced continuity of healthcare provision. The evidence suggests that local health

services should be alerted to the potential need for increased service promotion for new residents and increase care planning for those who may be displaced.

### Access to good quality space/urban design

Ding et al<sup>64</sup> [1+] summarise findings from peer reviewed papers on the associations between neighbourhood environment and physical activity among young people. The review found 'moderate' strength evidence that for children the environmental attributes that were consistently associated with physical activity were walkability, traffic speed/volume, access/proximity to recreation facilities, land-use mix, and residential density. 'Moderate' strength evidence was also found for adolescents that the most supported correlates were land-use mix and residential density. These findings suggest that planning policies should: enhance access to parks during neighbourhood regeneration; encourage schools to open facilities to the community; provide incentives for private recreational facilities to locate in underserved neighbourhoods; require mixed-use development; and create roadways that are pedestrian friendly and promote safe traffic patterns. These findings are consistent with Carter et al<sup>34</sup> [1+] who found 'high' strength evidence that socioeconomic disadvantage increases child adiposity (obesity). The findings suggest that reducing socioeconomic disadvantage has an important role to play in reducing levels of childhood obesity. Another opportunity for reducing childhood obesity that may arise during the planning of residential developments is improving opportunities for physical activity. McCormack<sup>31</sup> et al [2++] find 'moderate' strength evidence that access to nearby parks and natural settings is associated with improved healthy weight among children. The review notes that actual and perceived attributes including safety, aesthetics, amenities, maintenance, and proximity are important for encouraging park use. The review reinforces the suggestion that during residential developments opportunities should be taken to create more high quality neighbourhood parks within walking distance.

Yen et al<sup>65</sup> [2++] identify 'moderate' strength evidence that neighbourhood environment is important for older adults' health and functioning, as a majority of older adults are inactive and physical inactivity is linked to quality of life, morbidity, and mortality. The review found that more accessible neighbourhood design (including well laid out good quality walking surfaces) supported greater levels of walking. Similarly, Lovasi et al<sup>59</sup> [1+] found 'moderate' strength evidence that quality of sidewalks, parks and exercise facilities affect levels of physical activity. The review notes that as use is also highly dependent on cost, opening hours and maintenance, low income groups usually have less access to indoor and outdoor places to exercise. Lovasi et al also identified that low income and minority populations tend to live in neighbourhoods that are perceived as less attractive and less safe. Their review finds 'low' strength evidence that pleasant aesthetics or green spaces are linked to reduced health disparities and to lower obesity risk. Lovasi et al conclude that advantaged subgroups benefit the most from new resources when they are provided at the same level to all. Thus, a built environment improvement may increase health disparities unless disadvantaged groups are specifically targeted.

### What is the experience from previous Health Impact Assessments?

#### HIA summaries (additional detail is provided in appendices)

The *Marsh Farm Central Area Regeneration Masterplanning HIA*<sup>13</sup> noted that although there were likely to be long-term health and wellbeing benefits from the development, during construction and decanting there would be considerable disruption of daily routines with adverse impacts on mental health, social networks and access to services. The HIA noted that children were particularly vulnerable to disruption of school and extra-curricular activities, with adverse impacts on health and wellbeing. The loss of shops and amenities that particularly targeted younger age groups, or which had strong meanings for existing local children was also noted as important. Other disadvantaged groups included, women with childcare responsibilities, older people, people with disabilities or people from black or ethnic minorities. For these groups disruption to local services was more pronounced, as was the loss of local shops that provided culturally important specialist produce. Key mitigation recommendations included: provision of financial assistance to longstanding residents to support their move; provide community spaces and a range of facilities, (e.g. health centre, business space and community facilities); homes should meet high quality standards; shopping area should be family friendly and prioritise use by families, older people and those with disabilities; shopping area should include an ATM cash machine; provision of biodiverse green-space with play areas and covered seating; include a 'cop shop' to reduce perceptions of crime; any pub should

be away from residential areas; routes should be safe, accessible and well lit; adopt a 'walkable community and development' principle; ensure adequate provision for maintenance is built into the proposals; and make provision for sustainable waste management.

The *San Francisco Public Housing Redevelopment HIA*<sup>14</sup> noted the importance of using safe building materials, e.g. lead free paint and low VOC materials. The HIA also stressed the importance of high quality design and maintenance to avoid structural defects which could have adverse health impacts (e.g. build-up of pollutants/allergens, infestation and mould). Recommendations for this issue included: quality plumbing; good noise insulation; avoid carpeting; good ventilation and drainage to avoid mould; and food and garbage management to avoid pests. The HIA also examined neighbourhood context, noting the importance of environmental hazards such traffic calming measures to reduce traffic-related pollution and community noise. Housing affordability was also highlighted in preventing homelessness, overcrowding and displacement as a result of the development. Crime and fear of crime featured as important design considerations. Being prospective the HIA was able to note residents' views that the open nature of the residential site created a sense of vulnerability and the important role that the community centre played in keeping youth out of trouble. The HIA recommended that future developments ensure that commitments are made to provide ongoing security for the areas of the development, as a onetime investment is insufficient to keep levels of violence low. A major concern raised during the HIA concerned involuntary residential displacement and the importance of providing additional support to any residents temporarily displaced by the redevelopment, particularly the elderly, families or vulnerable individuals. To reduce the likelihood of displacement, the HIA recommended opportunities to expand rather than redevelop public housing. The HIA noted that children are a key, and often vulnerable, population during public housing redevelopments. The HIA recommended developments include on-site community centres with extended hours (e.g. computer labs, job training, sports and fitness, afterschool education and college planning). Health eating was also raised with the recommendation that there be fewer fast food and more supermarket grocery stores onsite in new neighbourhoods. The HIA includes a useful diagrammatic summary of the pathways between health and housing, which has been reproduced in Appendix B (see Figure 3). The HIA argues that the strongest evidence for housing-health relationships exists at the 'microenvironmental' level.

The regeneration of *Kipling & Blackmore on the South Acton Estate Mental Well-being Impact Assessment (MWIA)*<sup>15</sup> focused on the adverse mental health impacts associated with decanting populations during large scale residential redevelopment projects. The impact assessment noted that such disruption is stressful and can break up social networks particularly for vulnerable immobile elderly people. The report found that families need additional support owing to stress associated with changes in schools. Adolescents also had particular difficulties owing to limited success in re-establishing themselves in a new community, with consequent loss of social networks and friendships. A further vulnerable group during decanting were refugees and migrants who face barriers to accessing services (particularly language). This group may have less understanding of what is happening; may have less opportunity to participate; and may not have secure tenure. It was noted that those most affected by the regeneration were those least likely to come to the regeneration office to participate or receive information. A suggestion was that targeted outreach could be undertaken to ensure those who are most at risk had a better understanding of what was happening. Other recommendations of the HIA were to include residents in the design process, as they would be able to quickly identify improvements simply by looking at the design with a view to living in it (e.g. access to gardens through the kitchen instead of the living room). Other recommendations included: providing additional temporary lighting to areas under redevelopment to improve safety; providing a means for residents to identify their home as it is being built to create a sense of identity and attachment in the early phases; providing practical support for residents e.g. crèche facilities available when people are moving out; and establishing a 'buddy' scheme whereby existing tenants can volunteer to mentor new tenants.

The *HIA of social housing redevelopment in Devonport*<sup>16</sup> found that there would be improved health in the long run from better housing. However the HIA also identified potential health risks, particularly from construction phase activities. Key issues included: stress, disruption and pollutants affecting residents; economic stress on local businesses; serious stress and reduced access to health moderating services from inefficient or poorly communicated decant plans. The HIA recommended involvement of experts and residents in considering ways to improve the efficiency of the decanting process and in planning provision for disabled people. With regard to operational housing provision the HIA found there was: inadequate housing provision for people with disabilities,

with the result that this group suffered reduced health outcomes from not being integrated within communities; insufficient access to green space; and inadequate provision for the housing needs of young people (the HIA noted that community cohesion is harmed if youth needs are unmet). The HIA also noted stakeholder concerns that the development was not addressing: stress arising from 'problem' neighbours; resentment at perceived 'priority' treatment for others; and the need for housing for people facing homelessness. To address these concerns the HIA recommended a 'locally sensitive lettings policy' was developed which recognised in particular the needs of minority groups, young people and disabled people.

A sustainable new community at Sherford HIA<sup>17</sup> categorised potential housing development health opportunities and risks into five areas, namely: service provision; transport and connectivity; social and cultural governance; housing and the built environment; and the economy and employment. For service provision the key opportunities were: provision for small retailers, which were described as the linchpin of a sustainable business base at neighbourhood level; and good availability of services and amenities that supported eating fresh vegetables, obtaining medicines, or getting regular exercise. The HIA recommended partnership working with local producers and retailers. Health risks associated with service provision highlighted a current lack of both formal and informal youth orientated services and facilities, catering for both older as well as younger children. In the transport and connectivity category, the HIA noted: the opportunity for car park and green travel plans that included elements of physical activity; the potential social, as well as exercise, benefits of 'safe routes to school' initiatives; and the advantages of developing access plans for those with disability that provided a complete solution from within the home, to shops/work and back to home. Health risks associated with transport and connectivity were also described, including: the disproportionate effect of poor public transport access on women, children and disabled people, people from minority ethnic groups, older people and people with low socio-economic status; and the trade-off between the benefits of improved transport and the potential for severance of community networks at the local level due to large traffic volumes. The HIA recommended regular travel surveys and inclusion of residents in the detailed design of each leg of public/private travel planning. Within social and cultural governance the HIA identified opportunities for building empowerment and social capital from community participation. Public art was cited as a potential focus for community activity. In contrast potentially adverse health outcomes were linked to: social isolation; failing to integrate new and existing residents; lack of support for local representatives/councillors during the community transition; and crime/fear of crime in reducing social cohesion and causing stress, particularly for the elderly. The HIA recommended the provision of: flexible social infrastructure, which can be easily adapted to a changing population; affordable sports facilities; and services and facilities that cater not only for young people, especially teenagers, but also for the needs of different faith groups. Within the category of housing and the built environment the HIA found opportunities to improve health by: using high design standards (e.g. BREEAM); make provision within the scheme for opportunities to safely exercise (parks, green space and sports facilities); specifically catering to issues of setting that facilitate social interactions within older people (e.g. access to transport, safe public spaces and trees near older peoples' homes); include and maintain a high percentage of affordable housing within the scheme; make neighbourhoods walkable (e.g. mixed land use, high density, high street connectivity, and safety features such as lighting and CCTV). The HIA recommendations for housing included: designing homes to be 'flexible' to changing family needs; investigating and meeting the specialist housing needs of people with mental health issues or disabilities; defining a clear urban rural edge to the development to prevent sprawl; and including amenities such as lighting, water fountains, bicycle racks and walking/jogging paths to increase physical activity. Alongside these opportunities the HIA also noted health risks arising from the design of housing. In particular the HIA noted that although there are advantages to avoiding lower quality standards or zoning of affordable housing, such 'tenure blind' developments run the risk of only making inequalities less visible rather than reducing them. The HIA recommended that plans include additional support for those in affordable housing. A further risk to social cohesion and community investment may arise from a high turnover in occupancy of affordable housing; this may be compounded by affordable houses decreasing the value of adjacent properties (pepper-potting). With regard to construction phasing the HIA notes the importance of ensuring that social infrastructure is established in advance of or in tandem with, the population moving in. A further area of risk is associated with long construction periods, which may mean that a cohort of children grow up amongst heavy construction (associated with: air pollution; noise pollution; dust; injury as a result of road traffic accidents involving construction vehicles; and hazards from contaminated land). The HIA suggests that this effect could be minimised by ensuring areas are fully developed one at a time and do not suffer ongoing piecemeal development for extended periods. In the economy and employment category the HIA finds opportunities for beneficial health impacts from local employment (though

the project should actively link to providing training and engaging socially excluded groups, e.g. the long-term unemployed and those with low educational achievement). The potential for further benefits to the local and regional economy are also noted, with the effect of health on labour supply as a major contributor to economic growth. However the HIA warns that traditionally regeneration initiatives are often filled by workers from other areas, which whilst having beneficial regional or sub-regional effects may have adverse local effects. Finally the HIA notes the importance of job quality. Jobs that offer only low pay, insecurity and limited job sustainability will not promote the social inclusion of the worst off. The HIA recommends that the developer work with skills trainers to bring trained employees forward in line with demand (e.g. construction and operation of new facilities).

The Dove Gardens HIA, Derry<sup>18</sup> made a number of recommendations to address potential health effects associated with the demolition and redevelopment of a housing estate, of 79 dwellings, these included: the need for traffic calming measures; local consultation on the demolition contract; involvement of residents in environmental work e.g. tree planting; ensure homes are energy efficient to reduce fuel poverty; include planting within areas that retain clear responsibility for the plants, e.g. within gardens; incorporate recycling systems into the design of kitchens and gardens; design homes that can be adapted to the changing needs of families as children grow up, e.g. provision for the study needs of children and students; minimise use of flats; ensure new developments compliment the layout of retained areas; provide safe play areas and make street safe places from children; build contracts for ongoing maintenance into the scheme; regularly update residents on the development's progress, e.g. meetings and newsletters; form a residents association early on in the process as a forum for formal consultation; include outreach work and comprehensive information packs in any decant process; identify how individual health needs can be catered for within dwellings; encourage contractors to link with local training and employment schemes; and finally develop a communication strategy to publish the results of the HIA.

The *Highway 99 Sub-Area Plan HIA*<sup>19</sup> cites wealth as the most significant social determinant of health, with equal access to decent and affordable housing as a way to begin to equalize the health outcomes of all residents across income levels. The HIA recommended prioritising provision of affordable housing; making every effort to avoid homelessness as a result of displacement caused by the development; using a mixed-income single and multi-family housing model; and avoiding segregation of housing units by ethnicity or age. The HIA goes on to note the importance of incorporating income opportunities though the inclusion of businesses that provide living wage jobs in the area. With regard to housing density the HIA finds that as dwelling density is increased, creation of mixed-income housing has the capacity to enhance social equity and social cohesion in a neighbourhood. However, if the economics unfairly burden low-income residents through high rents or displacement, such cohesion will be challenging. The HIA therefore recommends that developers set-aside 10% for affordable housing units to avoid displacement or unfair burden on low income residents. Continuing in the economic vein, the HIA discusses how although a 'destination' based community is desirable, there are inherent conflicts between traffic (with its risk of automobile related injury and adverse health outcomes related to air and noise pollution) and the aspiration for a mixed use walkable / bikeable community. In finding a balance to this conflict, the HIA recommends creating multiple hubs where clustered retail, grocery, and other amenities essential to daily life are within easy walking distance (ideally ¼ mile) of housing. Such hubs should be complimented with a variety of transport options and mitigation that protects against the adverse effects of road injury, traffic noise and traffic air pollution (e.g. traffic calming, noise barriers, building sound insulation and locating dwellings and commercial hubs away from arterial roads). The importance of healthy eating options through the avoidance of 'food deserts' is also highlighted by the HIA. The HIA recommends a low retail food environment index (total number of fast food restaurants and convenience stores in a geographic area divided by total number of super markets and produce vendors) by limiting the geographic concentration and number of fast food restaurants, convenience stores and liquor retailers. The importance of maintaining accessibility for the elderly and those with disabilities is noted. The HIA recommends frequently stopping public transport options and well maintained sidewalks suitable for wheelchairs. For other groups the HIA recommends well maintained and safe cycle routes as a key opportunity to bring health benefits to a community. Parks and increased 'urban canopy' are linked to increased physical and mental health, particularly for older people. To further increase walkability of a development the HIA recommends a street network simulates a grid pattern, with block sizes in the range of 200-800 feet and maximum distances between intersections of 1,000 feet on arterial streets and 500 feet on local streets. The HIA also notes the importance of safety and recommends: pedestrian scale architecture; well-lit streets; local policy limiting permits for alcohol retail; form-based zoning; green space (including plazas and pocket parks); clean sidewalks; elimination of graffiti; heritage trails; and garbage and recycling containers.

The *Better Homes Better Health, HIA of Sheffield's Housing Strategy*<sup>20</sup> acknowledges that for the majority of residents the housing market provides a secure home, conferring the psychosocial benefits of mental health and well-being. However for a minority of residents, stress arising from the financial insecurity of their home leads to depression and anxiety. The HIA therefore recommends that a strong social housing sector is maintained and short-term measures that alleviate financial distress are also considered. Features of homes that contribute to health and wellbeing include: warmth, safety, security, cohesive communities and good quality housing. The HIA recommends focusing on improvements to warmth and security, particularly for single pensioner households. At the neighbourhood level the HIA notes the need for a balance between environmental objectives with those for health, social cohesion and community safety. Strategic planning and investment in housing services should therefore promote the independence of vulnerable residents and alleviate physical dependency caused by ill health. To this end the HIA recommends expansion of the Joint Strategic Needs Assessment (JSNA) which covers the area of the development to include a cost-benefit analysis of housing's contribution to adding quality of life to years lived.

The *29th St./ San Pedro St. Area Health Impact Assessment*<sup>66</sup> notes the benefits of high density residential housing in improving: access to goods and services; the success of neighbourhood retail; walkability; the success of public transit; and the amount and access to parks and open space. This is primarily due to the ability to offer services more efficiently with less supporting infrastructure per capita. However the HIA warns against 'urban sprawl' as people living in areas of sprawling development are less likely to walk, and more likely to weigh more and to suffer from high blood pressure. In designing new communities, the HIA advocates reducing income-related residential segregation, as this improves household safety, reduced exposure to crime, and decreased neighbourhood social disorder. However consideration should be given to balancing housing costs as high rents or mortgage costs can precipitate eviction and displacement, conditions that can lead to overcrowding, segregation and even homelessness. The HIA therefore recommends prioritising developing housing units that can be offered at an affordable rate for local community residents most in need. The range of affordable housing costs should be recalculated to reflect rates that allow local residents to be paying no more than 30% of their income on rent or mortgages. The HIA also recommends that the size and number of bedrooms in housing units should reflect the range of family size in the local population and that specific housing opportunities should be made for teachers and/or local school employees in order to focus on the link between the project site and neighbourhood schools. A further point on housing design is the suggestion that buildings facing park and recreation spaces should have windows that open onto these areas in order to increase community surveillance. Finally the HIA notes the importance on ongoing maintenance to prevent deterioration of housing. Substandard and deteriorating housing contributes to a variety of ailments, from respiratory disease and neurological disorders to psychological and behavioural dysfunction. At the community level, deterioration of housing stock results in "housing filtering", or the trend of those with lower levels of income to move into a neighbourhood over time, which results in progressively poorer housing maintenance and quality.

The *San Francisco Housing Authority Flooring Policy HIA*<sup>22</sup> addresses the single issue of alleviating allergens that exacerbate respiratory symptoms through selection of flooring surface. The HIA notes that carpeting serves as a nesting environment for dust mites in the home and that people who rent their accommodation have limited control over the flooring. The HIA therefore recommends that a reasonable proportion of the new units are built without carpeting. This review notes that whilst this is a pragmatic suggestion, the evidence is not conclusive regarding the results of such interventions (see Douglas et al<sup>42</sup> [4], which suggests that interventions targeting house dust mite and allergens exposure do not improve health or reduce asthma symptoms.)

## 4 Appendix A: Literature Summaries

### Interpretation

Results are presented in three groups:

- Section A presents evidence from systematic reviews (this is the strongest evidence)
- Section B presents evidence from other published literature
- Section C presents a review of previous HIAs of housing developments (internationally)

The results are presented chronologically by date of publication, with each section starting with the most recent publications.

### Section A: Evidence from systematic reviews

ID	64
Citation	Ding D, Sallis JF, Kerr J, Lee S, Rosenberg DE. Neighborhood environment and physical activity among youth a review. <i>Am J Prev Med.</i> 2011 Oct;41(4):442-55. doi: 10.1016/j.amepre.2011.06.036.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/21961474">http://www.ncbi.nlm.nih.gov/pubmed/21961474</a>
Type of evidence	Systematic review
Publication Date	October 2011
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Ding et al <sup>64</sup> summarise findings from peer reviewed papers on the associations between neighbourhood environment and physical activity among young people. The review found 'moderate' strength evidence that for children the environmental attributes that were consistently associated with physical activity were walkability, traffic speed/volume, access/proximity to recreation facilities, land-use mix, and residential density. 'Moderate' strength evidence was also found for adolescents that the most supported correlates were land-use mix and residential density. <i>(Strength of evidence = Moderate; Topic = Urban design)</i>
Implications	Planning policies should: enhance access to parks during neighbourhood regeneration; encourage schools to open facilities to the community; provide incentives for private recreational facilities to locate in underserved neighbourhoods; require mixed-use development; and create roadways that are pedestrian friendly and promote safe traffic patterns.

ID	24
Citation	Sauni R, Uitti J, Jauhiainen M, Kreiss K, Sigsgaard T, Verbeek JH. Remediating buildings damaged by dampness and mould for preventing or reducing respiratory tract symptoms, infections and asthma. <i>Cochrane Database Syst Rev.</i> 2011 Sep 7;(9):CD007897.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/21901714">http://www.ncbi.nlm.nih.gov/pubmed/21901714</a>
Type of evidence	Systematic review
Publication Date	September 2011
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Sauni et al <sup>24</sup> identify mould infestation as a problem in houses, apartment buildings, office buildings and schools, affecting both adults and children. The review found 'moderate' strength evidence that remediation of mould in houses decreases asthma-related symptoms and decreases respiratory infections, compared to no intervention. <i>(Strength of evidence = Moderate; Topic = Urban design)</i>
Implications	Mould damaged houses should be remediated to decrease asthma-related symptoms. Remediation methods vary from complete rebuilding to improving heating and ventilation. Further research is required to investigate mould remediation in schools and office buildings.

ID	23
Citation	Braubach M, Jacobs DE, and Ormandy D (2011) 'Environmental Burden of Disease associated with inadequate housing'. Copenhagen, Denmark: WHO Europe.
Web link	<a href="http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/Housing-and-health/publications/2011/environmental-burden-of-disease-associated-with-inadequate-housing.-full-version">http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/Housing-and-health/publications/2011/environmental-burden-of-disease-associated-with-inadequate-housing.-full-version</a>
Type of evidence	Systematic review
Publication Date	June 2011
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>A review of the effect of housing quality on mental health noted that people living in multiple family housing or on the upper floors of high rise buildings have greater mental health problems. These effects are probably larger for women with young children. The review notes that there are methodological problems with quantification of mental health impacts at population level. <i>(Strength of evidence = Moderate; Topic = Mental health)</i></p> <p>The review concludes that it is unlikely that housing itself will precipitate serious mental disorder. However, there are two likely ways in which housing can contribute to mental health.</p> <ol style="list-style-type: none"> <li>1. It can directly affect chronic stress which is known to affect nonclinical symptoms of anxiety, depression, and hostility and frustration.</li> <li>2. Poor quality housing may be an additional risk factor that often co-varies with poverty and thus is associated with other physical (e.g., pollution, toxins) and social (e.g., family instability, violence) risk factors.</li> </ol> <p>The review notes that exposure to multiple risk factors dramatically escalates the probability of psychological distress. <i>(Strength of evidence = Moderate; Topic = Mental health)</i></p> <p>The link between poor housing and poor health is well established. Many cross-sectional studies have reported consistent and statistically significant associations between poor housing conditions and poor health. Those living in poor housing are most likely to be socioeconomically deprived and have long-standing illness. In addition, vulnerable groups such as the sick, the elderly, and the unemployed, are among those most likely to live in poor housing and also tend to spend large amounts of time in their homes exposed to potentially hazardous environments. <i>(Strength of evidence = Moderate)</i></p> <p>Improvements in provision of affordable warmth can lead to health improvement in the short term, in particular respiratory and mental health. The greatest potential for health improvements is for those with existing respiratory illness who are living in houses that are difficult and costly to heat. Improved warmth in the home may also impact positively on socioeconomic health determinants. Following these types of improvements, residents reported less time off work/school, and increased social and educational opportunities; these impacts may be health promoting in the long term. <i>(Strength of evidence = High; Topic = Urban design)</i></p> <p>Despite programmes of housing-led renewal delivering major improvements to housing and the outdoor housing environment, it would appear that there is little evidence of associated improvements in health. There is some suggestion from poorer quality studies that mental health may improve. Very little is known about possible impacts on respiratory health or other specific symptoms. It is important to note that there is little evidence that rehousing leads to deterioration in physical or mental health. <i>(Strength of evidence = Low; Topic = Urban design)</i></p> <p>Although effective measures to reduce noise may reduce disturbance and annoyance caused by noise, little is known about the health impacts of measures to reduce occupants' exposure to noise. <i>(Strength of evidence = Very Low; Topic = Urban design)</i></p> <p>Housing adaptations to promote independent living and rehousing to meet medical or mobility needs can have health benefits for residents. <i>(Strength of evidence = Moderate; Topic = Social cohesion; Service access)</i></p>
Implications	<ul style="list-style-type: none"> <li>• Mental health should be included as a separate outcome in assessing the health impacts of housing. Consequently measures of housing quality need to consider factors that might be relevant to mental health.</li> <li>• Investment in affordable warmth measures that are targeted at those in poor housing, and with pre-existing illness can lead to health improvements, in particular respiratory improvements. Health improvements following area-based programmes of housing-led neighbourhood renewal are less clear. There is little suggestion that housing improvement leads to negative health impacts.</li> <li>• Interventions most likely to lead to measurable health improvements are those that target groups in most need where the potential to benefit is greatest, i.e. residents in the poorest housing who are also most vulnerable to the detrimental health effects of poor housing.</li> <li>• Poor housing, poverty, and poor health are inextricably linked to each other and it may be that improvements to housing conditions alone are insufficient to lead to measurable health improvements, especially in the short term. The possibility of long-term health impacts and prevention of poor health among future generations remains largely unknown.</li> </ul>

ID	58
Citation	Andrea L. Rosso, Amy H. Auchincloss, and Yvonne L. Michael. The Urban Built Environment and Mobility in Older Adults: A Comprehensive Review. J Aging Res. 2011; 2011: 816106. Published online 2011 June 30. doi: 10.4061/2011/816106.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3134204/">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3134204/</a>
Type of evidence	Systematic review
Publication Date	June 2011
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>Rosso et al<sup>58</sup> found 'low' strength evidence that transportation systems, land use patterns, and urban design can impact mobility in older adults.</p> <ul style="list-style-type: none"> <li>• A high percentage of car commuters is positively associated with increased walking difficulty among those aged 75 and older, but not among younger age groups.</li> <li>• Proximity to walking paths and trails is associated with amount of daily walking but not with frequency of neighbourhood walking.</li> <li>• Proximity to retail and employment destinations increases walking. However proximity to other destinations has produced varied results.</li> </ul> <p>The presence of safety measures for pedestrians against traffic increases walking. <i>(Strength of evidence = Low; Topic = Service access; Urban design)</i></p>
Implications	To promote physical activity (walking) in older adults, developments should give consideration to reducing car commuters; increasing paths and trails; proving retail and employment opportunities close to residential areas; and include traffic safety measures for pedestrians.

ID	51
Citation	Metcalfe A, Lail P, Ghali WA, Sauve RS. The association between neighbourhoods and adverse birth outcomes: a systematic review and meta-analysis of multi-level studies. Paediatr Perinat Epidemiol. 2011 May;25(3):236-45. doi: 10.1111/j.1365-3016.2011.01192.x.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/21470263">http://www.ncbi.nlm.nih.gov/pubmed/21470263</a>
Type of evidence	Systematic review
Publication Date	May 2011
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>Metcalfe et al<sup>51</sup> provide 'high' strength evidence using both descriptive analysis and meta-analysis that living in a poor neighbourhood has a negative impact on birth outcomes, over and above individual effects. The study showed a significant pooled association between neighbourhood income and low birthweight [odds ratio = 1.11, 95% confidence interval: 1.02, 1.20] whereby women who lived in low income neighbourhoods had significantly higher odds of having a low birthweight infant. The study strongly suggests that neighbourhoods play a significant role in birth outcomes. <i>(Strength of evidence = High; Topic = Urban design)</i></p>
Implications	Further research to determine the mechanisms by which neighbourhoods influence birth outcomes.

ID	28
Citation	Miller WD, Pollack CE, Williams DR. Healthy homes and communities: putting the pieces together. Am J Prev Med. 2011 Jan;40(1 Suppl 1):S48-57.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/21146779">http://www.ncbi.nlm.nih.gov/pubmed/21146779</a>
Type of evidence	Systematic review
Publication Date	January 2011
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>Miller et al<sup>28</sup> report that the physical, social, and economic environments of local communities affect residents' health and exacerbate health disparities. The review provides 'moderate' strength evidence that access to goods and services within one's community can promote and sustain health. The review reports that:</p> <ul style="list-style-type: none"> <li>The presence of sidewalks and crosswalks, bike paths, playing fields, parks, shopping accessible on foot, and public transportation— along with the perception that it is safe to be outside— contribute substantially to the average amount of regular physical activity that residents of a neighbourhood achieve.</li> <li>Education and employment opportunities influence health by providing the means to achieve an adequate standard of living now and in the future.</li> <li>Neighbourhoods with better access to supermarkets and other retail outlets with minimally processed foods tend to eat a healthier diet than their counterparts in neighbourhoods with less access to these goods.</li> <li>The density of fast food outlets and preponderance of energy-dense foods in convenience stores and other small markets has been linked with higher prevalence of obesity and higher BMI. Similarly, liquor stores are more likely to be located in low-income and more heavily minority communities and their greater density is associated with adverse community-level consequences.</li> <li>Communities with large concentrations of low-income and minority residents are especially likely to be exposed to high concentrations of pollutants and are less protected by zoning from the siting of dumps and bus depots and proximity to highways. Children are particularly sensitive to unhealthy conditions in neighbourhoods; even low levels of pollution can increase morbidity and mortality.</li> <li>Hazards in the home may include lead, indoor allergens (e.g., dust mites, mold), and radon, each of which has been shown to harm health. Exposures in the home have been implicated in approximately 40% of children diagnosed with asthma.</li> <li>Along with the physical dangers within the home, lack of housing affordability has been linked to health. The financial strain of unaffordable housing has been associated with decreased spending on health and health care, including delays in seeking preventive and routine medical care, medication non-adherence, and increased emergency department utilization. High utility bills place an additional burden on lower-income families, forcing tradeoffs among housing, heating, food, medical care, and other basic needs, and this can undermine children's growth and healthy development.</li> <li>Lack of affordable housing is associated with increased prevalence of residential relocation and mobility, causing a disruption in schooling, health care, and social networks.</li> </ul> <p>Miller et al conclude that parks, green spaces and recreational facilities, high-quality schools, competitively priced supermarkets and other commercial services, and zoning that keeps industrial sites and pollutants at a distance from residential areas contribute to an environment that is conducive to the achievement and maintenance of good health. These local assets reduce adverse environmental exposures, promote opportunities for self-development, and allow individuals and families to engage in health-promoting activities. <i>(Strength of evidence = Moderate; Topic = Service access; Urban design)</i></p>
Implications	An effective population health improvement strategy requires enlisting new partners among public agencies including housing, transportation, recreation, community development, and planning, and joint efforts between private sector business and voluntary organizations. Further research on community-based interventions to guide policy makers.

ID	25
Citation	Fisk WJ, Eliseeva EA, Mendell MJ. Association of residential dampness and mold with respiratory tract infections and bronchitis: a meta-analysis. Environ Health. 2010 Nov 15;9:72
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/21078183">http://www.ncbi.nlm.nih.gov/pubmed/21078183</a>
Type of evidence	Systematic review
Publication Date	November 2010
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Fisk et al <sup>25</sup> provide 'high' strength evidence that residential dampness and mould are associated with statistically significant increases in both respiratory infections and bronchitis. The review also notes that dampness and mould in buildings is consistently associated with asthma exacerbation. The study provides evidence that preventing or remediating dampness and mould in residences, a very common condition, may substantially reduce the burden of respiratory infections. <i>(Strength of evidence = High; Topic = Urban design)</i>
Implications	Prevent building dampness and mould problems in buildings, and take corrective actions where such problems occur.

ID	26
Citation	Gibson M, Petticrew M, Bamba C, Sowden AJ, Wright KE, Whitehead M. Housing and health inequalities: A synthesis of systematic reviews of interventions aimed at different pathways linking housing and health. Health Place. 2010 Sep 29.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/21159542">http://www.ncbi.nlm.nih.gov/pubmed/21159542</a>
Type of evidence	Systematic review
Publication Date	September 2010
Quality of study	1++ (high quality MA; or SR of RCTs; or RCT with very low bias risk)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>Systematic review methods were used to locate and evaluate published and unpublished systematic reviews of studies that evaluated the impact of housing and community interventions on health and health inequalities. Five reviews met the criteria for inclusion, containing a total of 130 studies of relevance to this overview of reviews. Of the five systematic reviews, three of these reviews included studies aimed at improving area characteristics, one included studies aimed at internal housing conditions, and one included interventions aimed at a range of pathways.</p> <p>There is evidence to suggest that interventions aimed at altering disadvantaged participants' neighbourhood conditions by moving them to areas of lower poverty can lead to reductions in the percentage of participants reporting depression and increases in the proportion reporting good or excellent health. Moving people from high to low poverty neighbourhoods can improve mental health, reduce obesity and impact positively on some wider determinants of health, such as respondents' experience of social disorder. Such interventions seem to have the potential to alleviate health inequalities by improving the health of disadvantaged groups. <i>(Strength of evidence = Moderate; Topic = Mental health; Social cohesion)</i></p> <p>There is some evidence of positive impact for area effects interventions designed to improve high poverty areas, although adverse impacts can also result from these. Focusing investment on deprived areas may assist all of the residents and thus be more cost-effective. However, it is difficult to gather robust evidence of impact for area-level interventions aimed at improving either area characteristics or internal housing conditions in part because impacts may be diluted by benefiting many who are not personally disadvantaged. <i>(Strength of evidence = Low; Topic = Social cohesion)</i></p> <p>There is strong evidence that warmth and energy efficiency interventions have positive impacts on health, although the evidence on general improvements to housing conditions remains unclear. <i>(Strength of evidence = High; Topic = Urban design)</i></p> <p>Multiple level housing and neighbourhood interventions were most likely to be successful. However there is insufficient evidence to support specific interventions. <i>(Strength of evidence = Moderate; Topic = Urban design)</i></p> <p>The lack of systematic reviews of the health impact of housing interventions aimed at altering housing tenure represents a significant gap in the systematic review evidence base on pathways linking housing and health. <i>(Strength of evidence = Moderate)</i></p>
Implications	Interventions carefully targeted at those in greatest need may hold the most promise for improving health.

ID	31
Citation	McCormack GR, Rock M, Toohey AM, Hignell D. Characteristics of urban parks associated with park use and physical activity: a review of qualitative research. Health Place. 2010 Jul;16(4):712-26. Epub 2010 Mar 12.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/20356780">http://www.ncbi.nlm.nih.gov/pubmed/20356780</a>
Type of evidence	Systematic review
Publication Date	March 2010
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>McCormack et al<sup>31</sup> note that physical activity participation provides mental and physical health benefits and can also reduce the risk of many chronic diseases. The review notes that the built environment can both enable and limit physical activity participation. Specifically, neighbourhood characteristics such as the proximity and mix of land uses, pedestrian connectivity, aesthetics and interesting scenery, and traffic and personal safety are important correlates of physical activity. The review finds that access to nearby parks and natural settings is associated with improved mental health, reduced anxiety, physical health, and healthy weight among children. The review provides 'moderate' strength evidence for features and attributes of parks that are associated with improved park use and hence physical activity.</p> <p>Park feature:</p> <ul style="list-style-type: none"> <li>For children and adolescents access to facilities that support sports and play (playgrounds and trees) increase park use. Facilities which are age-inappropriate, poorly equipped, out-dated, or mentally or physically unstimulating should be avoided.</li> <li>For adults and adolescent girls constructed and natural trails were important for park use.</li> <li>Barbeques, seating, water fountains, picnic tables and bathrooms were important in promoting park use for all ages.</li> <li>Other facilities that promote park use include dog litter bins and appropriate placement of shade-providing devices for children and caregivers.</li> </ul> <p>Park condition:</p> <ul style="list-style-type: none"> <li>For both adults and children the cleanliness of parks and the maintenance of facilities and playing surfaces are important in park use.</li> </ul> <p>Park accessibility:</p> <ul style="list-style-type: none"> <li>Generally, having more local parks within walking distance was positively associated with park use, while the necessity of driving to reach a park often deterred use. However concerns over safety at local parks and the presence of high quality facilities at more distant parks affect this pattern.</li> <li>Aesthetics are important for adults, adolescents and children. The presence of graffiti or vandalism discourages park use. The presence of animal wildlife in parks can either encourage or discourage park use depending on individual viewpoints. The presence of trees, bushes, gardens, grass, flowers, natural features and water features encourage park use.</li> </ul> <p>Park safety:</p> <ul style="list-style-type: none"> <li>Actual and perceived park safety is often dependent on the presence of undesirable users (e.g. drug users, homeless people and loiterers). The presence of older children and teenagers in parks can be a concern for younger children and caregivers.</li> <li>Specific park attributes that influence safety from crime include: lighting, law-enforcement patrols, surveillance features, secluded paths or areas.</li> <li>Specific park attributes that influence safety from injury include: grass, syringes, rocks, debris, heavy traffic, cyclists and other fast moving park users.</li> </ul> <p>Park social environment:</p> <ul style="list-style-type: none"> <li>A park environment that facilitates social meetings is associated with increased park use. Opportunities to socialize in safe and supportive social environments appeared to be important, notably for women and girls. For girls, meeting friends at local parks facilitated both active and passive leisure pursuits. For adolescents the opportunity to socialise independently from adults was an important determinant of park use. Social clubs and neighbourhood associates are positively linked to park use and physical activity.</li> </ul> <p>McCormack et al conclude that actual and perceived attributes including safety, aesthetics, amenities, maintenance, and proximity are important for encouraging park use, which is an important facilitator of physical health, mental health and social networking. <b>(Strength of evidence = Moderate; Topic = Mental health; Social cohesion; Service access; Urban design)</b></p>
Implications	Create more high quality neighbourhood parks within walking distance of most residents to encourage physical activity participation in the population.

ID	36
Citation	Renalds A, Smith TH, Hale PJ. A systematic review of built environment and health. Fam Community Health. 2010 Jan-Mar;33(1):68-78
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/20010006">http://www.ncbi.nlm.nih.gov/pubmed/20010006</a>
Type of evidence	Systematic review
Publication Date	March 2010
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Renalds et al <sup>36</sup> found 'moderate' strength evidence that neighbourhoods that are characterized as more walkable, either leisure-oriented or destination-driven, are associated with increased physical activity, increased social capital, lower overweight, lower reports of depression, and less reported alcohol abuse. <b>(Strength of evidence = Moderate; Topic = Mental health; Social cohesion)</b>
Implications	Residential areas should be designed to increase walkability and incorporate desirable mixed use destinations (e.g. leisure, retail or employment).

ID	34
Citation	Carter MA, Dubois L. Neighbourhoods and child adiposity: a critical appraisal of the literature. Health Place. 2010 May;16(3):616-28. Epub 2010 Jan 4.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/20106712">http://www.ncbi.nlm.nih.gov/pubmed/20106712</a>
Type of evidence	Systematic review
Publication Date	January 2010
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>Carter et al<sup>34</sup> find 'high' strength evidence that socioeconomic disadvantage increases child adiposity (obesity). <b>(Strength of evidence = High)</b></p> <p>The review also found 'moderate' strength evidence that high social capital (as measured by low social disorder or a high level of belief in the capabilities of the community to collectively achieve social and political outcomes) protected against increased adiposity. The review notes that due to heterogeneity in the scientific literature, it is unclear if and how other neighbourhood environmental features, such as safety, street layout and block design, availability/accessibility of amenities etc., play a role. <b>(Strength of evidence = Moderate; Topic = Social cohesion)</b></p>
Implications	As part of measures to reduce obesity in children, consideration should be given to planning interventions that reduce socioeconomic disadvantage, reduce social disorder and promote community participation.

ID	53
Citation	Mansell J, Beadle-Brown J. Dispersed or clustered housing for adults with intellectual disability: a systematic review. J Intellect Dev Disabil. 2009 Dec;34(4):313-23.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/19860598">http://www.ncbi.nlm.nih.gov/pubmed/19860598</a>
Type of evidence	Systematic review
Publication Date	December 2009
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Mansell et al <sup>53</sup> found 'moderate' strength evidence that dispersed community-based housing is superior to clustered housing on the majority of quality of life indicators for adults with intellectual disabilities. The only exception being that there are some benefits to village communities for people with less severe disabilities. <b>(Strength of evidence = Moderate; Topic = Mental health)</b>
Implications	Consideration should be given to providing appropriate community based accommodation opportunities for adults with intellectual disabilities.

ID	65
Citation	Yen IH, Michael YL, Perdue L. Neighborhood environment in studies of health of older adults: a systematic review. Am J Prev Med. 2009 Nov;37(5):455-63
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/19840702">http://www.ncbi.nlm.nih.gov/pubmed/19840702</a>
Type of evidence	Systematic review
Publication Date	November 2009
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Yen et al <sup>65</sup> identified that neighbourhood environment is important for older adults' health and functioning. A majority of older adults are inactive and physical inactivity is linked to quality of life, morbidity, and mortality. The review found 'moderate' strength evidence that more accessible neighbourhood design supported greater levels of walking. <b>(Strength of evidence = Moderate; Topic = Urban design)</b>
Implications	To increase physical activity in older adults, neighbourhoods should be designed to have well laid out good quality walking surfaces.

ID	27
Citation	Thomson H, Thomas S, Sellstrom E, Petticrew M. The health impacts of housing improvement: a systematic review of intervention studies from 1887 to 2007. Am J Public Health. 2009 Nov;99 Suppl 3:S681-92
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/19890174">http://www.ncbi.nlm.nih.gov/pubmed/19890174</a>
Type of evidence	Systematic review
Publication Date	November 2009
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Thomson et al <sup>27</sup> describe the health impacts of housing improvements. The review notes 'moderate' strength evidence for improvements in general, respiratory, and mental health following warmth and energy efficiency improvements to housing. The review notes that there is 'very low' strength evidence with respect to other aspects of housing-led neighbourhood renewal programs. This is due to conflicting and unclear impacts and generally low quality scientific studies. Thomson et al conclude that other than the benefits from improved warmth, the size and type of health impacts following programs of housing-led neighbourhood renewal is currently unknown. <b>(Strength of evidence = Moderate; Topic = Mental health; Urban design)</b>
Implications	Provide improvements in housing warmth for vulnerable individuals who have poor health and live in poor housing. Further research into the socioeconomic impacts associated with housing improvement is needed to investigate the potential for longer-term health impacts.

ID	59
Citation	Lovasi GS, Hutson MA, Guerra M, Neckerman KM. Built environments and obesity in disadvantaged populations. Epidemiol Rev. 2009;31:7-20. Epub 2009 Jul 9.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/19589839">http://www.ncbi.nlm.nih.gov/pubmed/19589839</a>
Type of evidence	Systematic review
Publication Date	July 2009
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Lovasi et al <sup>59</sup> found that disadvantaged groups in the US tend to live in worse environments with respect to food stores, places to exercise, aesthetic problems, and traffic or crime-related safety. The review found that: <ul style="list-style-type: none"> <li>• There is 'moderate' strength evidence that proximity to convenience stores is associated with higher body mass index in adolescents as well as fewer health food choices and poorer quality produce. Low income areas tend to have more convenience stores and fewer supermarkets. Supermarkets are generally associated with greater fruit and vegetable consumption.</li> <li>• There is 'moderate' strength evidence that quality of sidewalks, parks and exercise facilities affect levels of physical activity. Though use is also highly dependent on cost, opening hours and maintenance. Low income groups usually have less access to indoor and outdoor places to exercise. <b>(Strength of evidence = Moderate; Topic = Service access)</b></li> <li>• Low income and minority populations tend to live in neighbourhoods that are perceived as less attractive and less safe. There is 'low' strength evidence that pleasant aesthetics or green spaces have been linked to reduced health disparities and to lower obesity risk, with enjoyable scenery being a particularly important determinant of physical activity among lower-income participants.</li> </ul> <p>Lovasi et al conclude that advantaged subgroups benefit the most from new resources when they are provided at the same level to all. Thus, a built environment improvement may increase health disparities unless disadvantaged groups are specifically targeted. <b>(Strength of evidence = Low; Topic = Urban design)</b></p>
Implications	Increasing supermarket access, places to exercise, and neighbourhood safety may reduce obesity-related health disparities.

ID	54
Citation	Kozma A, Mansell J, Beadle-Brown J. Outcomes in different residential settings for people with intellectual disability: a systematic review. Am J Intellect Dev Disabil. 2009 May;114(3):193-222.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/19374466">http://www.ncbi.nlm.nih.gov/pubmed/19374466</a>
Type of evidence	Systematic review
Publication Date	May 2009
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Kozma et al <sup>54</sup> noted that the presence of people with intellectual disabilities in the community, their participation in community-based activities, and use of community facilities are often seen as one of the core indicators of their social integration. The review found 'moderate' strength evidence that people with mental health conditions in small scale community-based residences or in semi-independent or supported living arrangements have a better objective quality of life than do people in large, congregate settings. Particularly, they have more choice-making opportunities; larger social networks and more friends; access more mainstream facilities, and participate more in community life; have more chances to acquire new skills and develop or maintain existing skills; and are more satisfied with their living arrangements. The review provides evidence for the benefits of integrating people with mental health conditions into communities. <b>(Strength of evidence = Moderate; Topic = Mental health; Social cohesion)</b>
Implications	Residential developments should consult with local mental health services on how aspects of housing provision and urban design can support people with mental health conditions and their carers within the community.

ID	32
Citation	Kim D. Blues from the neighborhood? Neighborhood characteristics and depression. Epidemiol Rev. 2008;30:101-17. Epub 2008 Aug 27.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/18753674">http://www.ncbi.nlm.nih.gov/pubmed/18753674</a>
Type of evidence	Systematic review
Publication Date	August 2008
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Kim et al <sup>32</sup> found 'moderate' strength evidence for an association between high levels of neighbourhood social disorder and depression. The finding adds to the growing body of evidence for broad neighbourhood characteristics as important independent contributors to individual health and well-being, above and beyond individual level socio-demographic and socio-economic characteristics. The review also found 'low' strength evidence that higher neighbourhood-level SES may have beneficial effects on mental health, including protecting against depression. The review noted that there is limited evidence for associations between depression and neighbourhood physical conditions, built environment, services and amenities. <b>(Strength of evidence = Moderate; Topic = Mental health)</b>
Implications	To improve low level mental health outcomes (depression) consideration should be given to urban designs and local policies that minimise social disorder and promote neighbourhood socioeconomic status. Further research into the mediating pathways and effect-modifying factors will help to identify what specific neighbourhood features matter for depression.

ID	35
Citation	Egan M, Tannahill C, Petticrew M, Thomas S. Psychosocial risk factors in home and community settings and their associations with population health and health inequalities: a systematic meta-review. BMC Public Health. 2008 Jul 16;8:239.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/18631374">http://www.ncbi.nlm.nih.gov/pubmed/18631374</a>
Type of evidence	Systematic review
Publication Date	July 2008
Quality of study	1++ (high quality MA; or SR of RCTs; or RCT with very low bias risk)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Egan et al <sup>35</sup> found 'moderate' strength evidence that favourable psychosocial environments that promote factors such as, social support and networks, social capital, social cohesion, collective efficacy and participation in local organisations tend to be associated with better health outcomes. Poor psychosocial environments (including exposure to community violence, anti-social behaviour, or discrimination) may reduce health outcomes and contribute to health inequalities. In terms of more specific results, the review found: <ul style="list-style-type: none"> <li>• Social support and size of social networks may be associated with lower risk of coronary heart disease and cancer (particularly breast cancer).</li> <li>• Social support (from spouses at home and from social networks in the wider community) and participation in local activities may be associated with better health amongst elderly populations.</li> <li>• Fewer social resources at a community level may be related to an increased likelihood of child maltreatment at home, and that unsupportive or maladaptive family relationships at home may be associated with a higher risk of offspring developing bi-polar disorder in later life.</li> <li>• Egan et al conclude that there is some evidence that supports the view that favourable psychosocial environments are linked to better health, but there is also a significant body of scientific evidence that finds little or no association. Local factors and circumstances are therefore likely to be important.</li> </ul> <b>(Strength of evidence = Moderate; Topic = Social cohesion)</b>
Implications	Housing developments should promote favourable psychosocial environments by considering how the housing mix, layout and integration with transport and amenities can optimise opportunities for social support and social networks. Further research into community participation using better quality studies is needed.

ID	57
Citation	Jelleyman T, Spencer N. Residential mobility in childhood and health outcomes: a systematic review. J Epidemiol Community Health. 2008 Jul;62(7):584-92.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/18559440">http://www.ncbi.nlm.nih.gov/pubmed/18559440</a>
Type of evidence	Systematic review
Publication Date	July 2008
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Jelleyman et al <sup>57</sup> examined health outcomes in children and adolescents exposed to high levels of relocation. Although there was limited support for causal relationships, the review found 'moderate' strength evidence that during childhood outcomes included increased indirect aggression, property offences and behavioural problems requiring psychological help. During adolescence outcomes included earlier initiation of drug use and related problems, earlier onset of depression and, among adolescent girls, an increased risk of both premarital sexual behaviour and teenage pregnancy. <b>(Strength of evidence = Moderate; Topic = Mental health; Service access)</b> There was also 'low' strength evidence for an association between children and adolescents exposed to high levels of relocation and reduced continuity of healthcare provision. <b>(Strength of evidence = Low; Topic = Service access)</b>
Implications	Consideration should be given to creating stable residential environments for children and adolescents. This may include appropriate access to parental employment opportunities as well as an affordable family housing. The impact of housing and economic policies on childhood residential mobility should be evaluated considering this evidence.

ID	55
Citation	Kyle T, Dunn JR. Effects of housing circumstances on health, quality of life and healthcare use for people with severe mental illness: a review. Health Soc Care Community. 2008 Jan;16(1):1-15.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/18181811">http://www.ncbi.nlm.nih.gov/pubmed/18181811</a>
Type of evidence	Systematic review
Publication Date	January 2008
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Kyle et al <sup>55</sup> noted that individuals with severe and persistent mental illness (SPMI) identify housing as an important factor in achieving and maintaining their health. However, many live in substandard accommodations that are physically inadequate, crowded, noisy and located in undesirable neighbourhoods. The review found 'high' strength evidence that providing housing to formerly homeless persons with SPMI reduces hospital admissions and reduces days hospitalised. The review also found that length of time in housing rather than type of housing appears to be the key factor and that 95% of housing costs were offset by hospital service reductions. Similarly 'high' strength evidence suggests that life satisfaction is unrelated to housing type for previously homeless people with SPMI. <b>(Strength of evidence = High; Topic = Mental health; Service access)</b> For individuals with SPMI not identified as being homeless, the review found 'low' strength evidence that poorly delivered housing programmes had detrimental effects on mental health. Similarly housing interventions that maintain or improve the housing circumstances of individuals with SPMI, may reduce psychiatric symptoms and increase well-being. Features of housing identified as increasing symptoms of anxiety, anger and depression include: large numbers of residents, poor housing quality and not having one's own room. Kyle et al conclude that when housing eligibility for people with SPMI is not dependent on psychiatric treatment compliance and sobriety, providing permanent housing minimises harm and may free people to voluntarily seek treatment. <b>(Strength of evidence = Low; Topic = Mental health)</b>
Implications	People with severe and persistent mental illness (SPMI) should be offered housing that offers an unlimited length of stay because SPMI is a chronic and fluctuating condition that requires stable surroundings to maintain health. Housing should ideally have low numbers of residents, be of good quality (though type of housing does not appear to change outcomes) and provide individuals with their own rooms. More research is needed about housing solutions for individuals with SPMI who are housed, but in precarious or inappropriate housing situations.

ID	60
Citation	Papas MA, Alberg AJ, Ewing R, Helzlsouer KJ, Gary TL, Klassen AC. The built environment and obesity. Epidemiol Rev. 2007;29:129-43. Epub 2007 May 28.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/17533172">http://www.ncbi.nlm.nih.gov/pubmed/17533172</a>
Type of evidence	Systematic review
Publication Date	May 2007
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Papas et al <sup>60</sup> looked mainly at US studies and found 'moderate' strength evidence that access to affordable, healthy foods, is constrained within low-income communities, thus partially explaining the higher rates of obesity seen in low-income communities. However the review notes that studies (not systematic reviews) from Australia <sup>61-63</sup> have found weak or no association between neighbourhood-level socioeconomic factors and food availability. <b>Strength of evidence = Moderate; Topic = Service access)</b> The review also found 'low' strength evidence that for older people perceived 'availability of services for seniors' and 'neighbourliness' increase physical activity in home-dwelling persons aged 65 years or older. Papas et al conclude that there are significant positive associations between aspects of the built environment and obesity. <b>Strength of evidence = Low; Topic = Service access)</b>
Implications	To promote healthy eating and physical activity, residential developments should: have access to affordable, healthy food; facilitate access to services for older people; and adopt development layouts that encourage positive interactions with neighbours. Further research on the impact of the built environment on obesity is needed.

ID	30
Citation	Truong KD, Ma S. A systematic review of relations between neighborhoods and mental health. J Ment Health Policy Econ. 2006 Sep;9(3):137-54.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/17031019">http://www.ncbi.nlm.nih.gov/pubmed/17031019</a>
Type of evidence	Systematic review
Publication Date	September 2006
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Truong et al <sup>30</sup> found 'moderate' strength evidence of an overall association between mental health and neighbourhood characteristics, after adjusting for individual factors. <i>(Strength of evidence = Moderate; Topic = Mental health)</i> However the variation between studies meant there was only 'low' strength evidence on specific relationships. <i>(Strength of evidence = Low; Topic = Mental health)</i>
Implications	Further research with better study design is required.

ID	56
Citation	Sellström E, Bremberg S. The significance of neighbourhood context to child and adolescent health and well-being: a systematic review of multilevel studies. Scand J Public Health. 2006;34(5):544-54.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/16990166">http://www.ncbi.nlm.nih.gov/pubmed/16990166</a>
Type of evidence	Systematic review
Publication Date	July 2006
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Sellström et al <sup>56</sup> found 'moderate' strength evidence that the risk of giving birth to a low-birth-weight Infant (a significant determinant of child health) increased by over 10% if the mother lived in a disadvantaged neighbourhood. The review notes that this finding adds to existing evidence that low-income mothers with limited education give birth to low-birth-weight infants more often than do more advantaged mothers. The review also found 'moderate' strength evidence that behavioural problems among children were more common in poor neighbourhoods, and within these communities more prevalent amongst families of low socioeconomic status. Sellström et al conclude that neighbourhood socioeconomic status and social climate have small to moderate effects on child health outcomes, i.e. birth weight, injuries, behavioural problems, and child maltreatment. <i>(Strength of evidence = Moderate; Topic = Mental health; Service access)</i>
Implications	Health risks to children, especially in families that lack resources, can be reduced by targeting regeneration (and other interventions) in underprivileged neighbourhoods.

ID	33
Citation	Rehkopf DH, Buka SL. The association between suicide and the socio-economic characteristics of geographical areas: a systematic review. Psychol Med. 2006 Feb;36(2):145-57.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/16420711">http://www.ncbi.nlm.nih.gov/pubmed/16420711</a>
Type of evidence	Systematic review
Publication Date	February 2006
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Rehkopf et al <sup>33</sup> found 'moderate' strength evidence that suicide rates are associated with neighbourhood level socioeconomic level, with suicide rates increasing as socio-economic levels decrease. Furthermore the review found that area suicide rates are most strongly associated with the proportion of residents that are living below the poverty level (or similar measures of economic deprivation). Results did not vary significantly by gender. Rehkopf et al conclude that these findings are consistent with a contextual explanation where area suicide rates are driven by social and economic isolation of neighbourhoods with higher levels of deprivation. <i>(Strength of evidence = Moderate; Topic = Mental health)</i>
Implications	To reduce rates of suicide, regeneration should target areas of high deprivation, poverty and unemployment. Suicide prevention resources should focus more on communities of a relatively lower socioeconomic level, in particular, those at high levels of concentrated disadvantage.

ID	29
Citation	Anderson LM, Charles JS, Fullilove MT, Scrimshaw SC, Fielding JE, Normand J; Task Force on Community Preventive Services. Providing affordable family housing and reducing residential segregation by income. A systematic review. Am J Prev Med. 2003 Apr;24(3 Suppl):47-67.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/12668198">http://www.ncbi.nlm.nih.gov/pubmed/12668198</a>
Type of evidence	Systematic review
Publication Date	April 2003
Quality of study	1+ (well-conducted MA, SR, or RCTs with a low risk of bias)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Anderson et al <sup>29</sup> note that the social, physical, and economic characteristics of neighbourhoods are increasingly recognized as having both short- and long-term consequences for residents' physical and psychological well-being. The review notes that affordability of housing is linked to the health and well-being of individuals and families. When a market lacks a sufficient supply of affordable housing, lower income families are often forced to limit expenditures for food, medical care, and other necessities in order to pay rent. The lack of affordable housing within a community can contribute to family residential instability, as families are forced to move frequently, live with other families in overcrowded conditions, or experience periods of homelessness. The review found 'moderate' strength evidence that the use of tenant-based rental assistance programs (which subsidize the cost of housing secured by low-income households within the private rental market through the use of vouchers or direct cash subsidies) are effective in improving household safety, on the basis of reductions in exposure to crimes against person and property and decreases in neighbourhood social disorder. The review was unable to draw conclusions with respect to effects on reducing housing hazards, youth risk behaviours, or psychological and physical morbidity. <i>(Strength of evidence = Moderate; Topic = Social cohesion)</i> The review identified that due to a lack of relevant studies there was only 'very low' strength evidence available on the effectiveness of mixed-income housing (publicly subsidized multifamily rental housing developments) in improving family health and safety while providing affordable housing. <i>(Strength of evidence = Very low; Topic = Social cohesion)</i>
Implications	To improve household safety and reduce social disorder, consider programmes that subsidise the cost of private rental housing for low income households.

## Section B: Evidence from other published literature

ID	43
Citation	Bond et al. Exploring the relationships between housing, neighbourhoods and mental wellbeing for residents of deprived areas. BMC Public Health 2012, 12:48
Web link	<a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3293078">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3293078</a>
Type of evidence	Controlled observational study (controlled but not randomised)
Publication Date	January 2012
Quality of study	2+ (well conducted non-RCT studies with a low bias risk and moderate probability of a causal relationship)
Region	
Evidence statements (note population, intervention and outcomes)	<p>This study has examined the associations between housing, neighbourhood and mental wellbeing after controlling for personal characteristics (age, gender, household type and economic factors) and found that the residential and environmental aspects of people's houses and neighbourhoods were significantly associated with positive mental wellbeing. In particular, for residential aspects, perceiving the area as having a good internal reputation, being satisfied with house and landlord and feeling that both the home and neighbourhood contribute to a sense of doing well were all associated with average or higher than average levels of mental wellbeing. <i>(Strength of evidence = Low; Topic = Mental health)</i></p> <p>In terms of environmental aspects, average and high levels of wellbeing were associated with living in a house (rather than a flat), having a home in good repair, living in an area perceived as having attractive buildings, and living in an attractive, quiet and peaceful environment. <i>(Strength of evidence = Low; Topic = Mental health)</i></p>
Implications	The implication for regeneration activities undertaken to improve housing and neighbourhoods is that it is not just the delivery of improved housing that is important for mental wellbeing, but also the quality and manner of delivery.

ID	38
Citation	Milner J, Vardoulakis S, Chalabi Z, Wilkinson P. Modelling inhalation exposure to combustion-related air pollutants in residential buildings: Application to health impact assessment. Environ Int. 2011 Jan;37(1):268-79. Epub 2010 Sep 27.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/20875687">http://www.ncbi.nlm.nih.gov/pubmed/20875687</a>
Type of evidence	Grey literature
Publication Date	September 2010
Quality of study	2+ (well conducted non-RCT studies with a low bias risk and moderate probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>Buildings are becoming increasingly airtight in developed countries under moves designed to provide thermal comfort and to reduce energy consumption. Coupled with this are changes in the lifestyles of an aging population in the developed world, where people are spending ever greater proportions of their time indoors. There is a need to strike a balance between improving building energy efficiency and maintaining adequate ventilation for reducing concentrations of harmful air pollutants. Indoor air pollutants may relate to combustion processes, primarily particulate matter (e.g. PM10 and PM2.5), carbon monoxide (CO), oxides of nitrogen (NOX) and volatile organic compounds (VOC). Exposures may also include other indoor pollutants (such as mould, radon and chemicals from household products). <i>(Topic = Urban design)</i></p>
Implications	In designing new homes, consideration should be given to balancing building thermal efficiency and the need for adequate ventilation.

ID	49
Citation	Kelagher M, Warr DJ, Tacticos T. Evaluating health impacts: Results from the neighbourhood renewal strategy in Victoria, Australia. Health Place. 2010 Sep;16(5):861-7. Epub 2010 Apr 28.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/20472489">http://www.ncbi.nlm.nih.gov/pubmed/20472489</a>
Type of evidence	Controlled observational study (controlled but not randomised)
Publication Date	January 2012
Quality of study	2+ (well conducted non-RCT studies with a low bias risk and moderate probability of a causal relationship)
Region	Australia
Evidence statements (note population, intervention and outcomes)	<p>The analysis demonstrates a Neighbourhood Renewal [NR] intervention was effective in improving health and life satisfaction among people living in NR areas, who were disadvantaged in terms of socioeconomic position, health status and life satisfaction. The study noted that a NR intervention was not effective at a wider area level because it has no health benefit for people living in NR areas which were not reached by the intervention. The intervention was less effective at reaching immigrants from non-English speaking countries, people educated below year 10 and the unemployed. <i>(Strength of evidence = Moderate; Topic = Mental health; Social cohesion; Service access; Urban design)</i></p> <p>The intervention was an interagency cooperation program between local and government with 50% resident membership, whose objectives were: increased community pride and participation; enhanced housing and environment; improved employment, learning and local economic activity; decreased levels of crime and improved personal safety; better health and wellbeing; and increased access to services and improved government responsiveness.</p>
Implications	Results suggest that enhanced housing delivered as part of an area-based health intervention, that includes residential involvement alongside local and government agencies, can be an effective way of reducing health inequalities.

ID	40
Citation	Petticrew M, Kearns A, Mason P, Hoy C. The SHARP study: a quantitative and qualitative evaluation of the short-term outcomes of housing and neighbourhood renewal. BMC Public Health. 2009 Nov 17;9:415.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/19919687">http://www.ncbi.nlm.nih.gov/pubmed/19919687</a>
Type of evidence	Controlled observational study (controlled but not randomised)
Publication Date	November 2009
Quality of study	2+ (well conducted non-RCT studies with a low bias risk and moderate probability of a causal relationship)
Region	United Kingdom
Evidence statements (note population, intervention and outcomes)	<p>SHARP (Scottish Housing Health and Regeneration Project) assessed the effects of new social housing and area regeneration on the health and wellbeing of tenants in the social-rented sector. The study found that rehousing resulted in dramatic improvements in two major aspects of housing quality: damp and cold. There was also a significant increase in neighbourhood satisfaction, due to the improvements in general appearance and reductions in antisocial behaviour. However the study found no significant change in health in the year following rehousing. A small proportion of respondents in this study reported that rehousing had been followed by decreases in the affordability of some household bills or services; nevertheless, most found no change, or an improvement. <i>(Strength of evidence = Moderate; Topic = Mental health; Social cohesion; Urban design)</i></p>
Implications	Social housing renewal may bring positive psychosocial benefits to tenants; however such benefits may not be accompanied by significant changes in health, at least in the short term. Consequently although there are well-documented associations between poor housing and poor health, housing investment may not be a major tool for improving health and reducing health inequalities.

ID	50
Citation	Mala Rao , Sunand Prasad , Fiona Adshead , Hasitha Tissera. The built environment and health. The Lancet, Volume 370, Issue 9593, Pages 1111 - 1113, 29 September 2007
Web link	<a href="http://www.ncbi.nlm.nih.gov/pubmed/17868821?dopt=Citation">http://www.ncbi.nlm.nih.gov/pubmed/17868821?dopt=Citation</a>
Type of evidence	Grey literature
Publication Date	September 2007
Quality of study	4 (expert opinion)
Region	International - all
Evidence statements (note population, intervention and outcomes)	Rao et al <sup>50</sup> note that the built environment is defined as encompassing all buildings, spaces, and products that are created or modified by people. The built environment affects indoor and outdoor physical environments, social environments, and subsequently health and quality of life. It includes urban design, transportation systems, and land-use planning and policies that affect communities in urban, rural, and suburban areas. The article goes on to note that access to green open space can increase physical activity and mental wellbeing, because most sustained exercise is incorporated into daily routine activities. The article also suggests that within buildings clear signposting, good acoustics and natural lighting may reduce stress. <b>(Strength of evidence = Low; Topic = Mental health; Urban design)</b>
Implications	Create streets, green spaces, and neighbourhoods that encourage more walking and cycling and opportunities for informal social contact and interaction. Incorporate clear signposting, good acoustics and natural lighting into building design.

ID	39
Citation	Thomson H, Atkinson R, Petticrew M, Kearnes A. Do urban regeneration programmes improve public health and reduce health inequalities? A synthesis of the evidence from UK policy and practice (1980–2004). J Epidemiol Community Health. 2006 February; 60(2): 108–115.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2577369/pdf/108.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2577369/pdf/108.pdf</a>
Type of evidence	Grey literature
Publication Date	February 2006
Quality of study	2+ (well conducted non-RCT studies with a low bias risk and moderate probability of a causal relationship)
Region	United Kingdom
Evidence statements (note population, intervention and outcomes)	Despite significant public investment in national urban regeneration programmes there is still little evidence to demonstrate the impacts on socioeconomic or health outcomes. The dearth of data validating links between regeneration or housing investment within regeneration programmes and subsequent health improvement has been established in both systematic and non-systematic reviews. This report used a systematic review approach to consider data and lessons from previous policy interventions within government reports of policy evaluations. The review concluded that evaluations of national regeneration investment have rarely assessed impacts on health or impacts on the socioeconomic determinants of health; far less is reported on the social distribution of these impacts. The report notes that the lack of data on both health impacts and socioeconomic impacts may undermine the rhetoric that links such investment to health gains and reductions in health inequalities. However, the absence of impact data does not provide grounds for inaction, and it would be wrong to conclude that there is no research evidence to support hypothetical links between urban regeneration investment and health impact. For example, in the UK both the Black Report and the Acheson Report presented data from a wealth of cross sectional and longitudinal studies to establish clear links between socioeconomic circumstances and poor health. The available evidence suggests that regeneration programmes may lead to some small positive impacts on health and socioeconomic circumstances, however due to the incompleteness of research adverse impacts are also a possibility.
Implications	In the absence of more substantive evidence, urban regeneration decisions must be based on the “best available evidence”. The report notes that there is a need for impact evaluations that can be used to inform both public policy and healthy public policy.

ID	52
Citation	Hood, E. Dwelling Disparities, How poor housing leads to poor health. Environmental Health Perspectives, Volume 113, Number 5, May 2005
Web link	<a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257572/pdf/ehp0113-a00310.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257572/pdf/ehp0113-a00310.pdf</a>
Type of evidence	Grey literature
Publication Date	May 2005
Quality of study	4 (expert opinion)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<ul style="list-style-type: none"> <li>Scientific evidence has shown that various aspects of the built environment can have profound, directly measurable effects on both physical and mental health outcomes, particularly adding to the burden of illness among ethnic minority populations and low-income communities.</li> <li>Lack of sidewalks, bike paths, and recreational areas in some communities discourages physical activity and contributes to obesity; in those low-income areas that do have such amenities, the threat of crime keeps many people inside.</li> <li>Income segregation—the practice of housing the poor in discrete areas of a city—has also been linked with obesity and adverse mental health outcomes.</li> <li>Dilapidated housing is associated with exposures to lead, asthma triggers (such as mold, moisture, dust mites, and rodents), and mental health stressors such as violence and social isolation.</li> </ul> <b>(Strength of evidence = Low; Topic = Mental health; Social cohesion; Service access; Urban design)</b>
Implications	

ID	37
Citation	Thomson H, Petticrew M. Is housing improvement a potential health improvement strategy? Geneva: WHO Health Evidence Network, 2005
Web link	<a href="http://www.euro.who.int/__data/assets/pdf_file/0007/74680/E85725.pdf">http://www.euro.who.int/__data/assets/pdf_file/0007/74680/E85725.pdf</a>
Type of evidence	Grey literature
Publication Date	February 2005
Quality of study	2+ (well conducted non-RCT studies with a low bias risk and moderate probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<ul style="list-style-type: none"> <li>In countries where the hazards of carbon monoxide, lead, poor sanitation and unsafe access have been minimized through the enforcement of strict building regulations, the most serious hazards linked to adverse health are poor air quality, inadequate heat, dampness, radon, trips and falls, noise, house dust mites, tobacco smoke and fires.</li> <li>Housing improvements that ensure the provision of affordable warmth may have the greatest potential to reduce the adverse effects of poor housing. The elderly and very young are particularly at risk from both low and high indoor temperatures.</li> <li>The most common sources of domestic infestation that pose potential health hazards are lice, bedbugs, fleas, cockroaches, mites, rats and mice. Such infestations can be prevented through careful food and waste storage and good hygiene.</li> <li>Faecal pellets from house dust mites and mould spores are the most common domestic allergens. Well-ventilated, damp-free housing and household dust control are recommended to minimise growth of domestic allergens.</li> </ul> <b>(Strength of evidence = Moderate; Topic = Mental health, Urban design)</b>
Implications	The potential that housing improvement has to generate health improvement cannot be considered separately from other changes that residents may experience as part of housing improvement, such as increased housing costs, relocation and more general neighbourhood changes. Some of these may have additional health impacts, either negative or positive.

ID	41
Citation	Thomson H, Petticrew M, Douglas M. Health impact assessment of housing improvements: incorporating research evidence. J Epidemiol Community Health. 2003 Jan;57(1):11-6.
Web link	<a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1732281/pdf/v057p00011.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1732281/pdf/v057p00011.pdf</a>
Type of evidence	Grey literature
Publication Date	January 2003
Quality of study	2+ (well conducted non-RCT studies with a low bias risk and moderate probability of a causal relationship)
Region	International - all
Evidence statements (note population, intervention and outcomes)	<p>In an evidence summary<sup>41</sup> based on an earlier review<sup>67</sup> Thomson et al synthesised findings indicating the expected health effects of specific housing improvements. The authors also reviewed observational data of housing associated health risks to highlight the key impacts to consider when doing a housing HIA. The evidence summary notes that although the systematic review on which it is based found some health gains associated with housing interventions, the evidence was generally weak. The authors explain that the evidence summary was produced in response to consultation with policymakers and HIA practitioners to find a way in which the available research could be used to inform HIA. Note:</p> <ul style="list-style-type: none"> <li>The 2009 review by Thomson<sup>27</sup> updates information provided in the 2001 review (hence the 2001 review is not included separately).</li> <li>This 2009 article appears to have been written as a chapter (68) in Braubach et al.<sup>23</sup></li> </ul> <p>The findings of this evidence summary are collectively considered 'low' strength evidence, consistent with the 2001 systematic review that underpins them. However several of the topics have since been covered in more recent systematic reviews (e.g. warmth and mould) where stronger evidence is presented. The review identifies that the main housing factors that have been associated with health variation and targeted as part of common housing improvements are:</p> <ul style="list-style-type: none"> <li>Indoor air quality, including: house dust mite and allergens; and dampness and hygrothermal conditions. See more recent reviews.<sup>24,25</sup></li> <li>Temperature and warmth. See more recent reviews.<sup>27</sup></li> <li>Home ownership. Generally home ownership is associated with improved health. However the trend does not hold for those people who are living on the margins of home ownership where mortgage arrears increase insecurity and are detrimental to mental health.</li> <li>House type and design, for example, flat or house. Causal relationships are not possible due to limited evidence. However there are associations between flat dwelling and stressful living conditions such as increased social isolation, crime, reduced privacy and reduced opportunities for safe play for children.</li> </ul> <p><b>(Strength of evidence = Low; Topic = Mental health; Social cohesion; Service access; Urban design)</b></p> <p>The review identifies the following issues that are also associated with programmes of housing improvement:</p> <ul style="list-style-type: none"> <li>Moving and relocation. Moving house is considered to be a stressful, health damaging life event, particularly in the field of social housing where there are limited opportunities to negotiate with the housing authority. The review notes that housing relocation has also been associated with loss of community, uprooting of social networks and unsatisfied social aspiration that may counteract satisfaction with improved housing.</li> <li>Displacement. Housing regeneration projects can lead to displacement of original residents, which may result in misleading shifts in routine social and health statistics.</li> <li>Area effects. Socioeconomic characteristics of a neighbourhood may have an effect on a person's health status. The review notes that health improvements are likely where employment, education and social integration opportunities increase.</li> <li>Housing costs. Rent rates may impact on health outcomes. Also see more recent review on voucher schemes.<sup>29</sup></li> <li>What is residents' baseline satisfaction level with their housing?</li> <li>What levels of displacement can be predicted over the period of improvement?</li> <li>What explanations might there be for displacement?</li> </ul> <p><b>(Strength of evidence = Low; Topic = Mental health; Social cohesion; Service access; Urban design)</b></p>
Implications	<p>Thomson et al. recommend that housing HIAs include the following questions:</p> <ul style="list-style-type: none"> <li>What are the specific housing changes/improvements that are proposed?</li> <li>Are there other housing changes not detailed in the proposals that may occur?</li> <li>What is the evidence that these changes will affect health and any specific symptoms?</li> <li>Are there vulnerable groups (for example, elderly, asthmatic people) who may benefit particularly from the proposed changes?</li> <li>When can health gains be realistically expected?</li> <li>Will the improvement be too marginal to detect?</li> <li>Are there going to be any changes in housing costs?</li> <li>Is there any other change that may affect living costs— transport, food, access to amenities?</li> <li>Was there sufficient consultation about the housing improvements?</li> </ul> <p>Further research into the health impacts of housing interventions.</p>

ID	42
Citation	Douglas M, Thomson H, Gaughan M. Health Impact Assessment of housing improvements: a guide, Public Health Institute of Scotland, Glasgow, 2003. ISBN 1-904196-13-6.
Web link	<a href="http://www.hiaconnect.edu.au/files/HIA_of_Housing_Improvements.pdf">http://www.hiaconnect.edu.au/files/HIA_of_Housing_Improvements.pdf</a>
Type of evidence	Grey literature
Publication Date	May 2003
Quality of study	4 (expert opinion)
Region	United Kingdom
Evidence statements (note population, intervention and outcomes)	<p>The guide includes a literature review of all studies which have monitored health change following housing improvement between 1930 and 2000. The review notes the following potential health effects associated with housing:</p> <ul style="list-style-type: none"> <li>Indoor air quality is influenced by many factors and can impact on health. Elderly and people with asthma especially at risk.</li> <li>Dampness &amp; hygrothermal growth can result in small increased risk of respiratory symptoms.</li> <li>Interventions targeting house dust mite &amp; allergens exposure do not improve health or reduce asthma symptoms.</li> <li>The elderly are at increased risk from cold weather. Measures to improve protection from the cold in this group may have positive health impact in this group.</li> <li>Home ownership is associated with improved health; however, negative health impacts are associated with mortgage arrears and insecure home ownership.</li> <li>Living in a flat (as opposed to a house) is associated with poor mental health and other adverse conditions which may impact on health.</li> <li>Relocation to a new area may provide a different social environment, as well as educational and employment opportunities. There may also be positive changes to the economic and social environment as a result of influx which may have health benefits.</li> <li>Housing costs such as increased rents may affect people's ability to buy an adequate diet, and may create a benefit trap limiting employment opportunities.</li> <li>Moving &amp; relocation can lead to: loss of social networks; stress; and uncertainty and lack of control over changes and living circumstances.</li> <li>Original residents may be displaced and not benefit from the housing improvement.</li> <li>Residents in neighbouring areas not part of a regeneration program may feel excluded. This may result in community divisions between improved and non-improved area.</li> </ul> <p><b>(Strength of evidence = Low; Topic = Mental health, Social cohesion; Service access; Urban design)</b></p> <p>The review also makes the following observations:</p> <ul style="list-style-type: none"> <li>Regeneration has unclear overall impact on health or illness.</li> <li>There is moderate evidence that energy efficiency measures and medical priority rehousing improve self-reported health.</li> <li>There is moderate evidence that rent increases are linked to higher mortality rates.</li> <li>There is conflicting evidence regarding the effect of housing improvement on respiratory symptoms, however improved energy efficiency may reduce respiratory symptoms.</li> <li>Housing improvement may be associated with the following social impacts: increased community involvement; social support; sense of belonging and feeling of safety; reduced fear of crime; and sense of isolation, however the health impacts of these are unknown.</li> <li>There is moderate evidence that increased rents lead to reduced income, which may result in an inability to buy an adequate diet.</li> <li>There is moderate evidence that improved energy efficiency in schools can lead to less school time lost due to asthma symptoms, but not other symptoms.</li> </ul> <p><b>(Strength of evidence = Moderate; Topic = Mental health, Social cohesion; Service access; Urban design)</b></p> <p>The review also makes the following observations:</p> <ul style="list-style-type: none"> <li>There is strong evidence that regeneration and medical priority rehousing improve mental health. Although there is no mental health improvements reported following improved energy efficiency.</li> <li>There is strong evidence that safety devices in the home, such as smoke alarms and child resistant packaging on poisonous products, can reduce unintentional injury.</li> <li>There is strong evidence that environmental modifications and tailored exercise programmes help prevent falls in the elderly.</li> </ul> <p><b>(Strength of evidence = High; Topic = Mental health, Social cohesion; Service access; Urban design)</b></p>
Implications	This guide may be a useful companion in undertaking the Villawood HIA.

ID	9
Citation	Giles-Corti B, Ryan K, Foster S, 2012, Increasing density in Australia: maximising the health benefits and minimising the harm, report to the National Heart Foundation of Australia, Melbourne.
Web link	<a href="http://www.heartfoundation.org.au/density">www.heartfoundation.org.au/density</a>
Type of evidence	Grey literature
Publication Date	March 2012
Quality of study	2++ (High quality SR of non-RCT studies; or high quality non-RCT studies with a very low bias risk and high probability of a causal relationship)
Region	Australia
Evidence statements (note population, intervention and outcomes)	<p>Building and environmental factors can be manipulated to mitigate the effects of exposure to environmental stressors.</p> <ul style="list-style-type: none"> <li>• number of rooms and household density;</li> <li>• maintenance, upkeep and pest control, location (including presence of trees);</li> <li>• design (balconies, cross ventilation); and</li> <li>• proximity to high traffic roads and location in relation to prevailing winds.</li> </ul> <p>It is the location, design, construction and quality of housing which influence mental health rather than housing density in and of itself.</p> <p>Housing density may have direct effects on mental health: eg environmental stressors such as crowding, noise, indoor air quality and light. Housing density may have indirect effects: eg other factors that affect daily living and social interactions between residents.</p> <p>The impact of higher density housing on mental health may relate to:</p> <ul style="list-style-type: none"> <li>• the social environment (who else lives in the housing and their SES);</li> <li>• the floor on which residents live (indicative evidence that higher floors lead to adverse effects especially for stay-at-home women with children); and</li> <li>• levels of interaction and social support.</li> </ul> <p>Crime and fear of crime: higher density housing with higher population levels can increase the incidence of crime and disorder simply because there are more people in the area. Internal and external environments can be designed to help reduce crime and fear of crime.</p> <p>Giles-Corti et al report some overlapping findings for children and young people and housing density including:</p> <ul style="list-style-type: none"> <li>• behavioural problems – British and Austrian studies showing higher rates of behavioural problems for children in centrally located high-rises or in multiple-dwelling units;</li> <li>• overweight and obesity – few studies have examined this issue. The authors cite a Cypriot study of children aged 9-13 which found that girls in highly urbanised areas were 4 times as likely to be overweight as girls in areas of medium urbanisation. The authors note the complexity of the issue and relate findings to parenting styles and opportunities for independent mobility;</li> <li>• independent mobility – mixed-use and dense environments may work well for adults but they can restrict opportunities for active play and independent mobility;</li> <li>• risk of pedestrian injury – a major influencing/limiting factor for children's mobility;</li> <li>• physical activity – improve walkability of neighbourhoods;</li> <li>• active play – ensure that public open space is accessible and that it is considered safe by parents;</li> <li>• child density – co-locate families to provide opportunities for interaction;</li> <li>• involving young people in decision-making.</li> </ul> <p><i>(Strength of evidence = N/A; Topic = Mental health; Urban design)</i></p>
Implications	

ID	10
Citation	Hulse, K, Jacobs K, Arthurson K, Spinney A. At home and in place? The role of housing in social inclusion. Melbourne, Australia: Australian Housing and Urban Research Institute. AHURI Final Report No.177, 2011
Web link	<a href="http://www.ahuri.edu.au/publications/p50566/">http://www.ahuri.edu.au/publications/p50566/</a>
Type of evidence	Grey literature
Publication Date	2011
Quality of study	n/a
Region	Australia
Evidence statements (note population, intervention and outcomes)	<p>Three different types of housing-related policies and programs using a threefold typology of social exclusion (from Ref 69)</p> <ol style="list-style-type: none"> <li>1. Deep social exclusion refers to relatively small numbers of people who are disadvantaged and marginalised as a result of multiple and overlapping factors that often accumulate over time. Examples of housing-related policies and programs include homelessness prevention and intervention, targeting 'at risk' population groups, and addressing behaviours associated with disadvantage that have an impact on place.</li> <li>2. Concentrated social exclusion refers to a clustering of people with multiple disadvantages in particular locations, where this might in itself result in further disadvantage. Examples of housing-related policies and programs are targeting services to people in disadvantaged places and comprehensive area-based initiatives.</li> <li>3. Wide social exclusion refers to situations where a large number of people may be excluded on one or two dimensions of disadvantage. Examples of housing-related policies and programs are: improving the condition and standard of social housing, increasing the supply of social and affordable rental housing, and interventions to improve the functioning of housing markets to enable social inclusion.</li> </ol> <p>Housing markets had restructured such that lower-income and vulnerable households were being displaced from inner city areas with good transport, jobs, services and facilities to outer suburbs, and peri-urban and regional areas, which were less well serviced on all these dimensions. This was a particular issue for people with disabilities who faced greater challenges in accessing services.</p> <p>Concentrations of disadvantaged people. This was seen as partly about housing market failure but also about ways in which government housing policies could exacerbate social exclusion, for example, increased targeting of social housing to people with high and complex needs who lacked other options. While this might be designed to improve outcomes for individuals/ households, housing people in what were already areas of concentrated disadvantage on older public housing estates could exacerbate social exclusion.</p> <p><i>(Strength of evidence = N/A; Topic = Social cohesion)</i></p>
Implications	The most effective programs are those that have a dual focus: on people, but also on the wider systemic processes that maintain inequality. Yet to maintain a dual focus requires sufficient resources streams and political commitment. Area-based interventions alone are incapable of addressing the wider systemic problems that arise from fiscal policies that sustain economic inequality. Any effective 'narrowing of the gap' requires sustained investment in locations that are disadvantaged, for example, economic development to generate jobs as well as strategies to equip people for, and connect with, work.

ID	4
Citation	Ruming KJ, Mee KJ, McGuirk PM. Questioning the rhetoric of social mix: courteous community or hidden hostility? Australian Geographical Studies 2004;42(2):234-48.
Web link	<a href="http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8470.2004.00275.x/abstract">http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8470.2004.00275.x/abstract</a>
Type of evidence	Grey literature
Publication Date	2004
Quality of study	N/A
Region	Australia
Evidence statements (note population, intervention and outcomes)	N/A <i>Topic = Social cohesion</i>
Implications	

ID	7
Citation	Randolph B, Ruming KJ and Murray, D. Unpacking social exclusion in Western Sydney: exploring the role of place and tenure. <i>Geographical Research</i> 48 (2):197-214, 2010.
Web link	<a href="http://onlinelibrary.wiley.com/doi/10.1111/j.1745-5871.2009.00619.x/abstract">http://onlinelibrary.wiley.com/doi/10.1111/j.1745-5871.2009.00619.x/abstract</a>
Type of evidence	Grey literature
Publication Date	2010
Quality of study	4 (expert opinion)
Region	
Evidence statements (note population, intervention and outcomes)	<p>Six dimensions of exclusion:</p> <ul style="list-style-type: none"> <li>• neighbourhood;</li> <li>• social and civic engagement;</li> <li>• access;</li> <li>• crime and security;</li> <li>• community identity; and</li> <li>• economic characteristics</li> </ul> <p>The division of social exclusion based on tenure characteristics alone is questioned. Rather, it is the experience of public housing residents of multiple dimensions of exclusion which is the most significant tenure based difference.</p> <p>It is in relation to the incidence of exclusion through access to services (locational disadvantage) and economic capacity (poverty) that the divergences between locations of public housing and private housing neighbourhoods emerge most strongly.</p> <p>Social exclusion is not the product of agency characteristics of local residents. The authors argue that exclusion through access and economic capacity for public housing tenants represents the structural outcomes of Australian public housing and planning policy. The accessibility of public housing estates in the western Sydney context is driven largely through historical land purchase and the development policies of social housing providers in the 1960s and 1970s. While fringe residential development was rapid, the majority of these locations were developed in the absence of coherent and funded infrastructure provision plans or local economic opportunities. It is these historical factors which play a significant role in present day exclusion of public housing residents in areas such as Shalvey and Villawood. <i>(Strength of evidence = N/A; Topic = Service access; Urban design)</i></p>
Implications	The incidence of multiple social exclusion differentiates the experience of social exclusion in areas of public housing. Policy prescriptions to address exclusion [in these areas in western Sydney] need to address the compounding difficulties that poor accessibility and high levels of income poverty generate for these communities.

ID	8
Citation	Kathy Arthurson. Neighbourhood effects and social mix policies, Australian efforts at urban renewal. Adelaide, Australia: Flinders University. SOAC, 2011.
Web link	
Type of evidence	Grey literature
Publication Date	2001
Quality of study	4 (expert opinion)
Region	
Evidence statements (note population, intervention and outcomes)	<p>The concept of social cohesion 'is a difficult concept' to grapple with, not least because of its numerous dimensions and utilisation by policy makers in a variety of ways that are often ill defined (70, p458). Social cohesion is not a new concept but it emerges at different times in response to widespread societal upheaval and change.</p> <p>There seems little evidence to support the expectations of policy makers that balanced social mix builds social cohesion. This contention appears refutable on the basis of reviews of both quantitative and qualitative research findings, at least from Australian, English and Dutch studies.</p> <p><i>Length of residence</i> in the neighbourhood is an important factor as time is needed for building trust and relationships. Social capital tends to develop over time in response to stability of residency and opportunities for social interaction, which in turn helps to establish the bonding and bridging networks that build trust and participation within neighbourhoods.<sup>71</sup></p> <p><i>Spatial scale</i> is also an important factor in facilitating cross-tenure social interaction as it enlarges or decreases opportunities for contacts to occur. However, scale increases the risk of negative interactions as socially engineering a too fine-grained social mix may enhance opportunities for conflict to occur rather than leading to the envisaged social cohesion, especially where differences in socioeconomic characteristics between residents are considerable. In some mixed-tenure neighbourhoods, owners and renters expressed the view that they did not mind living near each other but resistance increased exponentially as spatial proximity between residents of different housing tenures increased.</p> <p>Some studies have found that <i>schools</i> aid with social cohesion as children develop friendships with other local children. Other studies have not found this effect so Arthurson suggests that the quality of the school is important: good quality schools with a socioeconomic mix of students may have an important role to play in the development of neighbourhood social cohesion. NB: residents often talked about social mix in terms of the age of neighbourhood residents. Specifically they expressed the view that the presence of children was conducive to enhancing social cohesion particularly through interactions at local schools. The elderly and longer term residents as well were identified as more stable groups of residents that generated a sense of community and neighbourliness. These aspects of social mix have received only limited attention in the wider debates about social mix.</p> <p>A number of studies conclude that attempts to facilitate social mix through building socially diverse housing often have to deal with owner-occupier perceptions that <i>poorer households are inherently bad neighbours</i>. Owners are associated with an enhanced area reputation but in turn they are more likely to identify problems, such as inappropriate social behaviour, as due to public housing tenants. This is not surprising given that individuals entering public housing are increasingly high need and complex tenants that without proper support and service provision can provide challenges for their neighbours. <i>(Strength of evidence = N/A; Topic = Social cohesion)</i></p>
Implications	Questions the aspirations for integration and social cohesion given that the target groups entering social housing are no longer predominantly low income working families but mostly people on government pensions often with complex social and behavioural issues, including ex-prisoners, drug addicts and people with mental health issues being rehabilitated in the community. Communication technology such as mobile phones, the internet and social media, along with more general motor vehicle access means that for many residents life is no longer bound to the specific geographical space of the neighbourhood in the way that it was in the past.

ID	48
Citation	Coutts A, Ramos-Pinto P, Cave B and Kawachi I. Social capital indicators in the UK. Ben Cave Associates Ltd for the CRE. A research project for the Commission for Racial Equality, 2007. .
Web link	<a href="http://bit.ly/UBW3Mg">http://bit.ly/UBW3Mg</a>
Type of evidence	Grey literature
Publication Date	2007
Quality of study	N/A
Region	North America
Evidence statements (note population, intervention and outcomes)	<p>Social capital must be understood as the combination of both cognitive and structural elements which reinforce each other to generate the stream of outcomes that has been associated with the concept. This means that the structures of social capital (social networks) must not be disassociated from the cognitive elements (trust, attitudes, etc) which are more commonly measured by surveys.</p> <p>A multi-level approach to social capital measurement enables the distinction between the effects of context and those of social capital.</p> <p>The growing literature on this topic suggests an important distinction between two types of social capital ties. Bonding social capital refers to the relations within homogeneous groups. These are the strong ties that connect family members, neighbours, and close friends and colleagues. Bonding relationships act as the primary means for the transfer of social norms to family members and friends. Bonding social capital is important for establishing and favouring norms that define appropriate social behaviour, generating mutual aid, and protecting the vulnerable.</p> <p>By contrast, bridging social capital looks at heterogeneous relations, ones that exist between groups; these are the weak ties, including formal or informal social interactions that link people and communities of different ethnic, occupational and socio-economic backgrounds. On a macro level, bridging social capital is important for civil society. It is also recognised as an important source of benefits for individuals and communities. It provides opportunities to integrate with wider society through participation in heterogeneous groups of people from diverse social classes, and it opens channels to voice concern in favour of those who may have very little opportunity to reach more formal avenues in order to affect changes in society, for example, to instigate changes in public welfare-oriented policies.</p> <p><i>(Strength of evidence = N/A; Topic = Social cohesion)</i></p>
Implications	A multi-level approach to social capital measurement enables the distinction between the effects of context and those of social capital.

ID	5
Citation	Darcy M. De-concentration of disadvantage and mixed income housing: a critical discourse approach. Housing, Theory and Society 27 (1):1-22, 2010.
Web link	
Type of evidence	Grey literature
Publication Date	2010
Quality of study	N/A
Region	International - western style countries
Evidence statements (note population, intervention and outcomes)	<p>Public housing redevelopment projects which claim to use mixed income as a means of addressing poverty are explicitly ideological, and form part of the neoliberal agenda for economic transformation of cities.<sup>72,73</sup></p> <p>Social exclusion suggests a boundary, and focuses attention on those outside it rather than on the features of society which systematically generate widespread poverty and disadvantage.</p> <p>Three discourses within which social exclusion is framed.<sup>74</sup></p> <ul style="list-style-type: none"> <li>• a redistributionist discourse (RED) developed in British critical social policy, whose prime concern is poverty;</li> <li>• a moral underclass discourse (MUD) which centres on the moral and behavioural delinquency of the excluded themselves; and</li> <li>• a social integrationist discourse (SID) whose central focus is on paid work.</li> </ul> <p>MUD is the most closely associated with neoliberal ideology in that it locates the source and the remedy for exclusion primarily in the behaviour and choices of the “excluded” themselves, and de-emphasizes the role and responsibility of state agencies. MUD is also the discourse of exclusion which most easily integrates with and suggests a policy focus on place insofar as it suggests that a significant contributor to exclusion and to poverty is a set of learned and shared values and related behaviours which stand in contrast to the values of mainstream (working and home-owning) society.</p> <p>The unit of scale employed to describe and analyse disadvantage in the community obscures differences between areas<sup>44</sup> and recommended that future research on housing estates should employ smaller geographic areas than whole estates as their units of analysis. Little is known about the fate of people who have to move out of areas as a result of regeneration. People may move to a more affluent area where they are no longer identified as excluded as they are diluted in the wider scale of the city. The lived experience of disadvantage at the individual or household level is hidden from view by the discursive practices associated with a focus on geographic concentration and tenure.</p> <p><i>(Strength of evidence = N/A; Topic = Social cohesion)</i></p>
Implications	Research on housing estates should employ smaller geographic areas than whole estates as their units of analysis.

ID	11
Citation	Pawson H, Davison G and Wiesel I. Addressing concentrations of disadvantage: policy, practice and literature review. Melbourne, Australia: Australian Housing and Urban Research Institute. AHURI Final Report No.190, 2012.
Web link	<a href="http://www.ahuri.edu.au/publications/download/70704_fr1">http://www.ahuri.edu.au/publications/download/70704_fr1</a>
Type of evidence	Grey literature
Publication Date	2012
Quality of study	N/A
Region	International - western style countries
Evidence statements (note population, intervention and outcomes)	<p>Physical factors disadvantaging areas and their residents include:</p> <ul style="list-style-type: none"> <li>• substandard housing;</li> <li>• environmental pollution; and</li> <li>• locational disadvantage.</li> </ul> <p>The notion of place-based disadvantage has been challenged by the idea that individuals who are sufficiently mobile can avoid many of the negative outcomes associated with living in a disadvantaged place.<sup>47, p34</sup> It is therefore important, when measuring place-based disadvantage, to also recognise and measure various forms of mobility that are available to individuals as balancing factors. <i>(Strength of evidence = N/A; Topic = Social cohesion)</i></p>
Implications	Research could focus on: the extent to which interventions succeeded in maximising local policy coordination; how far resources were used effectively; what factors could help address the negative consequences of locational disadvantage for disadvantaged people; and which demographic groups could and should be targeted for programs and interventions. Also vitally important, given the policy zeitgeist around public participation, will be to delve into the extent to which disadvantaged communities have been actively involved in shaping interventions. What gap is there (if any) in the level of public service provision between disadvantaged places and their wealthier neighbours?

ID	75
Citation	National Travel Survey, England
Web link	<a href="http://bit.ly/RDkr1Q">http://bit.ly/RDkr1Q</a>
Type of evidence	Grey literature
Publication Date	2011
Quality of study	n/a
Region	United Kingdom
Evidence statements (note population, intervention and outcomes)	<p>“... car access is the most important factor affecting travel. On average in 2010, members of car-owning households made 39% more trips than people living in non-car-owning households, and travelled over twice as far per year. In 2010, 49% of households in the lowest income quintile had no car compared with 9% in the highest income quintile.”<sup>46</sup></p> <p>The questions that are not being asked is what do people who live in non-car owning households miss out on by making 39% less trips? For example</p> <ul style="list-style-type: none"> <li>• What services and opportunities are they not being able to access?</li> <li>• What social interaction and social networks are they not being able to access?</li> <li>• To what degree are they suffering from social isolation and its attendant health effects?</li> </ul> <p>To add to this, there is also a recent fact-sheet on travel of those with mobility difficulties and health difficulties.<sup>75</sup> This reports that:</p> <p>“... in the UK in 2008, 13% of adults 16 years and over experienced mobility difficulties. Of these, the majority (90%) of adults reported mobility difficulties going out on foot in 2008, slightly lower (2%) than 2007. Adults who said they had difficulty going out on foot were asked if they go out on foot alone, if they go out only with someone to assist them, or if they never go out on foot at all. Over half of them reported that they go out on foot alone despite their walking difficulties and one in five needed assistance (22%) or do not go out at all (23%). The NTS also asks people how often they walk for 20 minutes or more, for any reason. One-fifth of adults with mobility difficulties said they go out on foot at least once a week and seven in ten (70%) said they did so less than once a year or never. In contrast, those without any difficulties were 62% and 19% respectively ...”</p> <p>“Among people aged 16-69, those with mobility difficulties make around a quarter fewer trips than those without difficulties. This difference increases to over a third among people aged 70+ ...”</p> <p>This is a substantial level of immobility and isolation for this section of the population. This is further highlighted when the report goes on to say.<sup>46</sup></p> <p>“Adults with mobility difficulties were asked what difficulties they had with local buses and whether they used local buses at all. Nearly three quarter said they had difficulty getting to the bus stop, and two-thirds said they had difficulty in getting on or off buses or difficulty waiting at the bus stop ...”</p> <p><i>(Strength of evidence = N/A; Topic = Social cohesion; Service access; Urban design)</i></p>
Implications	

## Section C: Evidence from previous HIAs of housing developments

ID	13
Citation	Vohra S and Christopher Y. Marsh Farm Central Area Regeneration Masterplanning Health Impact Assessment, Strategic Consulting Report: 644-00202. Luton, UK: Research Consulting Services, IOM; 2009.
Web link	<a href="http://www.apho.org.uk/resource/view.aspx?RID=72452">http://www.apho.org.uk/resource/view.aspx?RID=72452</a>
Type of HIA	Health Impact Assessment - detailed
Date	May 2009
Scale of development	Large scale community redevelopment including master planning
Region	United Kingdom
Development description	Redevelopment of Marsh Farm Estate, (Luton, UK), a deprived area with a mixture of private and public sector housing, accommodating approximately 10,000 residents, designed in the 1960s. The master planning proposals were to increase the number of houses and flats; a redevelopment and/or relocation of the Community Enterprise and Resource Centre (CERC); redevelopment of the retail amenities including the creation of a new supermarket; and continuance and extension of the weekly markets. <i>For existing residents: Over the short term (demolition/construction phase):</i> worry and anxiety about the relocation and uncertainty over the move and new accommodation; disruption of daily routines as they wait to move, the move itself and then get settled in their new accommodation; loss of existing social networks of family, friends and neighbours; loss of easy access to the local shops (particularly for the elderly); disruption in access to health, social care and related services; and disruption of access to buses and walking routes. <i>Over the short to medium term (demolition/construction and early operation phases):</i> issues around whether new homes would be better than current homes, in a location residents liked and of a size and quality that meets their needs. <i>Over the long term (operation phase):</i> health and wellbeing impacts were uncertain as they were dependent on whether the new accommodation's quality and location was seen by residents as meeting their needs. <i>(Actions or mitigations taken: Financial assistance for some longstanding residents to support their move. Residents would get similar accommodation to what they already have i.e. if they have a two bedroom flat they will be offered a two bedroom flat elsewhere and will not have the opportunity to have a larger flat even if they or their families needs require more space.)</i> <i>For new residents: Over the short to medium term (demolition/construction and early operation phases):</i> brand new houses that are built to good quality housing standards; easy access to the new shops and amenities (particularly for older residents, those with disabilities and families); easy access to the new services and community facilities (including health and leisure); beneficial effects on their mental health and wellbeing from moving into new houses and a redeveloped central area. <i>Over the long term (operation phase):</i> health and wellbeing impacts were viewed as likely to continue to be positive. <i>(Actions or mitigations taken: New homes, services and amenities)</i> <i>For children and young people: Over the short term (demolition / construction phase):</i> disruption of bus and pedestrian access to school, leisure and extra-curricular activities; risk of injury from demolition and construction sites and vehicles; disruption to family and friendship networks from actual perceived changes in road safety and temporary loss of community amenities (shops/library); disruption of learning due to noise impacts on school; and disruption effects resulting in adverse impacts on general mental health and wellbeing. <i>(Actions or mitigations taken: None)</i> <i>For children and young people. Over the long term (operation phase):</i> loss of shops and retail amenities that specifically cater to children and young people or have strong meanings for existing local children as focal points; change in play areas and green-space; mental health and wellbeing benefits from the development demonstrating that things can change for the better on the estate. Spiritual, culture and leisure benefits from new amenities and facilities, including a new improved library linked to the school. <i>(Actions or mitigations taken: Improved: green space and play areas; and new amenities/facilities.)</i> <i>For women, older people, people with disabilities or people from black or ethnic minorities. Over the short term (demolition / construction phase):</i> disruption to daily routines particularly those women with childcare responsibilities (school, local shopping); disruption of access to pedestrian and bus routes; disruption accessing health, social care and other service; reduced mental health and wellbeing from perceived reductions in safety (particularly evenings and night); as a result of disruptions, reduced time to visit family and friends. <i>Over the short to medium term (demolition/construction and early operation phases):</i> disruption and potential loss of existing local shops before the new ones are built and let and potential loss of outdoor market (for ethnic minorities this may mean a loss of culturally important specialist foods). <i>Over the long term (operation phase):</i> health and wellbeing impacts were expected to be positive though dependent on the detailed design e.g. good accessibility for those with pushchairs, location of any new pub, good range of shops and amenities, clean and litter free environment. <i>(Actions or mitigations taken: None)</i> <i>For unemployed people. There are no specific health impacts on unemployed people however the new jobs created during both the demolition/construction (building jobs) and operation phases (working in the new shops and amenities) would have a positive impact on health and wellbeing. (Actions or mitigations taken: New employment opportunities)</i>
Health effects that directly link to housing (note populations)	
Other health effects considered	The HIA analysis divided residents into four groups: those who would be relocated; those who would face the greatest disruption; those from equalities/vulnerable groups; and other estate residents. Equalities/vulnerable group categories included: gender [men, women]; ethnicity; age [older people, children and young people]; disability [physical, sensory, learning, mental health]; faith; and other [unemployed, users of MF health/other services, those with respiratory problems]. The HIA considered four key phases of development: demolition, construction, operation and future refurbishment/redevelopment. Consideration was also given to effects over: the short term; the short to medium term; and the long term. The HIA considered the following issues: Pollution (dust, noise, vehicles); Physical injury; Mental health & wellbeing; Jobs and economy; Housing & shelter; Transport & connectivity; Education and learning; Crime & safety; Health and social care & CERC services; Shops and retail; Social capital and community cohesion; Spirituality culture and leisure; Lifestyle and daily routines; Energy and waste; Land and spatial. Recommendations include: provide community spaces and a range of facilities, (e.g. health centre, business space and community facilities); homes should meet high quality standards; shopping area should be family friendly and prioritise use by families, older people and those with disabilities; shopping area should include an ATM cash machine; provision of biodiverse green-space with play areas and covered seating; include a 'cop shop' to reduce perceptions of crime; any pub should be away from residential areas; routes should be safe, accessible and well lit; adopt a 'walkable community and development' principle; ensure adequate provision for maintenance is built into the proposals; and make provision for sustainable waste management. Key issues in determining the success of the development included: standards to which the housing will be built; detailed design of the retail space and open and green space; the mix of tenure in the new housing and the criteria for allocating new tenants homes; detailed planning for the relocation of health/social services; continuity of the existing shops; the criteria used to select new shops and the leasehold conditions that they should meet; access to shops and health/social services during the demolition and construction phase; and appropriate relocation of existing tenants.

ID	14
Citation	University of California Berkeley Health Impact Group (UCBHIG), HOPE VI to HOPE SF, San Francisco Public Housing Redevelopment: A Health Impact Assessment, University of California, Berkeley, CA, November 2009.
Web link	<a href="http://www.healthimpactproject.org/resources/document/hope-vi-to-hope-sf-san-francisco-public-housing-redevelopment.pdf">http://www.healthimpactproject.org/resources/document/hope-vi-to-hope-sf-san-francisco-public-housing-redevelopment.pdf</a>
Type of HIA	Health Impact Assessment - detailed
Date	November 2009
Scale of development	Large scale redevelopment of two deprived communities in San Francisco
Region	North America
Development description	The retrospective HIA considered how redevelopment of public and affordable housing had either positively or negatively impacted residents' health. The HIA examines the 'Housing Opportunities for People Everywhere' (HOPE VI) federal Housing and Urban Development initiative. HOPE VI aimed to fundamentally transform public housing by both physically revitalizing properties and also changing the character of low-income housing communities. The HIA analysis consisted of a review of the literature on public housing and health, conducting surveys and interviews with housing residents, management, and key individuals in the redevelopment process, and mapping neighbourhood-level data for the two housing sites. <i>Materials factors:</i> Use of lead based paints homes has been associated with lead exposures, which affects neurodevelopment in children. The HIA notes mixed evidence for carcinogenic or 'sick building syndrome' effects associated with volatile organic compounds (VOCs). VOCs are chemicals that are released as gases from many household items, including paints, varnishes, particle board and plywood and adhesives. <i>(Actions or mitigations taken: Although implementation is unknown, the HIA recommended: building materials that use low VOC materials.)</i> <i>Maintenance and design factors:</i> Planning the maintenance of new homes can have important outcomes for health. For instance the presence of dirty carpets is associated with dust, allergens, and pesticide residues, which are related to allergic reactions, respiratory, neurological, and hematological illness. Structural defects (e.g. cracks and holes in walls) and excess moisture (e.g. from poor ventilation and leaky plumbing) that can occur from improper maintenance are associated with pest infestations and fungal mould growth. Furthermore the use of chemicals to control pests may result in household exposures to pesticide residues. Poor ventilation may concentrate indoor air pollutants and toxic chemicals, e.g. nitrogen dioxide or carbon monoxide from improper combustion in appliances. Structural defects and poor maintenance of basements may lead to the intrusion of radon, which has been associated with lung cancer. Poorly designed, substandard, or poorly maintained housing can increase the risk of injuries and death from fire as well as from slips, falls, and drowning. <i>(Actions or mitigations taken: Although implementation is unknown, the HIA recommended: quality plumbing; good noise insulation; avoid carpeting; good ventilation and drainage to avoid mould; and food and garbage management to avoid pests.)</i> <i>Neighbourhood factors:</i> Exposure to environmental hazards such as traffic-related air pollution is associated with excess risks for mortality, cardiovascular disease, and a variety of respiratory illnesses. Likewise, exposures to community noise are associated with a number of health impacts, including sleep disturbance and annoyance. The lack of affordable housing may lead some people to become homeless, some to become displaced, and some to make economic sacrifices (e.g., for food and/or energy costs). Still others may live in overcrowded situations, which may create risks for acquiring communicable diseases, and affects cognition and creates psychological distress. <i>(Actions or mitigations taken: Although implementation is unknown, the HIA recommended: investigating the used of traffic calming and/or truck rerouting strategies if significant traffic-related health impacts are likely to occur with redevelopment.)</i> The HIA found that redevelopment had had a minor positive impact on crime and safety. There remains fear of gang related activity on one hand, and police harassment on the other. In retrospect, many of the residents were not happy with the open nature of the residential site, which created a sense of vulnerability. Poor maintenance contributes to safety concerns. Ongoing concerns over crime and safety have resulted in residents seeking a safe haven – the community centre served an important role in keeping youth out of trouble, providing programming and services to residents, and engaging residents in community activities. <i>(Actions or mitigations taken: The HIA noted with respect to mitigation to reduce fear of crime that public housing redevelopment has the ability to mitigate some of the risk factors associated with violence; however it is clear that a one-time investment in redevelopment is not sufficient in keep levels of violence low, particularly in areas where there is not an added incentive for others to keep the neighbourhood safe (e.g. tourism or market rate housing). Instead, a commitment must be made to maintain the buildings, and provide ongoing security and violence prevention services to the residents.)</i> Involuntary residential displacement causes short- and long-term health effects. Unaffordable housing as a result of displacement may cause many families to have to choose between other basic necessities such as food and clothing. Likewise, sub-standard housing and overcrowding as a result of displacement can cause increased risk for infections. Having to relocate from one's home can also be stressful and even traumatic. Residential instability and mobility for children and adolescents has been linked to depression. Displaced residents who must relocate outside of their neighbourhoods may lose valuable supportive family and community relationships. Strong social networks and relationships have been found to be protective health factors. Research has shown that public housing residents, particularly those that have lived longest in public housing have the strongest bonds with people and place and that their social capital is spatially specific. <i>(Actions or mitigations taken: Although implementation is unknown, the HIA recommended: providing more support to people temporarily displaced due to redevelopment, including assistance with finding rental accommodation; outreach to provide education about the various housing options available; provide particular support to families, older and more vulnerable residents; and provide links to culturally- and age-appropriate institutions in their new neighbourhoods. To reduce the likelihood of displacement, the HIA recommended that the redevelopment look for opportunities to expand rather than redevelop public housing.)</i> Children living in distressed public housing are vulnerable populations. Health status later in life can be predicted by trajectories that are initiated early in life. Such trajectories can either protect health or increase vulnerability and are influenced by social contexts. Public housing redevelopment has the potential to create physical spaces and new social services in which youth can develop stronger social and community ties. Specific health objectives for children, such as increasing physical activity may be facilitated by consideration of play areas, mixed land use, and environmental conditions that promote active modes of transportation. The promotion of healthy diets may also occur with fewer fast food and more supermarket grocery stores onsite in the neighbourhood. On-site community centres can serve as physical focal point for youths' skills and educational development (after school programs, leadership training, library, access to Internet, and music, dance, and computer classes, etc.). Having dedicated space and programming committed to children's academically development during redevelopment may promote better education attainment, which has lasting health impacts, such as economic status in adulthood. <i>(Actions or mitigations taken: Although implementation is unknown, the HIA recommended: On-site community centres that serve as a place to coordinate positive health programs for the community, particularly children and young people (e.g. computer labs, job training, sports and fitness, afterschool education and college planning). Such facilities should have extended hours that includes evenings and weekends. A key requirement of the success of such facilities is insuring that the redevelopment scheme is responsible for fully implementing, funding, and staffing the Community and Supportive Services (CSS) beyond the life of the redevelopment project.)</i>
Health effects that directly link to housing (note populations)	
Other health effects considered	The HIA argues that the strongest evidence for housing-health relationships exists at the 'microenvironmental' level which considers the associations between how well a dwelling is designed and maintained and its health effects, e.g. deteriorating lead-based paint in homes has been associated with lead exposures, which affects neurodevelopment in children. The HIA summarises the pathways between housing and health at the social, macroenvironmental and microenvironmental level (see Appendix B, Figure 3).

ID	15
Citation	Durrant N, McCormack L, Peabody G, Ahmed M., The regeneration of Kipling & Blackmore on the South Acton Estate Mental Well-being Impact Assessment (MWIA). October 29th 2008.
Web link	<a href="http://www.apho.org.uk/resource/item.aspx?RID=70426">http://www.apho.org.uk/resource/item.aspx?RID=70426</a>
Type of HIA	Health Impact Assessment - other
Date	October 2008
Scale of development	MWIA addresses decanting of 127 homes. This forms a part of a wider regeneration programme for an estate of 5,000 people.
Region	United Kingdom
Development description	Regeneration of an estate in the London Borough of Ealing, built 1949 – 1970, covering 25 hectares of land, providing 1,800 dwellings and home to a population of approximately 5,000 people. The Regeneration Project aims to transform the estate into a thriving mixed tenure sustainable neighbourhood. The current phase of regeneration focuses on the decantment of residents from 127 homes and the allocation of new homes to those which are secure tenants. The impact assessment focuses on mental health outcomes and uses a workshop approach.
Health effects that directly link to housing (note populations)	Decanting may be a disruptive and stressful process that breaks up social networks particularly for vulnerable immobile elderly people. <i>(Actions or mitigations taken: Specific mitigation not suggested, see below for community wide measures.)</i> Families need additional support owing to stress of decantment process, which may affect a change in schools. <i>(Actions or mitigations taken: Specific mitigation not suggested, see below for community wide measures.)</i> May be difficult for adolescents to re-establish themselves in a new community resulting in a break up of social networks and friendships. <i>(Actions or mitigations taken: Specific mitigation not suggested, see below for community wide measures.)</i> Refugees and migrants may face barriers to accessing services (language); may have less understanding of what is happening; may have less opportunity to participate; and may not have secure tenure. <i>(Actions or mitigations taken: Specific mitigation not suggested, see below for community wide measures.)</i>
Other health effects considered	Resident involvement in the design process and create additional opportunities for residents to participate. There were a number of examples where residents had been able to quickly identify aspects of the design that could have been improved simply by looking at the design with a view to living in it. For example residents wanted to be able to access gardens through the kitchen instead of the living room, have a window in the toilet and have a kitchen that was of a reasonable size. They also would have liked a wider colour palette to choose from. The regeneration team may consider establishing a sub group within the resident's panel for decisions on housing design. As the regeneration moves forward, some areas will deteriorate before they are improved. This report suggests making arrangements to temporarily light those areas so people feel safe walking through them. It was noted that those most affected by the regeneration were those least likely to come to the regeneration office. A suggestion was that targeted outreach could be undertaken to ensure those who are most at risk had a better understanding of what was happening. It was seen as important to highlight the support networks available to those moving away as well as those who would remain. The regeneration team should make use of existing communications mechanisms (e.g. notice boards both in existing and new builds, local groups). Provide a means for residents to identify their home as it is being built will assist with creating a sense of identity and attachment in the early phases. Provide practical support for residents e.g. crèche facilities available when people are moving out. The regeneration team may consider establishing a 'buddy' scheme whereby existing tenants can volunteer to mentor new tenants and support them through the process of moving into a new home/community.

ID	16
Citation	Pratt A. A health impact assessment of social housing redevelopment in Devonport, Plymouth. Plymouth Primary Care Trust. May 2008.
Web link	<a href="http://www.apho.org.uk/resource/item.aspx?RID=49873">http://www.apho.org.uk/resource/item.aspx?RID=49873</a>
Type of HIA	Health Impact Assessment - detailed
Date	May 2008
Scale of development	Large scale demolition of 448 homes in Devonport, Plymouth, followed by redevelopment of 258 new homes.
Region	United Kingdom
Development description	448 existing Council dwellings in 9 'blocks' are due to be demolished and - over a 10 year period - replaced by 258 new dwellings, of which 65 will be social housing units. The plan requires the compulsory 'decanting' (i.e. relocating) of existing residents into alternative temporary or permanent dwellings. Some residents - depending upon individual circumstances and wishes and the availability of suitable homes - would then move back into redeveloped housing.
Health effects that directly link to housing (note populations)	Possibility of disruption (e.g. air pollution, noise, road closures etc) causing: <ul style="list-style-type: none"> <li>Stress for nearby residents &amp; businesses</li> <li>Risk of air/noise pollution (affecting health)</li> <li>Disruption (such as road closures) affecting daily life in a wider area (causing stress)?</li> </ul> <i>(Actions or mitigations taken: No specific action, but noted that role &amp; behaviour of building contractors is important. HIA recommended a review of the contractors' plans for demolition and redevelopment.)</i> Improved health from better housing in the longer term. <i>(Actions or mitigations taken: N/A)</i> Stakeholders identified that there had been problems with previous decanting. The HIA concluded that forced relocation can harm health and that serious stress can be caused by delays/lack of information/lack of control etc. <i>(Actions or mitigations taken: Decanting of people should be as quick &amp; efficient as possible. Experts and residents should consider ways to improve the efficiency of the decanting process.)</i> The HIA identified that there had previously been difficulties when the 'development team' liaised with 'community services' regarding the decanting of some residents. This can cause reduce wellbeing and reduced access to services that improve health outcomes. <i>(Actions or mitigations taken: Specific consideration should be given to ensuring that any decanted residents are given their proper entitlements, e.g. for disability needs, mental health support, school attendance, youth activities, benefits claims etc.)</i> The HIA identified concerns that the new development would have inadequate housing provision for disabled people. Such lack of provision was linked to reduced wellbeing outcomes for people with disabilities who are unable to be housed within the community. Disabled people were identified as being 'more vulnerable to housing issues' than others. <i>(Actions or mitigations taken: The HIA recommended that the relevant 'experts' including residents reassess the current and future needs for housing suitable for disabled people; and that the relevant authorities aim to ensure adequate housing supply and adjust plans if necessary.)</i> Stakeholders raised concerns that future city social housing allocation policy might not match with local community needs. Key issues that were not being met were: stress arising from 'problem' neighbours; resentment at perceived 'priority' treatment for others; and the need for housing for people facing homelessness. The HIA identified that resident empowerment & influence was important for wellbeing. <i>(Actions or mitigations taken: The HIA recommended a 'locally sensitive lettings policy' which recognised in particular the needs of minority groups, young people and disabled people.)</i> The HIA identified concern that the development had inadequate provision of green space & play opportunities. Play develops children's wellbeing and accessible green space benefits health for all. <i>(Actions or mitigations taken: The HIA recommendation was to increase the provision of green space, especially public green space and play-friendly space.)</i> The HIA raised concerns that there was insufficient emphasis being placed on the housing needs of young people, who may benefit from higher levels of 'support'. The HIA noted that community cohesion is harmed if youth needs are unmet. <i>(Actions or mitigations taken: The HIA recommended that senior development stakeholders review the plans to consider how to best represent resident's interests.)</i>
Other health effects considered	The HIA included a literature review, the key findings are presented below: <ul style="list-style-type: none"> <li>Housing improvements can improve health especially over the longer term.</li> <li>Housing relocation (temporary or permanent) can have negative health impacts (e.g. stress, loss of social network support).</li> <li>Relocated residents will often benefit from a range of support (to avoid negative health impacts).</li> <li>Consultation and 'empowerment' for residents during regeneration can potentially improve health outcomes.</li> <li>The role and behaviour of building contractors etc can have health impacts for local residents.</li> <li>Some groups (e.g. the disabled, elderly, BME) can be particularly vulnerable to negative impacts.</li> <li>Housing related health impacts are intricately related to other neighbourhood changes.</li> <li>Potential extra household costs arising from relocation or improved housing can have negative health impacts.</li> </ul>

ID	17
Citation	Cave B, Coutts A, Gibbs S, Wheeler B and Pratt, A. Health Impact Assessment: Sherford New Community. Ben Cave Associates Ltd for Devon County Council, South Hams District Council and Devon Primary Care Trust. 2007.
Web link	http://www.apho.org.uk/resource/item.aspx?RID=116034
Type of HIA	Health Impact Assessment - detailed
Date	July 2007
Scale of development	Large scale development of 4,000 new homes and supporting services/facilities on a greenfield site on the outskirts of Plymouth.
Region	United Kingdom
Development description	The 'Sherford New Community' development includes: approximately 4,000 new dwellings by 2016, possibly increasing to 5,500 by 2026; up to 67,000 square metres of business and commercial space; up to 16,800 square metres of mixed retail accommodation; community and sports facilities, including a youth centre; open space facilities, including a Community Park; three primary schools and one secondary school; one Health and Social Care centre; and a Park and Ride interchange at Deep Lane junction.
Health effects that directly link to housing (note populations)	<p>Services:</p> <p>The HIA identifies the following opportunities for health improvements:</p> <ul style="list-style-type: none"> <li>• Include provision for small retailers as these are the linchpin of a sustainable business base at neighbourhood level and are key to creating a socially and economically cohesive community.</li> <li>• Ensure there is good availability of services and amenities (such as grocery stores, pharmacies and recreational spaces) that facilitate people's ability to engage in health-promoting behaviours such as eating fresh vegetables, obtaining medicines, or getting regular exercise.</li> </ul> <p><i>(Actions or mitigations taken: Although actions taken are not reported, the HIA concluded that: partnerships should be established to give local producers of fruits and vegetables preferential access to market opportunities in or around the development. Community cafes and small local food retailers, which offer nutritious and locally produced foods, operate locally and should be incorporated into neighbourhood centres.)</i></p> <p>The HIA identifies the following potential health risks linked to services:</p> <ul style="list-style-type: none"> <li>• A lack of youth service provision for both younger and older children. Services could include a children's centre affiliated with the Health and Social Care Centre and sports fields/play grounds/community centres. Such facilities promote interaction and social inclusion.</li> </ul> <p><i>(Actions or mitigations taken: Although actions taken are not reported, the HIA concluded that: youth provision needs to incorporate plans for provision of informal shelters and formal youth service facilities as well as ensuring young people have access to other community facilities.)</i></p> <p>Transport and connectivity:</p> <p>The HIA identifies the following opportunities for health improvements:</p> <ul style="list-style-type: none"> <li>• 'Car parking management plans' and 'green travel plans' can be enhanced by locating parking away from key buildings and by incorporating elements of physical activity through walking distances. Controlling parking in residential areas will contribute to road safety.</li> <li>• 'Safe Routes to School' initiatives: improve physical activity (including future behaviour); increase social interactions among peers and between generations; and increase engagement with surroundings.</li> <li>• Accessibility planning for those with disabilities should take account of the complete lived experience over a day starting from movement within an individual home to a shop, place of work etc and back to the home.</li> </ul> <p><i>(Actions or mitigations taken: Although actions taken are not reported, the HIA recommends: using a design hierarchy headed by pedestrians and cyclists and public transport; control/limit the speed of vehicles ...; create Home Zones in which people have greater degree of priority over vehicles; ensure public transport links are excellent; ensure that there is adequate emergency service access; make parking an integral part of the design; bus stops need to be positioned to maximise accessibility and reduce travel distances; and include a strategy for disabled access as part of the planning application.)</i></p> <p>The HIA identifies the following potential health risks linked to transport and connectivity:</p> <ul style="list-style-type: none"> <li>• Public Transport. Lack of access to transport is experienced disproportionately by many population groups including women, children and disabled people, people from minority ethnic groups, older people and people with low socio-economic status. These groups can find that their access is reduced to services such as shops and health care and they spend a higher proportion of their resources on transport. Conflicts arise between the need for fast moving bus services and frequent bus stops.</li> <li>• Social cohesion and community severance: Traffic has the potential to affect social networks on a very local basis: as traffic volumes increase people's sense of neighbourliness and the geographic density of their friendships decreases.</li> </ul> <p><i>(Actions or mitigations taken: A Travel survey should be conducted about mode of travel. It should be repeated at regular intervals. This could be designed with input from residents. This should look in detail at each stage, or leg, of a journey. This could be linked with a programme of Personalised travel planning.)</i></p> <p>Social and cultural governance:</p> <p>The HIA identifies the following opportunities for health improvements:</p> <ul style="list-style-type: none"> <li>• Some forms of democratic participation via effective governance structures may be beneficial for the health and wellbeing of those who take part. Participation may benefit individual health by enhancing one's sense of empowerment and self-efficacy; and may also contribute positively to health by building social capital in a community.</li> <li>• Public art can provide a focus for community activity and enhance the sense of civic pride and quality of life within towns. Resident involvement is a key factor in a successful public art strategy- enhancing the sense of ownership of the public realm.</li> </ul> <p><i>(Actions or mitigations taken: Although actions taken are not reported, the HIA recommends: community facilities are accessible and appropriate for all ages and population groups; representatives of the new residential development emerge as soon as possible; the social infrastructure is flexible and can be developed over time to meet the needs of a changing population: for example co-locating services; provide affordable sports facilities for everyone to use; provide areas within the development that can be used for both sporting and social activities; provide services and facilities to cater for young people, especially teenagers, but assess need before embarking on design; ensure that adequate, high quality, affordable and accessible childcare facilities are provided within the development; and ensure that the needs of different faith groups are met in the development.)</i></p>

ID	17
Health effects that directly link to housing (note populations)	<p>The HIA identifies the following potential health risks linked to social and cultural governance:</p> <ul style="list-style-type: none"> <li>• Adverse effects will arise from social isolation or an absence of a sense of community within the development.</li> <li>• A lack of integration with residents in existing settlements in as well as lack of integration between new residents could affect social cohesion and in turn the sustainability of the development.</li> <li>• Capacity building and increased support for local level councillors may be required as the transition from a quiet rural parish to a new town can be very stressful for elected representatives.</li> <li>• Crime is a significant public health problem simply because it is a leading cause of injury. Fear of crime may be even more damaging over the long-run by reducing social cohesion, imposing constant low-levels of stress and hormonal elevation, and making people less likely to leave homes. In particular, fear of crime leaves elderly people isolated and vulnerable. Strategies that are designed to mitigate crime, such as the use of physical barriers and imposition of negative freedoms, can also negatively impact health by reducing access, visibility and promulgating a culture of fear.</li> </ul> <p>Housing and the built environment:</p> <p>The HIA identifies the following opportunities for health improvements:</p> <ul style="list-style-type: none"> <li>• Incorporate high levels of housing/dwelling/neighbourhood design requirements, e.g. BREEAM excellent standard.</li> <li>• The most consistent evidence regarding the effects of environmental factors on physical activity in adults is observed for accessibility of facilities, opportunities for activity, and aesthetic qualities of the area.</li> <li>• Include civic spaces and urban parks; play areas; community park areas; and accessible semi-natural green space. Green space is beneficial to psychological and physical health. Viewing green space including sports facilities and formal and informal public space is linked to higher reported levels of health, well-being and satisfaction with their neighbourhood. The presence of enjoyable scenery and the frequency of seeing others exercise are positively associated with being physically active.</li> <li>• Consider the needs of older people when designing the development. Run down, noisy, high rise living conditions discourage older people from social interaction. Settings which encourage older adults to develop social ties with neighbours include features such as access to transport, safe public spaces and trees near older peoples' homes.</li> <li>• Include a high percentage of affordable housing within the development. Affordable housing helps support lower income families achieve home ownership, which can improve health.</li> <li>• Design safe neighbourhoods for children. Children who live in 'unsafe' neighbourhoods are exposed to greater risks of developing problem behaviours such as hyperactivity, aggression or withdrawal regardless of the quality of their family life. Environmental factors such as the distance between houses, access to facilities such as parks, the density of the child population, and safety all influence measures of children's behaviour.</li> <li>• Design neighbourhoods to be walkable. Urban design features such as lighting, the installation of CCTV and certain architectural designs are associated with lower levels of fear of crime. Residents of highly walkable neighbourhoods have been found to do 70 minutes more physical activity and have lower obesity prevalence than residents of low walkability neighbourhoods. High walkability neighbourhoods were classed as those possessing mixed land use, high density, street connectivity, and safety. This is particularly important for older people who may otherwise become socially isolated.</li> </ul> <p><i>(Actions or mitigations taken: Although actions taken are not reported, the HIA recommends: The physical design of the development should be conducive to walking; ensure the affordable housing remains affordable to prevent low income earners from being displaced; the development should include 'flexible' homes; the need for specialist accommodation for people with mental health issues or disabilities should be investigated and provision provided accordingly; and construction process must be managed by a construction environment management plan to minimise and avoid impacts. The HIA also noted: that a distinct urban/rural edge to the development maintains a sense of place and prevents sprawl; that the texture and width of pavements are important; and that inclusion of pedestrian amenities such as lighting, water fountains, bicycle racks and walking/jogging paths can increase physical activity.)</i></p> <p>The HIA identifies the following potential health risks linked to housing and the built environment:</p> <ul style="list-style-type: none"> <li>• The Sherford New Community master plan adopted an approach that the design would be 'tenure blind' in terms of quality and location. This commitment that affordable housing would be subject to the same design and environmental standards as private housing and will not be zoned or isolated from the rest of development is highly positive; however tenure blind housing which is not accompanied by appropriate support will only reduce visible inequalities and do nothing to reduce the actual health, and other social, inequalities that are experienced by deprived and low SES groups.</li> <li>• Affordable housing can decrease the value of adjacent properties. Pepper-potting tenancies can make marketing the homes more complicated. If high levels of affordable housing, which are not available for ownership, generate higher levels of turnover this can decrease social cohesion and lead to lower levels of community oversight and investment by public housing residents.</li> <li>• The phasing of the construction process is key - it will be important to ensure that all facilities and infrastructure are available at the required time. It will be important to ensure that the social infrastructure is established in advance of or in tandem with, the population moving in.</li> <li>• The cumulative impacts of more than 10 years of construction works from could be great. The spatial extent of effects will stretch across the areas surrounding the site. These effects will be felt in both the short and medium term and may have varying degrees of physical and mental health effects.</li> <li>• Maternal and child health in particular may be affected by this development. A cohort of children in will grow up amongst heavy construction. This effect could be minimised by ensuring areas are fully developed one at a time and do not suffer ongoing piecemeal development for extended periods.</li> <li>• Key issues for residents adjacent to the development site in relation to the construction works and traffic are: air pollution; noise pollution; dust; injury as a result of road traffic accidents involving construction vehicles; and hazards from contaminated land (though unlikely in this case due to the site being a greenfield development).</li> </ul> <p>Economy and employment:</p> <p>The HIA identifies the following opportunities for health improvements:</p> <ul style="list-style-type: none"> <li>• The employment opportunities generated by the development will have a beneficial health impact. However the impact will be dependent upon whether socially excluded groups such as the long-term unemployed are able to access these employment opportunities.</li> <li>• More widely the generation of employment opportunities via the development will have a positive social and economic impact on the local and regional economy. The health improvements that may occur due to economic growth can have further cumulative economic benefits. Better health increases labour supply and productivity and historically, health has been a major contributor to economic growth.</li> </ul> <p><i>(Actions or mitigations taken: Although actions taken are not reported, the HIA recommends: Active labour market programmes will have important role to play in enabling and facilitating people to take up employment opportunities associated with the development. The developer must work with local employers and Job Centre in order to ensure that individuals with low skills and educational qualifications are able to access the existing employment demand as well as the new employment opportunities generated by the construction and operation of the new development. The developer should work with skills trainers to bring trained employees forward in line with demand (e.g. construction).</i></p>

ID	17
Health effects that directly link to housing (note populations)	The HIA identifies the following potential health risks linked to the economy and employment: <ul style="list-style-type: none"> <li>Jobs created by regeneration initiatives are often filled by workers from other areas, rather than the local population. This is a double-edged sword as it may have a beneficial regional or sub-regional effect but an adverse local effect.</li> <li>The health impact of employment is entirely dependent on the nature of the employment. If employment opportunities become dominated by employment which is low paid, insecure, secondary sector, or non-standard they will begin to contain many negative attributes such as low pay, insecurity and limited job sustainability. These types of employment would not promote the social inclusion of the worst off.</li> </ul>
Other health effects considered	Transport is vital for successful development of new communities. However improvements to transport infrastructure may also impact negatively on health through pollution, accidental injury, severance of communities and reduction in some forms of travel which are healthy and sustainable, such as walking and cycling. Socially and economically disadvantaged communities are particularly at risk of these detrimental effects and so it is important to minimize or mitigate the potential negative health effects of transport development to avoid exacerbating health inequality.
	Achieving a balanced or mixed community is widely seen as an important objective of planning, housing and communities policy. This was as true for the New Towns Programme in the 1940s, as it is for the Sustainable Communities Plan today. Exactly what is meant by a "balanced community" is not very well defined by policy makers, but tends to presume a mix of people of different ages, household types and incomes. The concept of a "sustainable community", as defined by current policy includes the notion of balance, but also a wide range of other components, including economic, democratic, environmental and physical factors. The main public policy mechanism for achieving balance is the provision of a diversity of housing types, in terms of size, tenure and cost within a given area. The case for creating balanced communities is not based on idealised or utopian groupings. Rather, on the basis of powerful evidence which shows that where polarization has concentrated lower income and vulnerable people in an area, the resulting multiple deprivation becomes reinforcing and is difficult to address.

ID	18
Citation	Glackin D, Farrell B. Dove Gardens Health Impact Assessment – Derry, Northern Ireland. CAWT Health Impact Assessment- A cross border approach project. 2005.
Web link	<a href="http://www.apho.org.uk/resource/item.aspx?RID=77315">http://www.apho.org.uk/resource/item.aspx?RID=77315</a>
Type of HIA	Health Impact Assessment - rapid
Date	January 2005
Scale of development	Medium sized redevelopment (79 dwellings).
Region	United Kingdom
Development description	Demolition and redevelopment of a housing estate, of 79 dwellings, in the Brandywell ward in Derry, Northern Ireland.
Health effects considered	The following potential health effects of the development were identified and were the subject of recommendations: <ul style="list-style-type: none"> <li>Traffic calming, signage and pedestrian areas should be designed into the new scheme (including a 'welcome' sign);</li> <li>Include health and safety contractual requirements in tender assessments for contractors.</li> <li>Local consultation should be carried out on the detail of the demolition contract.</li> <li>Involve residents in environmental work such as planting.</li> <li>Minimise fuel poverty by producing energy efficient housing.</li> <li>Tree planting should be within gardens or other areas which clearly define responsibility for care/maintenance.</li> <li>Provision for recycling should be included in the design of kitchens and back gardens.</li> <li>Asbestos surveys and removal should take place under health and safety regulation.</li> <li>Homes should be designed which can be adapted to the changing needs of families including children. This should be reflected in bedroom sizes which accommodate the study needs of school children and students.</li> <li>Minimise the number of flats.</li> <li>The new layout of dwellings should complement the layout of any retained areas or dwellings.</li> <li>Provide safe play areas for children, including making streets safe.</li> <li>Contracts for ongoing maintenance should be put in place early, including any partnership working.</li> <li>Regular social meetings and newsletters should update residents on the development.</li> <li>A residents association should be formed as a formal body for consultation before, during and after the development.</li> <li>Outreach workers should be involved in any decant.</li> <li>Any decant should include a comprehensive information pack that includes assistance and advice on change of address.</li> <li>Individual health needs should be catered for within dwellings.</li> <li>Encourage contractor to link with local training schemes to local residents can be trained in construction skills and gain employment/apprenticeships via the development. Architect to offer work experience to young people in the development area.</li> <li>A communications strategy should be developed to publish the results of the HIA.</li> </ul>

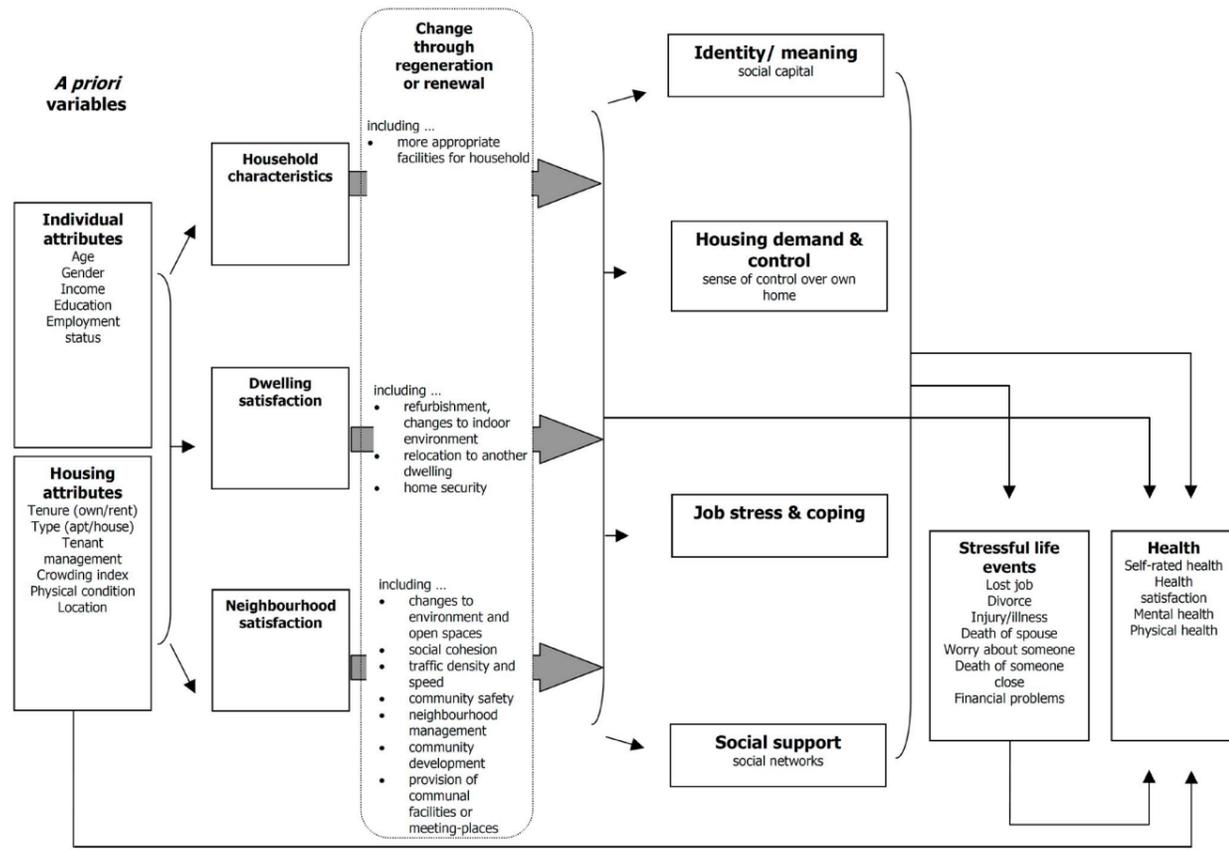
ID	19
Citation	Technical Report 9. Highway 99 Sub-Area Plan Health Impact Assessment. Clark County Public Health, Vancouver, Washington. 2008.
Web link	<a href="http://www.hiaguide.org/sites/default/files/TR9_highway99%20subarea%20plan.pdf">http://www.hiaguide.org/sites/default/files/TR9_highway99%20subarea%20plan.pdf</a>
Type of HIA	Health Impact Assessment - detailed
Date	December 2008
Scale of development	Large scale new community redevelopment project in the USA.
Region	North America
Development description	Clark County, USA, has developed a subarea plan to revitalize Highway 99 and neighbourhoods nearby. The project area is approximately 4 square miles, with a population of about 14,000. Goal of the Highway 99 Plan is to apply land use planning to build a healthy community that is economically viable, sustainable, active and socially cohesive.
Health effects that directly link to housing (note populations)	The most significant social determinant of health is wealth. Equal access to decent and affordable housing is one way to begin to equalize the health outcomes of all residents across income levels. <i>(Actions or mitigations taken: Prioritise provision of affordable housing. Make every effort to avoid homelessness as a result of displacement caused by the development. Use a mixed-income single and multi-family housing model and avoid segregation of housing units by ethnicity or age.)</i> Income equality is essential to creating both an economically vibrant and socially cohesive community. <i>(Actions or mitigations taken: The development should include businesses that provide living wage jobs in the area. Develop an area economic development and opportunity plan to anticipate the employment needs of area residents.)</i> As dwelling density is increased, creation of mixed-income housing has the capacity to enhance social equity and social cohesion in a neighbourhood. However, if the economics unfairly burden low-income residents through high rents or displacement, such cohesion will be challenging. <i>(Actions or mitigations taken: Create affordable housing options; include mixed income, mixed use family and individual units. Require developers to set-aside 10% for affordable housing units to avoid displacement or unfair burden on low income residents. Monitor for population stability and housing tenure during evolution of project.)</i> Although a 'destination' based community is desirable, there are inherent conflicts between the anticipated amount of traffic and the plan for a mixed use walkable / bikeable community. Residents, pedestrians or bicyclists may experience an increased risk of automobile related injury and adverse health outcomes related to air and noise pollution. <i>(Actions or mitigations taken: Mitigation measures to address pedestrian / bicyclist safety, air pollution and traffic noise are essential. Create multiple hubs where clustered retail, grocery, and other amenities essential to daily life are within easy walking distance (ideally ¼ mile) of housing. Ensure a variety of transit options in order to reduce dependence on automobiles which will decrease air and noise pollution.)</i> This project locates areas where there will be an increase of people walking, biking, or living near high volume motor vehicle traffic. Vehicle traffic is the major source of air pollution in urban environments. <i>(Actions or mitigations taken: Creating barriers, planting trees, and set design standards for new residences and businesses to address air pollution from traffic. Decreasing speed limits on surrounding roads. Where possible locate residential areas and mixed use nodes away from major roads to increase distance from exposure.)</i> Residents, business owners and customers, walkers and bicyclists are all at risk for the adverse health impacts of noise pollution due to the proximity of the development to arterial roads. <i>(Actions or mitigations taken: Hire an engineering firm to do noise study using noise measuring devices throughout the planning area to determine actual noise patterns and volumes. Mitigate impacts of noise pollution by such methods as limiting truck traffic, erecting sound walls between highways and homes, requiring soundproofing of all new buildings, and locating residential projects and mixed use nodes away from major roads. Consider ways to reduce traffic volume and speed including use of traffic calming measures.)</i> Neighbourhoods that are dominated by fast food chains, gas stations, or convenience stores, or that lack good public transportation to grocery stores, result in "food deserts", areas where good nutrition is a challenge due to lack of places to buy fresh fruit and vegetables and other healthy food. Such "food deserts" are more often characteristic of low-income neighbourhoods, so contribute to the disparate health outcomes between upper and lower income groups. <i>(Actions or mitigations taken: Dedicate some land for community gardens, farmers markets, and agricultural demonstration site. Encourage fruit and vegetable stands. Ensure a low retail food environment index (total number of fast food restaurants and convenience stores in a geographic area divided by total number of super markets and produce vendors) by limiting the geographic concentration and number of fast food restaurants, convenience stores and liquor retailers. Work with the Food Policy Council and other local partners to increase the percent (so the proximity throughout the sub-area) of fresh, locally produced, organic produce that is available for purchase through stores, restaurants or farmer's markets. Ensure that all such outlets are reachable by walking or transit.)</i> Increase the urban canopy [urban tree planting and management] (which has many health benefits, from improved mental health to increased absorption of CO2), conserve water and avoid the high pollution activity of mowing through street/sidewalk and median [central reservation] planting of native vegetation that is low on water consumption. <i>(Actions or mitigations taken: Increase urban canopy and other solutions that also contribute to greening.)</i> Increase frequency of transit stops so more residents live within a quarter mile of bus, trolley, or high capacity transit options, which will increase the likelihood of use and decrease reliance on carbon and particulate emitting personal vehicles. Ensure wheelchair and otherwise accessible sidewalks connected to transit stops in order to accommodate elderly and others with disabilities. <i>(Actions or mitigations taken: Expand transit stops into more areas where low income residents are concentrated. Locate elderly housing in close proximity to bus stops.)</i> Bicycling has enormous health benefits, but can be a high risk activity due to poor road and safety design and travelling along heavily trafficked roadways, resulting in exposure to noise and air pollutants as well as risk of injury. <i>(Actions or mitigations taken: Provide maximum bicycle safety features such as clear signage and markings, medians, wide bike lanes, reduced curb cuts for cars to enter into parking areas, and reduced traffic speeds. Provide bicycling incentives such as bike parking facilities, bike-transit connections, and complete bike lanes both north-south and east-west, as well as connectivity to bordering neighbourhoods.)</i> Access to parks and green spaces has multiple physical, psychological, and social health benefits, and contributes to community cohesion and identity. <i>(Actions or mitigations taken: Create parks, which may be "pocket parks" or areas integrated into the urban landscape, within one-quarter mile of population hubs. Increase park density and quality. Ensure parks are located in lower income areas and are both safe and easily accessible for the elderly and children.)</i> The health benefits of increased physical activity through walking are well established in the literature, and are extremely important to addressing not only health but social equity issues for elderly in particular. <i>(Actions or mitigations taken: Develop a complete street network that accommodate multiple modes of transportation and simulates a grid pattern. [Block sizes in the range of 200-800 feet and maximum distances between intersections of 1,000 feet on arterial streets and 500 feet on local streets]. Implement safety measures related to traffic calming, signalized crosswalks, protection from air and noise pollution.)</i> Motor vehicles are the leading cause of accidental death, and the number and severity of injuries increase as speed increases. <i>(Actions or mitigations taken: Use traffic calming measures such as reducing traffic speeds and/or reduce the number of traffic lanes while expanding the width of sidewalks and bicycle lanes.)</i> Fear of assault is not only a leading cause of anxiety, but a major reason people choose not to walk, use recreational facilities, or allow their children to play outside. While many variables influence violence and crime in communities, aspects of the physical environment can both encourage and discourage street crime. <i>(Actions or mitigations taken: Add safety features through built environment (pedestrian scale architecture, well lit streets) and policy (limited permits to alcohol retail outlets). Create inviting appearance through form-based zoning, green space (including plazas and pocket parks), clean sidewalks, elimination of graffiti, heritage trail, garbage and recycling containers, etc.)</i>

ID	20
Citation	Green G, Pugh P. Better Homes Better Health, Health Impact Assessment of Sheffield's Housing Strategy. Sheffield Hallam University. 2008
Web link	<a href="http://www.apho.org.uk/resource/item.aspx?RID=94668">http://www.apho.org.uk/resource/item.aspx?RID=94668</a>
Type of HIA	Health Impact Assessment - rapid
Date	October 2008
Scale of development	Strategic level policy HIA (Sheffield's Housing Strategy).
Region	United Kingdom
Development description	Review of potential health impacts and strategic interventions for housing policy.
Health effects that directly link to housing (note populations)	<p>For the majority of residents the housing market provides a secure home, conferring the psychosocial benefits of mental health and well-being. For a minority of residents, stress arising from the financial insecurity of their home leads to depression and anxiety. <i>(Actions or mitigations taken: Access: Maintain and replenish a strong social housing sector to enhance the financial security and mental health of lower income residents. Affordability: Short term focus on measures to alleviate financial distress in the private housing market and maximise gains in mental health.)</i></p> <p>A warm, safe and secure home contributes to residents' health and well-being. Cohesive communities and good quality housing environments contribute to successful neighbourhood health and wellbeing. <i>(Actions or mitigations taken: Housing quality: Cost-effective investment to improve health should focus on measures to improve security and warmth in private rented housing and in single pensioner households of all tenures. Neighbourhoods: A holistic model of successful neighbourhoods should balance environmental objectives with those for health, social cohesion and community safety.)</i></p> <p>Strategic planning and investment in housing services promote the independence of vulnerable residents and alleviates physical dependency caused by ill health. Safe neighbourhoods and social support in the home will promote mental health and well-being. <i>(Actions or mitigations taken: Independence: Expand the Joint Strategic Needs Assessment to include a cost-benefit analysis of housing's contribution to adding quality of life to years lived. Inclusion: Provide evidence of health gain from securing a home for vulnerable and excluded people.)</i></p>

ID	66
Citation	Human Impact Partners. 29th St./ San Pedro St. Area Health Impact Assessment. Oakland, California. 2009.
Web link	<a href="http://www.hiaguide.org/hia/crossings-29th-st-san-pedro-st-area-health-impact-assessment">http://www.hiaguide.org/hia/crossings-29th-st-san-pedro-st-area-health-impact-assessment</a>
Type of HIA	Health Impact Assessment - detailed
Date	August 2009
Scale of development	Large scale community development on previously industrial land.
Region	North America
Development description	A proposed 11.6 acre development providing more than 450 units of affordable housing along with retail and multipurpose space for community activities. The four-block area, located in South Los Angeles, is currently being rezoned from industrial to residential.
Health effects that directly link to housing (note populations)	<p>Residential density impacts access to goods and services, success of neighbourhood retail, walkability, success of public transit, amount and access to parks and open space and other factors that impact health. High density housing serves these health-related needs best. The compact nature of higher-density development requires less extensive infrastructure to support it, making delivery of basic services like mail, trash collection, and police and fire protection more efficient. With more people and activity within the same amount of space, communities with higher-density development have also been found to have greater safety. <i>(Actions or mitigations taken: Although actions taken are not reported, the HIA makes the following recommendations: Prioritize developing housing units that can be offered at an affordable rate for local community residents most in need of housing. The range of affordable housing costs should be recalculated to reflect rates that allow local residents to be paying no more than 30% of their income on rent or mortgages. The size and number of bedrooms in housing units being built should reflect the range of family size in the local population. Specifically target housing opportunities at teachers and/or local school employees in order to focus on the link between the project site and neighbourhood schools. Ensure that buildings facing the park and recreation space have windows open to these areas in order to increase community surveillance.)</i></p> <p>Negative health implications have also been associated with urban sprawl. Research has found that people living in counties with sprawling development are less likely to walk, and more likely to weigh more and to suffer from high blood pressure than those living in less sprawling counties.</p> <p>Increased rents or mortgage costs can also precipitate eviction and displacement, conditions that can lead to overcrowding, segregation and even homelessness. Displacement is a stressful life event and relocation can have significant impacts on health and childhood development.</p> <p>Segregated neighbourhoods have fewer institutional assets such as schools, libraries, and public transportation, and are often the site for the location of environmentally burdensome infrastructure such as highways, power plants, factories and waste sites, which compromise air, noise, water, and soil quality. Residentially segregated neighbourhoods have been found to experience more violent crime, and more infectious and chronic diseases. Research has shown that reducing income-related residential segregation improves household safety, reduced exposure to crime, and decreased neighbourhood social disorder.</p> <p>Substandard and deteriorating housing contributes to a variety of ailments, from respiratory disease and neurological disorders to psychological and behavioural dysfunction. At the community level, deterioration of housing stock results in "housing filtering", or the trend of those with lower levels of income to move into a neighbourhood over time, which results in progressively poorer housing maintenance and quality.</p>
Other health effects considered	In addition to 'housing', the HIA also addresses issues of: pedestrian safety, neighbourhood walkability and public transit; health services and food retail; education; and parks and recreational facilities.

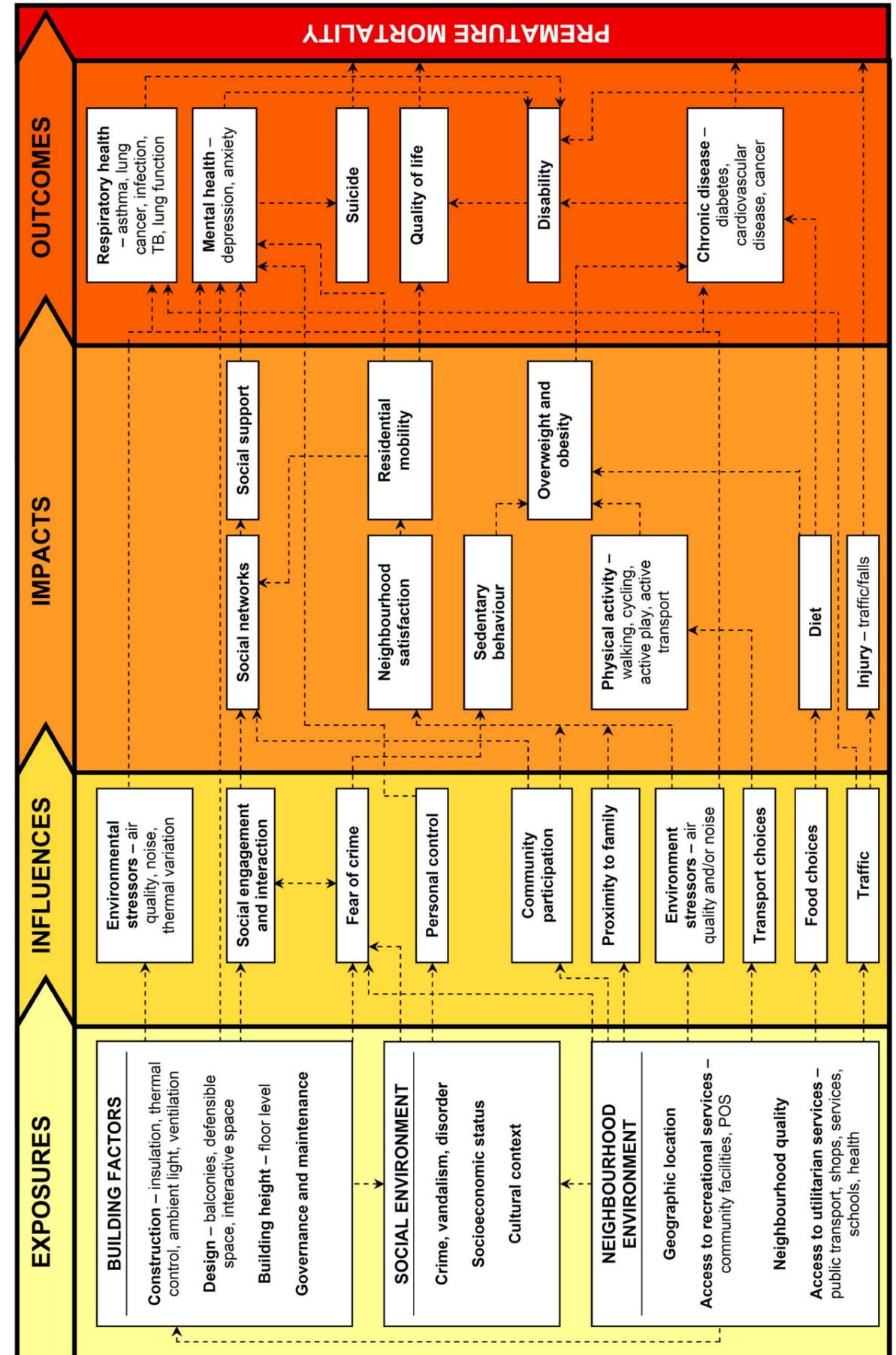
ID	22
Citation	San Francisco Housing Authority Flooring Policy. San Francisco Department of Public Health. 2009
Web link	<a href="http://www.apho.org.uk/resource/item.aspx?RID=64653">http://www.apho.org.uk/resource/item.aspx?RID=64653</a>
Type of HIA	Health Impact Assessment - other
Date	October 2009
Scale of development	Health Impact Assessment case study illustrating the use of impact assessment in a community setting.
Region	North America
Development description	HIA of housing flooring policy for new developments in San Francisco, USA.
Health effects that directly link to housing (note populations)	The dust mite is a common allergen and an asthma trigger. Carpeting and other fabric-covered furniture serve as nesting environments for dust mites in the home. Research has indicated that the removal of carpeting along with other physical remediation efforts have an effect on the dust mite allergen levels. Although rigorous daily vacuuming can reduce the level of dust mite allergens, most health experts recommend smooth flooring as a substitute for carpeting. For many families in San Francisco, obtaining smooth flooring can be a challenge because most of them are renters, who have minimal control over the flooring in their units. Families with asthma who live in public housing have limited financial resources and often become victims of a shortage of affordable housing. Furthermore, these families often are not given sufficient information and resources to create healthier environments. <i>(Actions or mitigations taken: A reasonable proportion of the new units in each complex of the development will be built without carpeting. Increase awareness of the option for removing carpeting in existing units.)</i>

Figure 1 Model of housing, housing change and health



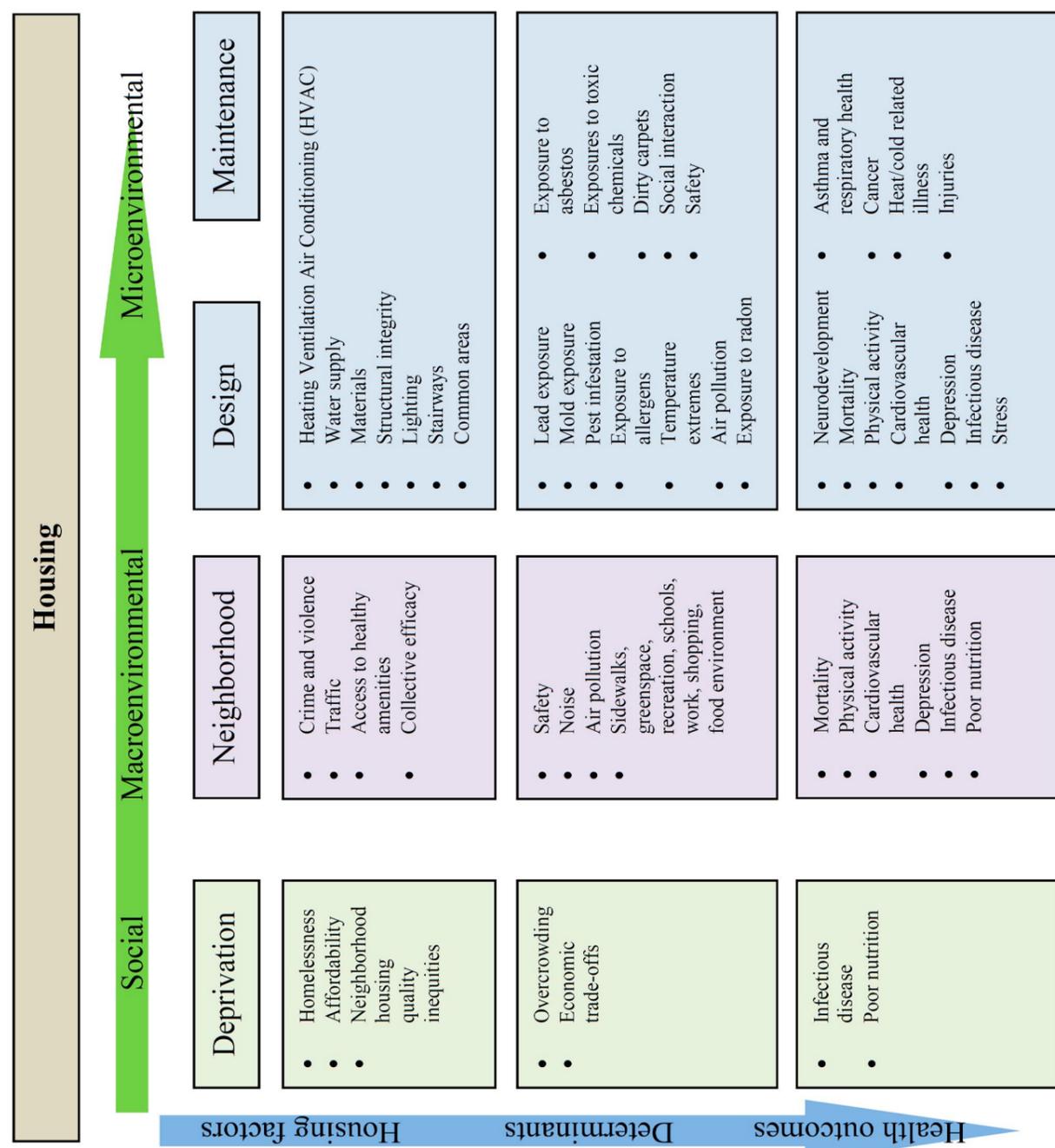
Source: Curtis S et al<sup>76</sup> p.13, which was adapted from Dunn and Hayes<sup>77</sup> p.565

Figure 2 Model of higher density housing and health



Source: Giles-Corti et al<sup>19</sup> p.86

Figure 3 Pathways between housing and health



Source: University of California Berkeley Health Impact Group (UCBHIG)<sup>14</sup> p. HHEH-3

## 6 Appendix C: Summary of key findings

Table 6 Summary of key findings and vulnerable populations

Potential health effects associated with housing developments	Potential for differential effects within the population
Improved warmth in the home may produce long-term positive socioeconomic health benefits, such as less time off work/school, and increased social and educational opportunities. <sup>23,26,27</sup>	People with existing respiratory illness Elderly
People with existing respiratory illness who are living in houses that are difficult and costly to heat. The elderly are at particular risk of extremes of temperature.	
Remediation of mould in houses decreases asthma-related symptoms and decreases respiratory infections. <sup>24,25</sup>	Children and people with existing respiratory illness.
The lack of affordable housing has been linked to: decreased spending on health and health care (including delays in seeking preventative medical care, medication non-adherence and increased emergency department utilisation); trade-offs among housing, heating, food, medical care, and other basic needs; and moving frequently, living with other families in overcrowded conditions, or experiencing periods of homelessness. <sup>28,29</sup>	Women and infants Children
Affordable housing costs should be calculated to reflect rates that allow local residents to be paying no more than 30% of their income on rent or mortgages. <sup>66</sup>	
Women who live in low income neighbourhoods are significantly more likely to have a low birth weight infant. Behavioural problems among children are more common in poor neighbourhoods, and within these communities more prevalent amongst families of low socioeconomic status.	
There is limited causal evidence that particular types of housing give rise to mental health problems, however living in multiple family housing or on the upper floors of high rise buildings is associated with greater mental health problems. <sup>23</sup>	Women with young children
There are associations between flat dwelling and stressful living conditions such as increased social isolation, crime, reduced privacy and reduced opportunities for safe play for children. <sup>41,42</sup>	
Access to nearby parks and natural settings is associated with improved mental health and reduced anxiety. <sup>31</sup>	General population
High levels of neighbourhood social disorder is associated with greater depression. <sup>32</sup>	General population
Suicide rates increase as socioeconomic levels in an area decrease. <sup>33</sup>	Residents living below the poverty level
High social capital (as measured by 'low social disorder' or a 'high level of belief in the capabilities of the community to collectively achieve social and political outcomes') protect against increased obesity. <sup>34</sup>	General population
Effective social support or large social networks are associated with lower risk of coronary heart disease and cancer (particularly breast cancer). However poor psychosocial environments (including exposure to community violence, anti-social behaviour, or discrimination) may reduce health outcomes and contribute to health inequalities. <sup>35</sup>	General population
The presence of sidewalks and crosswalks, bike paths, playing fields, parks, shopping accessible on foot, and public transportation, along with the perception that it is safe to be outside, contribute substantially to the average amount of regular physical activity that residents of a neighbourhood achieve. <sup>28</sup>	Elderly, children and young people
Education and employment opportunities influence health by providing the means to achieve an adequate standard of living now and in the future. <sup>9</sup>	Children and the unemployed
Neighbourhoods with better access to supermarkets and other retail outlets with minimally processed foods tend to eat a healthier diet (and have lower prevalence of obesity) than their counterparts in neighbourhoods with less access to these goods. <sup>28</sup>	Low-income communities and the elderly
Zoning that keeps industrial sites and pollutants at a distance from residential areas contribute to an environment that is conducive to the achievement and maintenance of good health. <sup>28</sup>	Low-income and minority residents, particularly children
Although effective measures to reduce neighbourhood noise levels (excludes construction noise) may reduce disturbance and annoyance, there is little evidence of health impacts associated with such changes in exposure in a housing context. <sup>23</sup>	General population
Neighbourhood characteristics such as the proximity and mix of land uses, pedestrian connectivity, aesthetics and interesting scenery, and traffic and personal safety are important correlates of physical activity. <sup>31</sup>	Elderly
Neighbourhoods that are characterised as more walkable and either leisure-oriented or destination-driven, are associated with increased physical activity, increased social capital, fewer overweight people, lower reports of depression, and less reported alcohol abuse. <sup>36</sup>	General population
To reduce concentrations of harmful indoor air pollutants, there is a need to strike a balance between improving building energy efficiency and maintaining adequate ventilation. <sup>38</sup>	The elderly and children are at particular risk of indoor air quality
Home ownership is generally associated with improved health. However the trend does not hold for those people who are living on the margins of home ownership where mortgage arrears increase insecurity and are detrimental to mental health. <sup>41</sup>	People with insufficient income to meet mortgage repayments
Positive mental wellbeing is associated with: having a home in good repair; living in an area perceived as having attractive buildings; and living in an attractive, quiet and peaceful environment. <sup>43</sup>	Low income and minority populations
A neighbourhood renewal intervention can be particularly effective in improving health and life satisfaction among disadvantaged people living in the target areas if there is effective cooperation between stakeholders. <sup>49</sup>	Immigrants from non-English speaking countries, people with low educational achievement and the unemployed
Moving house can be a stressful, health damaging life event, particularly in the field of social housing where there are limited opportunities to negotiate with the housing authority. <sup>41</sup>	Children and adolescents
Housing regeneration projects can lead to displacement of original residents, which may result in misleading shifts in routine social and health statistics. <sup>41</sup>	Residents displaced from the area of development
Health improvements are likely where employment, education and social integration opportunities increase alongside housing. <sup>41</sup>	General population
Residents in neighbouring areas not part of a regeneration program may feel excluded resulting in community divisions between improved and non-improved areas. <sup>42</sup>	Residents in areas adjoining area of development
Good access to waste storage is an important requirement to reduce domestic infestation that pose potential health hazards e.g. cockroaches, rats and mice. <sup>37</sup>	General population
Incorporating clear signposting, good acoustics and natural lighting into building design may reduce stress. <sup>50</sup>	General population

Potential health effects associated with housing developments	Potential for differential effects within the population
Housing the poor in discreet areas of a city with few amenities is linked to obesity and adverse mental health outcomes. Housing in such areas is typically dilapidated, with increased exposures to: lead; asthma triggers (such as mould, moisture, dust mites, and rodents); and mental health stressors such as violence and social isolation. <sup>52</sup>	Ethnic minority populations and low-income communities
Dispersed community-based housing is superior to clustered housing on the majority of quality of life indicators for adults with intellectual disabilities. The only exception being that there are some benefits to village communities for people with less severe disabilities. <sup>53</sup>	Adults with intellectual disabilities
Providing housing to formerly homeless persons with severe and persistent mental illness reduces hospital admissions and reduces days hospitalised. The evidence suggests that 95% of housing costs can be offset by the reduced use of hospital services. <sup>55</sup>	Homeless people
Construction can cause considerable disruption of daily routines with adverse impacts on mental health, social networks and access to services. Disruption of an affect access to local shops and services. <sup>13</sup> Children are particularly vulnerable to disruption of school and extra-curricular activities. Other disadvantaged groups included, women with childcare responsibilities, older people and people with disabilities.	Local residents close to site of construction Children Other disadvantaged groups
Provision for maintenance should be built into the proposals to avoid structural defects which could have adverse health impacts (e.g. build-up of pollutants/allergens, infestation and mould).	Children and the elderly
Housing development offers the opportunity to include on-site community centres with extended hours (e.g. computer labs, job training, sports and fitness, after school education and college planning). <sup>14</sup>	Children and young people
Housing development offers the opportunity to include residents in the design process, as they would be able to quickly identify improvements simply by looking at the design with a view to living in it. <sup>15</sup>	General population
Access plans for those with disability should provide a complete solution from within the home, to shops/work and back to home. <sup>17</sup>	People with physical disabilities
There is also an opportunity to identify how individual health needs can be catered for within dwellings. <sup>18</sup>	
Public art can be a potential focus for community activity, with benefits for community involvement and social cohesion. <sup>17</sup>	General population
Home design should be 'flexible' to accommodate changing family needs, e.g. provision for the study needs of children and students. <sup>17,18</sup>	Children and young people
The size and number of bedrooms in housing units should reflect the range of family size in the local population. <sup>66</sup>	
It is important that appropriate social infrastructure is established in advance of, or in tandem with, the population moving in. <sup>17</sup>	Elderly and people with disabilities
Residential development should include income opportunities though the inclusion of businesses that provide living wage jobs in the area. <sup>19</sup>	The unemployed and people on low incomes.
Traditionally regeneration initiatives are often filled by workers from other areas, which whilst having beneficial regional or sub-regional effects may miss opportunities for beneficial health impacts from local employment. <sup>17</sup>	The unemployed and people on low incomes
Although there are health benefits from employment, jobs that offer only low pay, insecurity and limited job sustainability will not promote the social inclusion of the worst off. <sup>17</sup>	The unemployed and people on low incomes
To reduce stress and uncertainty about the development local residents should be regularly updated on the development's progress, e.g. meetings and newsletters. Forming a residents association early on in the process can be an effective facilitator of consultation. <sup>18</sup>	Local residents, particularly socially excluded and hard to reach groups
Residential developments should ensure retail, grocery, and other amenities essential to daily life are within easy walking distance (ideally 400 metres) of housing. <sup>19</sup>	Elderly and people with disabilities
It is important to maintain accessibility for the elderly and those with disabilities, e.g. frequently stopping public transport options and well maintained sidewalks suitable for wheelchairs. <sup>19</sup>	Elderly and people with disabilities
Parks and increased 'urban canopy' are linked to increased physical and mental health. <sup>19</sup>	Elderly
High density residential housing can improve: access to goods and services; the success of neighbourhood retail; walkability; the success of public transit; and the amount and access to parks and open space. This is primarily due to the ability to offer services more efficiently with less supporting infrastructure per capital. <sup>66</sup>	General population
Although evidence is not conclusive, <sup>14</sup> consideration should be given to offering a reasonable proportion of the new units without carpeting; as carpeting serves as a nesting environment for dust mites and people who rent their accommodation have limited control over the flooring. <sup>22</sup>	Children and people with existing respiratory conditions

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# Centre for Health Equity Training Research and Evaluation

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