

ARE HEALTH ISSUES BEING ADEQUATELY INTEGRATED INTO SUSTAINABLE HOUSING POLICY AND DEVELOPMENTS? A PRELIMINARY ASSESSMENT

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Abstract. Sustainability of the built environment is becoming an increasingly prominent issue in academic and policy discussions in the UK and EU. Initiatives such as the Code for Sustainable Homes in the UK have been developed to aid the integration of sustainability principles into housing developments. The primary focus of policy initiatives, incentives and sustainable housing demonstrator developments has been largely on environmental sustainability, particularly energy efficiency, waste minimisation and ecological construction methods. However, in line with the definition of sustainable development, sustainable housing must encompass social and economic factors alongside environmental concerns. Drawing from an ongoing study investigating health impacts of sustainable housing, the article firstly outlines three key reasons why health and well-being need greater consideration within current sustainable housing policy and developments. These are: (i) Creation of greater market demand: Public demand for sustainable buildings could be enhanced through greater promotion of health within sustainable housing policies and availability of empirical evidence of enhanced well-being associated with such dwellings; (ii) Time-scales: Longevity of buildings means that health considerations are necessary to avoid any possible future adverse effects; and, (iii) Indirect societal benefits: Enhanced health and well-being can lead to wider societal and economic benefits such as lower healthcare costs and higher productivity. The paper then presents some of the seminal findings from health and housing literature review, outlining the current state of knowledge and research trends, and how these can be used to enhance sustainable housing policy and developments. The paper concludes by presenting the next stages of research in the study.

Keywords: health, sustainable housing, sustainable development, environment, United Kingdom.

1. Introduction

Given the significant impact housing has on the environment and its role as a key determinant of human health, the subject of housing features heavily in both environmental protection and public health discourses. Exploring the policy and academic literature on ‘sustainable housing’ and ‘health and housing’ quickly reveals many overlapping aims and objectives between the two. However at the same time, little meaningful conceptual or practical interaction can be identified.

While the issue of sustainability in the built environment has gained interest in academic, industry as well as policy discussions (Brown and Bhatti 2003; Williams and Dair 2006; Department for Communities and Local Government 2007), progress for the widespread adoption of sustainable housing has been slow (Sunikka 2003). This paper argues that for sustainable housing to progress faster, the concept of ‘sustainable housing’ must incorporate greater consideration of health and well being issues.

Primarily based on a review of housing and health literature, carried out as part of ongoing research into health

impacts of sustainable housing, the paper begins with a brief discussion on the meaning of ‘sustainable housing’. It then presents a number of arguments for why a greater consideration of health aspects is important and how this can act as a driver for sustainable housing. This is followed by three findings from the housing and health review that are relevant for the development of sustainable housing policy and research agenda. The paper concludes with a brief overview of the next stages of the study.

2. What is sustainable housing?

The most widely used definition for the concept of sustainability is that presented in the Brundtland Report ‘Our Common Future’: Sustainable development is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development 1987). This definition implies that for any development to be ‘sustainable’, it must achieve a balance between social, environmental and economic factors. Applying this definition to ‘sus-

tainable housing', a truly sustainable housing development would need to make provision for these three considerations.

However, the Brundtland definition is not always readily transferable into a working definition that can guide practice, and sustainable housing policy is no exception. A recent report investigating the extent to which UK development industry is incorporating sustainability into practice revealed a lack of industry-wide consensus on the meaning of sustainability, and while the idealism of the Brundtland definition is unlikely to provide a basis for a consensus, lack of common defining criteria is an important hindrance to implementation of sustainability in practice (Taylor Wessing LLP 2009). A definition for 'sustainable development' is also lacking within UK legislation, policy statements and guidance related to planning, where the concept is widely referred to but not defined (Dowden 2009).

A major implication of this lack of definition is that the term 'sustainable housing' is used in many cases to refer to *environmentally* sustainable housing. The social and economic elements (if at all acknowledged) tend to be treated as peripheral. For instance the UK's Code for Sustainable Homes (2010) consists of nine categories: (i) Energy and CO₂ Emissions; (ii) Water; (iii) Materials; (iv) Surface Water Run-off; (v) Waste; (vi) Pollution; (vii) Health and Well-being; (viii) Management; and (ix) Ecology. Eight of these categories cover environmental considerations, and crucially, only one considers health and well-being. Furthermore this one category considers only four issues – 'daylighting', 'sound insulation', 'private space', and 'lifetime homes'. However, as discussions later in the paper illustrate, health and well-being issues go far beyond these four considerations.

There is also evidence of greater focus on the environmental side of sustainability at the implementation level. For instance, Local Agenda 21 policies of regional and local councils are more focused on environmental issues and less on social and economic ones as sustainability policies tend to become the remit of environmental departments (Bond *et al* 1998). While a review of UKs registered social landlords sustainability policies by Carter and Fortune (2007) found that this is also reflected in practice as sustainable housing developments have primarily sought to address the ecological impacts of buildings.

The situation is not helped by the lack of consensus over the sustainable housing definition in academic discussions. In much of the sustainable housing literature, the concept is often seen in narrow terms of environmental sustainability, that is, housing with minimal negative impacts on the environment (Sunikka 2003; Sunikka and Boon 2003; Priemus 2005; Pickvance 2009; Winston 2009). On the other hand, public health literature unsurprisingly focuses more on the social element of sustainability. For instance Barton, Grant *et al.* (2003) argue that the Brundtland definition focus is clearly on people – "sustainable development is therefore about maintaining and enhancing the quality of human life - social, economic and environmental – while living within the carrying capacity of supporting ecosystems and the resource

base" (p. 5). If cities are to become attractive and healthy places to live, Barton and Tsourou (2000) stress that urban planners must focus on people and how they use the built environment, instead of simply focusing on the buildings themselves.

The lack of a guiding definition in sustainable housing discourse creates an imbalance between the three elements of sustainability, and two explanations can be put forward to account for the disproportionate focus on environmental issues (as opposed to social or economic factors). First reason for the environmental focus is that origins of the sustainable development concept can be traced back to the environmental movement of the 1980s. An important consequence of this is that political and organisational infrastructures in many countries are structured in such a way that anything labelled 'sustainable' will be handed over to agencies with environmental remit. The second reason is that environmental aspects such as pollution, energy use and waste production are generally easier to quantify and measure than are social and economic considerations, and are therefore easier to implement in practice. Both of these reasons will need to be adequately addressed if attempts were made to shift the focus toward a more even balance between the three elements.

However, despite the significant impact that housing has on the environment throughout its life-cycle, the imbalance between the three elements of sustainability creates a lack of a shared vision of sustainable housing, which is a significant barrier to achieving such housing (Winston 2009). Lack of a guiding definition creates a situation where one sustainability objective can be traded for another (Williams and Dair 2006). Perhaps it is time that a greater focus is made on people as has been suggested by public health researchers. This would achieve many of the environmental sustainability aspirations of current sustainable housing policies - not only because what is environmentally sustainable is often also healthy - but more importantly, it may yield a much needed stimulus for growth in market demand for such housing.

3. The potential benefits of greater integration of health and well-being considerations into 'sustainable' housing

Given the strong link between housing and health, there are many direct and indirect pathways through which improvements in the environmental quality of buildings will lead to improvements in human health and well-being. For instance, there is evidence of residents in efficient homes with heat recovery ventilators reporting reduced symptoms of respiratory conditions compared to occupants of control homes (Leech, Raizenne *et al.* 2004). While on broader neighbourhood scale, mixed use housing developments designed to lessen residents' reliance on private transport may improve health by encouraging walking and through overall lower levels of outdoor pollution (Jackson 2003). Housing can also impact health through more indirect pathways. Environmentally unsustainable housing will indirectly impact human health through more global level effects, for instance

through greater air pollution and contribution to climate change (Luria Lyons *et al.* 2009).

The above are just few examples of common goals that exist between environmentally sustainable housing and healthy housing. Unfortunately, given that much of the current sustainable housing developments have been built from the environmental sustainability perspective, empirical evidence is lacking to show how these developments affect the health of residents, particularly when compared to similar traditional housing developments. The aim of the ongoing research is to elucidate these effects (see section 5).

However, the potential benefits of greater integration of health issues into sustainable housing policies and developments go beyond the achievement of these common goals. The following three arguments present how greater focus on health can also stimulate demand for sustainable housing and potentially justify greater investment in such developments.

3.1. Marketing health benefits may foster growth in market demand for sustainable housing

In the UK, lack of market demand for sustainable buildings is currently a major barrier to widespread adoption of sustainability features in housing developments (Sunikka 2003). For instance, cases have been identified where lack of client demand for energy-efficient buildings has led to the adoption of only minimal environmental performance stipulated by statutory requirements rather than available best practice (Williams and Dair 2006). As the market for sustainable construction is still weak, it is doubtful that at this time market forces alone can drive the development of sustainable housing (Sunikka and Boon 2003). However if there were empirical evidence showing that a sustainable home is definitely a healthier home, it is likely to have a much stronger appeal to wider sections of society than arguments for sustainable housing based solely on environmental protection grounds. With appropriate marketing, evidence of positive health associations could act as a strong motivator and lead to greater market demand for sustainable housing.

Fostering greater public demand would also go some way in addressing the uneven distribution of benefits from environmentally friendly housing measures. While benefits such as cost savings from energy efficiency or integrated renewable energy installations are mostly enjoyed by end-users of the property, investment costs must be borne by the developer and often cannot be entirely passed on to the user (Priemus 2005). This creates a situation requiring appropriate fiscal measures and market demand to promote such investment, otherwise environmental sustainability measures may be too unprofitable for developers and landlords to take up. However, promotion of sustainable housing for health and well-being benefits may create a greater willingness among end-users to pay for investment costs passed on by developers.

Creation of greater public demand for sustainable housing also ties in closely with the life-time environmental sustainability of such developments, which is

largely influenced by occupants' behaviour and use of the building (Svane 2002). Activities carried out by a household have been identified as one of the key environmental impact determinants of a dwelling (Pickvance 2009). Public acceptance and demand for such measures is therefore of particular importance, because even in the unlikely scenario of government mandated sustainable housing developments, the phenomenon known as the 'rebound effect' may lead to negation of environmental measures effectiveness. In other words, occupants may modify their behaviour counteracting the purpose of a particular environmental feature, for instance through the increased use of heating or air conditioning in tightly insulated buildings (Priemus 2005).

3.2. The longevity of housing means that we cannot afford to make mistakes

As action on climate change gains momentum, together with issues such as energy security and availability of natural resources, there will be increasing pressure for the built environment to be more sustainable. However, given the longevity of buildings, it is imperative that sustainable housing policy does not neglect the other components of sustainability by focusing only on ecological issues. A report by Sustainable Buildings Task Group (2004) warned that the mistakes of 1960s building boom are not repeated, and design of communities must strive for economic growth, social justice and environmental protection.

Although the goals of environmentally sustainable and healthy homes will often be aligned, policy cannot be based solely on the assumption that environmentally sustainable housing developments will *always*, by default and without exception enhance residents' well-being. It must be based on appropriate evidence to ensure that (i) positive health impacts are enhanced as much as possible, and (ii) the risk of any unforeseen and unintended detrimental health effects from developments intended to enhance or protect the environment is minimised.

Currently, lack of evaluation seems to be a significant problem for assessing the success of sustainable housing measures (Winston, 2009), and even less research can be found on the direct health benefits of sustainably designed residential dwellings. To bridge this gap, some inference may be possible from studies investigating health impacts of housing improvements. However, such inference must be made with caution as in one review of intervention studies Allen (2000) observed "a reluctance to probe beyond a general assumption that health will improve as housing is improved" (p. 444). An analogous situation appears to exist with regards to sustainable homes – it is assumed that health will improve with installation of environment protective measures. This paper does not seek to negate the importance of such measures by any means, but calls for greater evaluation of the health impacts of sustainable homes.

Furthermore, greater attention needs to be paid to ensure that by focusing too much on environmental gains developers do not overlook any potentially adverse health effects. Building and housing development features with

known negative effects on health are avoided in the UK through Building Regulations and health impact assessments. However some health effects associated with housing may take years or decades to manifest and may not have yet been identified. It is therefore essential that the substantial (albeit incomplete) body of knowledge on the housing-health relationship is used in the development and implementation of sustainable housing in order to minimise the possibility of any adverse effects.

3.3. Improvement of public health could justify higher costs of sustainable housing

Another major barrier to a wider adoption of sustainable housing that has been identified is the perceived cost of such developments (Sunikka 2003). While this may become minimised through greater market demand for sustainable homes (as discussed above), in the shorter-term, sustainable housing policy may be promoted by the argument that enhanced public health and well-being through sustainable housing can lead to wider societal and economic benefits, leading to monetary savings elsewhere (such as lower healthcare costs, reduced absenteeism, higher productivity). The argument that greater investment in healthy homes can lead to wider economic and societal benefits is a motif found in housing and health literature. This argument is generally found in two forms:

Firstly, healthy housing can lead to potentially measurable (at least by approximation) savings in health care. Miles and Jacobs (2008) argue that when the range of health implications related to housing are not fully considered by planners during the planning processes, the result is a cost shifting between the housing and health care sectors of the economy. In other words, the cost of unhealthy housing is reflected in the medical costs, and in England, the Buildings Research Establishment has estimated that poor housing is costing the National Health Service over £600 million a year (Ormandy *et al* 2010). Such cost-benefit discussions have prompted some observers to argue that given the existence of substantial evidence linking poor health to low quality housing, investment in high quality housing may also be driven by health considerations and can lead to significant health improvements (Bonney 2004).

The second form of argument is more indirect and is based on the observation of the close relationship between housing quality and socio-economic status (SES). SES is closely aligned to health as research has linked low SES to poorer health and shorter life-expectancy than for individuals with high SES (Fuller-Thomson, Hulchanski *et al.* 2004). In turn, the housing sector has been noted as a significant producer of social inequality (Dunn 2002). The nature of these linkages are highly complex, and only indirect associations can be discussed, however improvement in the quality of housing through environmental (e.g. energy efficiency) measures and health considerations (e.g. improved air quality) can improve health and lower heating costs thereby contributing to improving the socio-economic position of a household.

4. Housing and health research – state of knowledge and lessons for sustainable housing

Research into the health impacts of housing has a relatively long history. Associations between health and housing were noted in the early 19th century when the link between high incidence of disease and poor quality housing was observed in industrialised cities of the UK (Chadwick 1842). This gave rise to the public health movement, and the targeted action to improve sanitation, over-crowding and the basic quality of the built environment leading to a decline in the rates of infectious diseases (Perdue *et al.* 2003).

Perhaps as a consequence of this success, links between urban planning and health became less prominent (Barton and Tsourou 2000; Dunn 2002). Yet while incidence of infectious diseases attributable to housing has diminished, the built environment has re-emerged as a priority for public health as more complex, chronic health conditions linked to housing have been acknowledged (e.g. allergies, skin irritations, asthma and other respiratory illnesses) (Krieger and Higgins 2002; Miles and Jacobs 2008).

The substantial body of research into housing impacts on health has been collated and reviewed by numerous authors (for example Bonney 2007; Carr-Hill 2000; Fuller-Thomson *et al* 2004; Krieger and Higgins 2002). However despite the quantity of research in this field, a common conclusion found in literature reviews is a lack of overall integration of individual studies into a holistic framework that could help define the housing-health relationship. Fuller-Thompson *et al* (2004) summed up existing research as “narrowly focused, fragmented, and of marginal practical relevance to either housing or health policy” (p. 109).

In recognition of this criticism, attempts have been made to unify and integrate existing research into models and frameworks that could guide understanding of this important relationship. While this is still work in progress, the empirical and conceptual developments in housing and health research are worth the consideration in sustainable housing discourse. The remainder of this section will outline three key themes that feature prominently in housing and health research and have significant relevance to sustainable housing policy and developments.

4.1. Housing and health definitions

Although the terms ‘health’ and ‘housing’ may appear straightforward, both in fact are broad in meaning and can be interpreted in different ways. Defining these terms is necessary not only to minimise ambiguity, but also aid establishment of a platform for discussion of this subject.

Health. The definition of health generally depends on the context in which the term is being used. For instance health practitioners will use the more traditional definition based on the biomedical model that focuses on the physical and chemical processes (Douglas 2004). However, perhaps the most widely used definition of ‘health’ - as defined in the preamble to the Constitution of the World Health Organisation (WHO) - is broader and

encompasses the social dimension of human condition: 'health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (WHO 1948).

The nature of how health is understood has important implications for housing and health policy as well as research. Historically, housing improvement policies were primarily based on the biomedical model as a particular housing feature was linked to a specific and often acute health condition, such as damp conditions leading to respiratory illness. This led to targeted action on that housing feature to minimise the source of the particular negative health impact. However, recent decades have seen a conceptual shift within public health policy from the biomedical, and hence largely reactive model, to a broader one that incorporates health promotion as well as social, life-style and psychological aspects (Barton and Tsourou 2000; Stewart 2005). Housing is now increasingly being understood as a determinant of health not only from the physical symptoms, but through numerous direct and indirect pathways, including mental health and social well-being.

This shift towards a broader conceptual meaning of health has several important implications for research in this field. Firstly, while a broad definition of health is perhaps more suitable for studying housing impacts, it also creates significant methodological barriers as it gives no provision of how health should be measured (Carr-Hill 2000). Second point to note is that broader definition as presented by the WHO describes essentially a positive state (as opposed to neutral or negative). However, most of the research into the health impacts of housing to date is focused on the negative associations (Fuller-Thomson *et al.* 2004). As the existing knowledge of the housing-health relationship is based on such research, it begs the question of whether enough knowledge exists to build housing to promote health rather than simply avoid illness.

Housing. As with the definition of health, the term 'housing' is seen by many researchers going beyond the simple physical structure of a dwelling. In its broadest sense, housing can be divided up into three levels:

- (i) The home. The intangible role of housing as a home has been linked to psychological health through the provision of a secure and protective environment (Kearns, Hiscock *et al.* 2000) and as a psychosocial symbol of achieved status (Howden-Chapman 2004). As Fullilove and Fullilove (2000) explain, this role is distinctive from the physical 'dwelling' as the psychological idea of a 'home' is the same among groups that may have very different dwellings, such as nomadic groups.
- (ii) Dwelling. Referring to the physical structure, it is primarily at this level of the 'housing' definition that most research on housing and health has been carried out. Dwelling features leading to health affecting conditions such as damp, indoor air quality, pest infestations and indoor pollution have received particular attention.
- (iii) The neighbourhood/community. At this level housing plays an important role in relation to other housing

units through the creation of a community or neighbourhood. This level comprises of the social elements that impact on health, which include socio-economic conditions, ethnic composition of the area, and the level and nature of the social interactions that are facilitated through the composition of the public area (Bonnefoy 2004).

The broader meanings of health and housing do add to the methodological complexities of this research field, which is perhaps why many studies focus on the biomedical definition of health and avoid making the distinctions in housing (Fuller-Thompson *et al.* 2004). However rather than a hindrance, these broader definitions can be viewed as an asset for conceptualising as well as implementing sustainability within housing. By encompassing psychosocial elements and human needs beyond the biomedical boundaries, 'health and well being' can be used as the central focal point for the 'social' element of sustainability. The discussions on the meaning of health found in the public health literature can contribute not only to the development of a framework, but also offer ways of measuring and implementing the social element of sustainable housing.

4.2. Housing is a key determinant of health

Health is determined by a complex interaction of numerous physical, chemical, behavioural and biological factors (Barton and Tsourou 2000). A model (Fig 1) developed by Dahlgren and Whitehead (1991) has been widely used to illustrate this interaction. Represented by the core of the model, health is primarily pre-determined by factors such as gender, age and hereditary conditions. This core is surrounded by four layers of factors whose influences generally become less direct, but nevertheless remain important. Individual lifestyle behaviour such as diet, smoking, alcohol consumption and level of exercise have a direct and significant effect on health. Community factors such as social networks influence lifestyle and therefore health of an individual. Wider societal, economic and global factors will influence health in a less direct way. These less direct factors can however have a strong influence on psychological wellbeing, which may be caused by for example stress and anxiety over employment, economy, political or global issues. Depending on how an individual is pre-conditioned to deal with these stresses (lifestyle and community levels play a major role in this), these less direct factors can manifest into physical and/or psychological ill health.

However, it is important to note that the outlined determinants can also be enhanced or reduced by each other. Although the model places housing in the third stratum of influence, review of research into the housing and health relationship reveals the important influence that the built environment will have on other determinants, which in turn can correspond to a greater or lesser effect on health and well-being.

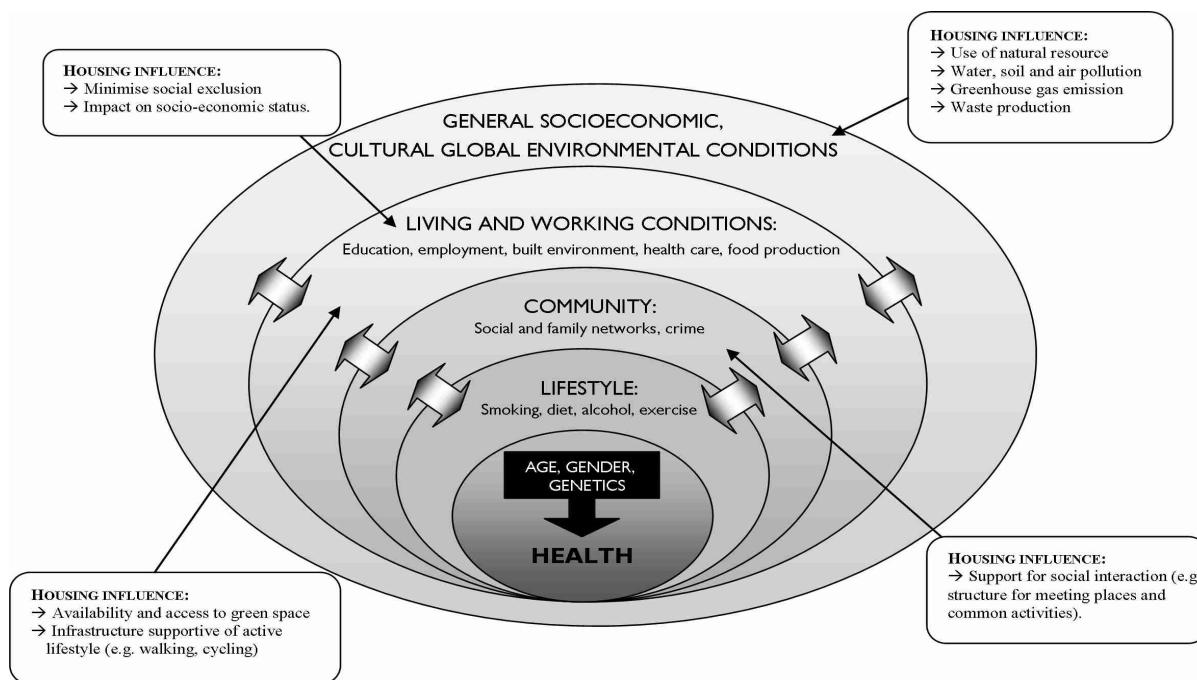


Fig 1. The determinants of health. Adapted from Dahlgren and Whitehead (1991).

Design of housing developments can influence individual's behaviour by for instance encouraging walking or cycling rather than car use (Jackson 2003). Spacious and appropriately designed kitchen facilities may encourage people to prepare home cooked meals, thereby leading to a more nutritious diet (CABE 2009). Supportive social networks may be encouraged by design of homes and communities with meeting spaces. The socio-economic impacts of housing are complicated but well documented (Fuller-Thompson *et al.* 2004), while examples of housing effects on the environment range from local impacts of pollution and water to global contribution to resource depletion and greenhouse gas emission.

If housing can positively or negatively affect health by influencing the other determinants in the model, another question arises – can the positive influence of housing *counteract* negative influences of these other factors? For example, it has been well documented that chronic stress can lead to a number of physical and mental ill-health conditions through several pathways (Easterlow *et al.* 2000). This is particularly problematic when stress is caused by conditions outside an individual's control such as economic uncertainties, politics and global issues. If housing was designed to provide a stronger sense of refuge and safety, and a place where one is able to choose privacy or quality time with family and friends, perhaps housing could counteract the negative influence of stress created by the other health determinants.

Such 'healing' features of buildings are not a new idea and have been investigated in the early 20th century (Hobday 2010). There is a substantial body of literature on hospital design and how certain features can be incorporated to speed healing and patient recovery (for example Ulrich 2006). However, very little of this knowledge

seems to be incorporated into sustainable housing in a systematic way.

4.3. Complexity must be acknowledged and addressed through a multidisciplinary and longitudinal approach

The disjointed nature of the housing and health literature is partly caused by the narrow, biomedical-model based interpretation of the relationship between housing and health (Lawrence 2004). Historically, many of the housing and health linkages were explained by simple causation models, such as unsanitary housing, overcrowding, inadequate ventilation and food storage leading to illness primarily caused by infection. Today, it is increasingly acknowledged that health conditions related to housing tend to have multiple causal factors acting at different levels of housing (see section 4.1). Also, chronic health conditions and some of the less direct affects can take many years to manifest - time-scales on which very few research methodologies currently operate on.

As the complexity of current health challenges linked to housing have been acknowledged, it has become widely recognised that solutions will need to be holistic (Miles and Jacobs 2008) requiring a cross-sectional and multidisciplinary research approach (Jackson 2003; Srinivasan *et al.* 2003). Impacts of individual factors need to be evaluated against the holistic concept of housing as these will tend to be affected by numerous confounding housing variables (Bonney 2007).

5. Next stage of research

The aim of the ongoing research is to assess whether sustainable housing developments have any discernible im-

pacts on residents' health compared to traditional housing of similar size, age and location. The anticipated primary output of this research will be recommendations for future sustainable housing developments that would enhance positive health impacts and minimising negative effects.

Given the lack of published research on health impacts of sustainable housing, a framework (Fig 2) was developed to guide the literature review to related and overlapping themes where significant levels of research do exist. Starting with the three components of 'housing', 'environmental sustainability', and 'health', substantial investigative work has been identified in the areas where each of the two components overlap. The purpose of this is to inform the central theme where all three components overlap, i.e. health and (environmentally) sustainable housing.

'Housing and health' theme forms the largest of the three areas, reflecting the long history of research into how housing impacts health. A smaller number of publications have been identified for 'sustainable housing' and 'health and sustainable development' themes. Again, these generally tend to focus on the environmental aspects of sustainable development. Nevertheless, all three areas have significant contributions to make in conceptualising how sustainable housing can impact health as well as providing guidance for developing ways of measuring this impact.

The next stage of research will involve selection of a number of sustainable housing developments based primarily on the (i) size of development; (ii) age of development; (iii) geographical location. Traditional housing developments will be selected according to similar specifications to enable multiple criteria analysis to be carried out. To gauge the level of residents' health in these two sets of developments, a questionnaire has been developed based on the findings of the housing and health literature review. Although self-determined health status has a number of drawbacks from methodological perspective, it has been used widely in research within this field (CABE 2009).

The survey will be supplemented by semi-structured interviews with relevant stakeholders of such housing developments. The purpose of these interviews will be to elucidate the level of consideration that health issues receive in sustainable and traditional-style housing.

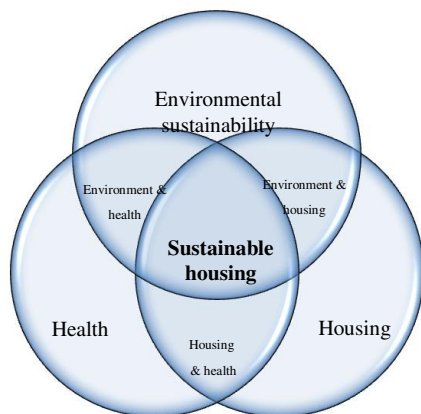


Fig 2. Guiding framework for review of health and sustainable housing literature

6. Conclusions

1. Despite the growing impetus for sustainable housing, progress to date has been relatively slow given the low market demand and lack of a guiding definition for sustainable housing. Compared to environmental protection measures, health and well-being issues have received significantly less attention in sustainable housing research, policy discourse, and developments. Yet opportunity exists to boost demand and implementation by focusing on the positive impacts on health of sustainable housing. Review of the extensive body of research into housing impacts on health support the importance of greater health focus in sustainable housing policy. Healthy homes and environmentally sustainable housing share many common goals and this is a good opportunity for the two areas to 'unite forces' for a greater chance of success in achieving these objectives.
2. However, lack of empirical research into the health impacts of sustainable housing is a hindrance in realising the above mentioned benefits. The aim of the ongoing research is to contribute in addressing this gap through a comparative study of health impacts of sustainable and traditional housing. As part of this research, a model (Fig 2) was developed to guide the literature review to areas of existing research where most inference can be made to inform the sustainable housing concept.

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