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Review of evidence on housing and health

Background document

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Review of evidence on housing and health

by

Xavier R.Bonnefoy[1]; Isabella Annesi-Maesano[2]; Luis Moreno Aznar[3]; Matthias Braubach[1]; Ben Croxford[4]; Maggie Davidson[5]; Véronique Ezratty[6]; Jérôme Fredouille[7]; Marcela Gonzalez-Gross[8]; Irene van Kamp[9]; Christian Maschke[10]; Mounir Mesbah[11]; Brigitte Moissonnier[1]; Kubanychbek Monolbaev[1]; Richard Moore[12]; Simon Nicol[4]; Hildegard Niemann[13]; Carita Nygren[14]; David Ormandy[11]; Nathalie Röbbel[1]; Peter Rudnai[15]

[1] WHO-EURO, European Center for Environment and Health, Bonn Office
[2] INSERM U 472 Villejuif, France
[3] University of Zaragoza, Spain
[4] Bartlett School of Graduate Studies, University College London, United Kingdom
[5] Building Research Establishment, United Kingom
[6] Services des études médicales, EDF-GDF, France
[7] Médecin psychiatre, hôpital du Vinatier, Bron, France
[8] Rheinische Friedrich-Wilhelms Universität, Bonn, Germany
[9] National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands
[10] Forschungs- und Beratungsbüro Maschke, Berlin, Germany
[11] Professeur de statistiques, Université de Bretagne Sud, Vannes, France
[12] University of Warwick, School of Law, Coventry, United Kingdom
[13] Berliner Zentrum Public Health, Berlin, Germany
[14] University of Lund, Department of Clinical Neuroscience, Lund, Sweden
[15] National Institute of Environmental Health, Budapest, Hungary.

Introduction

There is considerable evidence that housing conditions do affect health status. Nevertheless, we are still left with the question, "what is healthy housing?"

This document gives a preliminary overview of the work of a consortium of research institutions established by WHO within the area of housing and health. A short synthesis of the currently accepted evidence published on the theme of housing and health is presented. The first evidence gained from a pan-European survey on housing and health is also summarized. This working paper aims to provide scientific evidence useful for setting priorities at local and national levels, identifying risk groups and improving building regulations and housing controls. It is intended to support the proposals included in the Budapest ministerial declaration regarding the potential ways forward for ministers of health and ministers of environment.

What is Healthy Housing?

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Housing is the conjunction of the dwelling, the home, the immediate environment and the community.

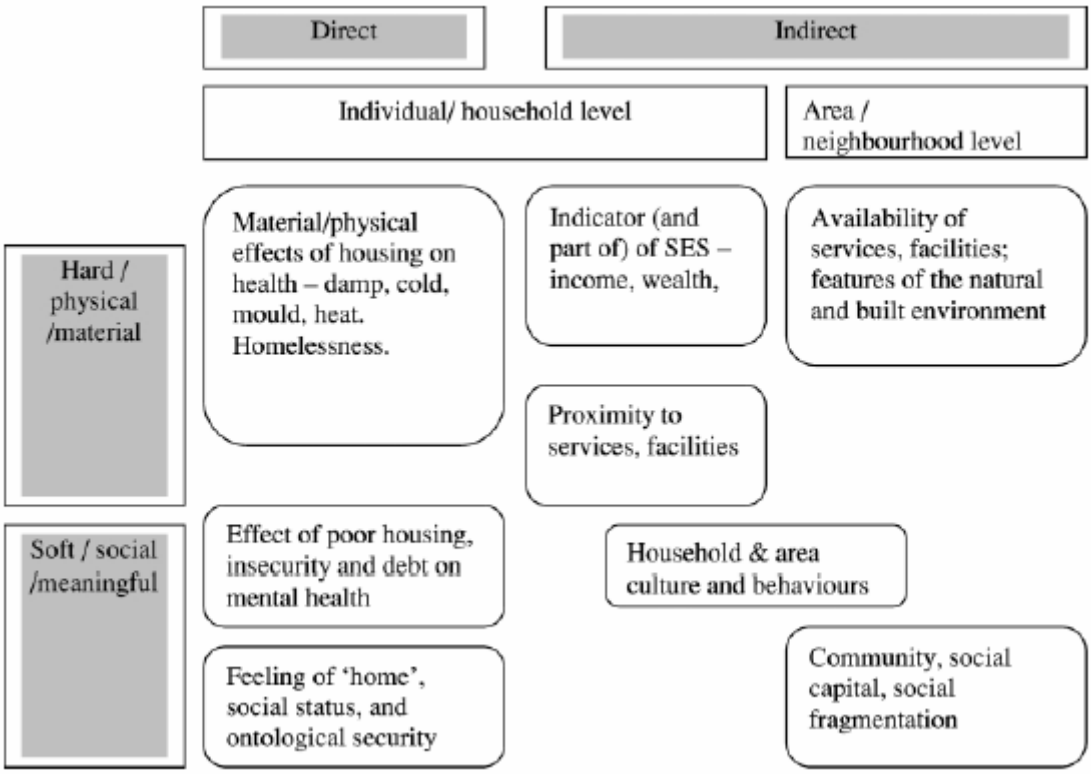
The role of public health is to provide the circumstances under which people can be healthy.

"Healthy housing" covers the provision of functional and adequate physical, social and mental conditions for health, safety, hygiene, comfort and privacy. A healthy home therefore is not a specially designed house, it is more a residential setting for a household that is including all standards and "best practice" knowledge that has been gained over centuries of dwelling construction and immediate environment design. The Habitat declaration, Istanbul (1996), defines the characteristics of an "adequate shelter"; which are very much in line with what healthy housing is.

"Adequate shelter means more than a roof over one's head. It also means adequate privacy; adequate space; physical accessibility; adequate security; security of tenure; structural stability and durability; adequate lighting, heating and ventilation; adequate basic infrastructure, such as water-supply, sanitation and waste-management facilities; suitable environmental quality and health-related factors; and adequate and accessible location with regard to work and basic facilities: all of which should be available at an affordable cost. Adequacy should be determined together with the people concerned, bearing in mind the prospect for gradual development. Adequacy often varies from country to country, since it depends on specific cultural, social, environmental and economic factors. Gender-specific and age-specific factors, such as the exposure of children and women to toxic substances, should be considered in this context…" (2nd HABITAT Conference in Istanbul).

Shaw (2004[i]) has presented a model describing housing and health interactions (Table 1), distinguishing between hard aspects of the building and physical infrastructure, and soft factors such as the social and perceptive dimension of housing. Also, Shaw points out that inadequate housing can have both direct and indirect effects on mental and physical health.

Table 1. Conceptual model for housing and health interactions (Shaw, 2004, Ann Rev PH 25)



How housing impacts on health

Housing and mental health

It is more difficult to define mental well-being than physical well-being as it involves complex realities where social, cultural and individual realities interact. Several studies, particularly in the field of social and environmental psychology have shown the influence of environmental factors such as pollution, level of noise and crowding on mental health (Halpern 1995[ii]; Leventhal/Brooks-Gunn 2003[iii]; Gomez-Jacinto/Hombrados-Mendieta 2002[iv]).

Within these multidimensional realities, it is possible to clarify some of the determining factors of housing on mental health. To live somewhere involves the development of a special relationship to space, time, luminosity, self and others. A house, in its concrete reality, brings support to certain aspects of individual psychological structuring – it is the "central reference point of human existence" (Relph 1976, page 20[v]). In addition, it contributes to the structuring of a family group and its relations to the outer world with an opening towards a potential sense of belonging to a community.

Housing and protection

One of the primary functions of housing is to provide a shelter from outside aggression. This has been the case since the very beginning when mankind sought protection in natural shelters such as caves. It is from the reality of this shelter that stems a feeling that something stable and permanent can come to be, the feeling of ontological security. Hence, beyond what it means as a

shelter from the outside, a dwelling is defined as a holding space, a physical and psychological envelope within which intimacy will appear and develop and where each and every individual will find an opportunity to be himself or herself. Thus, what was just a house will become a home. Integrity of body and mind are dependant upon this possibility of living in intimacy.

A house will become that by which an individual, or a family group, will be able to control its relationship to the outside world and define the limits of intimacy, of what is private and what is public.

The need for a private space differs from one individual to another and varies according to culture, but the pathogenic effects of homelessness, lack of control, deportation, being uprooted, are indications of the real importance of this need. A house loses its protective value when troubles from the outside break in and intrude on an individual. The concept of private space is akin to that of private property. Poor quality housing, providing insufficient protection from the outside, from noise, from scrutiny and intrusion, turning a housing project into some sort of "community loft", can be the source of major suffering. Ill defined boundaries of a home allowing easy unauthorized entry from the outside will induce the feeling that intimacy is intruded upon with a subsequent feeling of badly defined self. Such events may generate pathological manifestations such as anxiety, depression, insomnia, paranoid feelings and social dysfunction.

Social bonds

Everyone's security and quality of life depends very much on the establishment of good relations with neighbours. This depends on circumstances, on how they take place, on how the building and the built environment is spatially organized, on the quality of the building, its maintenance; all this influences how people look at each other and how they may perceive others as a nuisance, as potentially dangerous or even as outright foes. Bad circumstances in neighbourhood relations may generate pathologies: aggressiveness, vandalism, depression, anxiety, somatic complaints and even paranoid feelings and ideas. Beyond the quality of the actual building that can indeed influence, both ways, the development of social relations, it is interesting to understand how these relations take place and work.

Those parts of a building that are commonly used by residents function as a border zone between self and others. They do not belong to anyone in particular and all must share them. Tensions arise when they fail to act as buffer zones or when neighbours try to use them as private spaces, encumbering them with personal items such as prams or bicycles, using them as private meeting places (groups of noisy adolescents), and so forth. Some of this gratuitous behaviour is probably connected to inadequate housing when some domestic or social needs are not satisfied and carried out in common spaces. Some studies have shown that the presence of groups of different origin in the same residential neighbourhood does not indicate how people will get along together. Geographic closeness may promote social relations and mutual adjustments, or may give rise to tensions. Feeling safe in the intimacy of one's home, good neighbourhood relations, respect for the boundaries provided by those parts of buildings common to all, are all essential to the feeling of well-being in housing.

A house which would be thought of only as a protection from the outside world would become like some kind of jail, a neighbourhood with poor connections to the rest of the town, or poorly available public services would generate feelings of isolation and confinement. Furthermore,

these could increase and turn into feelings of being caught in a real impasse for individuals who cannot leave, or escape – for financial reasons for example. And from clinical psychiatry we have learned that conditions such as these may lead to serious physical or mental diseases.

Urban segregation and confinement of populations groups to specific geographical areas have generated undervalued ghettos, deteriorated neighbourhoods and people with low self esteem as a result of well known phenomena such as identification to the housing areas. The clinical expression of this low self esteem is, broadly speaking, depression.

Identity and housing

Identity has to do with that feeling that one is oneself (permanence of self) and at the same time different from others, and it is certain that a number of processes contributing to the building of the self are based upon housing characteristics. Personalization of a space of intimacy in a home allows for feelings of being separate and differentiated.

Loss of control over the environment, or difficulties in appropriating space will unsettle individuals and groups. Disorderly, reactive and transgressive appropriations will appear in overly impersonal places, in spite of the weight of standardization, under the form of vandalism, tagging, damaging common property and so for (Freeman 1993[vi]; Green et al 2002[vii]).

Mental disorders related to bad housing conditions

Symptoms of stress, anxiety, irritability, depression, even social misconduct (violence, vandalism) and alteration of attention capacities at school in children may be related to bad housing conditions.

It is also accepted that stressful housing conditions can aggravate pre-existing psychiatric pathologies (Evans, 2003)[viii].

Finally, indoor exposure to toxic compounds (i.e. heavy metals, solvents) may lead to neuropsychiatric disorders.

Sleep disturbance and strong annoyance during day time

Sleep is an essential condition for humans and can be severely disturbed by noise. Acute sleep disturbances affect the subjective condition and with an individual latency, also affect qualitative or quantitative performance. More than 10% of the adults in Europe suffer from chronic sleep disturbances in need of treatment, at least another 10% at sleep problems or occasional disturbances of the night's rest (Billard, 1993)[ix]; (Peter et al., 1995)[x], (Fischer et al., 2001)[xi]. Environmental noise is the leader of the exogenous causes.

The non-auditory effects of environmental noise appear to occur at levels far below those required to damage the hearing organ. Environmental noise acts as a stressor at night by disturbing sleep and via strong annoyance (or bothering) during the day and may impair the cardiovascular and the mental health in the long run (Babisch, 2000[xii]); (van Kempen et al., 2002)[xiii]; (Lercher et al,. 2002)[xiv];(Maschke et al., 2003)[xv]; (Rosenlund et al., 2001)[xvi].

Indoor air quality

Since people in European countries spent a majority of their time indoors, indoor air quality is a major determinant of health. Due to various indoor sources of a number of air pollutants, not only the duration of exposure, but also the concentration levels might exceed those encountered outdoors several fold. Depending on the specific situation, a number of harmful substances can be found in indoor air; examples are given below.

- Exposure to elevated levels of the radioactive gas radon may cause lung cancer (Field et al., 2000)[xvii]. Radon is formed by the natural radioactive decay of uranium in rock and soil. Once produced, radon moves through the ground to the air above and may be "captured" and concentrated in indoor air. It has been estimated that exposure to indoor radon (radon decay products) is on average the most important source of ionizing radiation from any natural or man-made source.
- Environmental tobacco smoke (ETS) can be harmful to human health, in particular for children. Effects include asthma, Sudden Infant Death Syndrome (SIDS), bronchitis and pneumonia and other respiratory diseases. It has also been suggested that ETS also has an adverse effect on the developing fetus (Dejmek et al., 2002)[xviii]. Exposure to secondhand smoke may also cause lung cancer, eye, nose and throat irritation and may affect the cardiovascular system.
- Emissions of pollutants from cooking with gas and heating have been found to affect respiratory illnesses in children. Observed effects were an increase in respiratory diseases (Burr 1999)[xix] and respiratory infections (Chauhan et al., 2003)[xx], an increase in the susceptibility to asthma and changes in lung function (Corbo et al., 2001)[xxi].
- Due to specific sources (cleaning materials, solvents, etc.), the concentration of volatile organic compounds (VOCs) measured in indoor air are often significantly higher than outdoors. Some of them are known to cause harmful effects to health, several of them are known carcinogens.
- Asbestos was formerly widely used as fireproof material indoors and in consumer products as fireplace gloves, ironing board covers, etc. When asbestos-containing material is damaged or disintegrates with age, microscopic fibres may be dispersed into the air. The presence of these fibres within the lungs over longer periods may result in asbestosis (asbestos-caused fibrosis of the lung), lung cancer and pleural or peritoneal cancer, or mesothelioma (US EPA, 1986)[xxii].

Home accidents

Unintentional home injuries are a serious public health problem. Each year in the EU there are around 20 million home and leisure injuries requiring medical attention. About 2 million of these lead to hospital admissions, and around 83 000 result in death. Over half of these accidents occurred in or around the home. In the United Kingdom in 1999 there has been 2.8 million home accidents requiring medical attention for an estimated cost to the society around €35.5 billion (UK DTI, 1999)[xxiii]. The home has seen more people dying from accidents (4006) than the road (3598) (RoSPA, 2000[xxiv]). In Italy during the year 2000, 4 380 000 home accidents have lead to 6000 casualties and 7 300 000 working days lost

There are two factors relevant to home accidents – human behaviour and dwelling design and maintenance.

Behaviour can contribute, to a greater or lesser extent, to a home accident or it can be the sole cause. Young children lack the knowledge and experience to recognise danger, but are inquisitive by nature. The mobility and sight of the elderly may be impaired. A person may be distracted by something, such as an unexpected noise. Some people, perhaps in a rush, will take risks, while others may be maladroit, or just careless.

Also, occupiers can create hazards by leaving obstacles on stairs, having loose carpets, and leaving medicines and cleaning products easily accessible to young children. Houses contain physical dangers, many of which society considers necessary or desirable – such as gas and electricity supplies, steps and stairs, and balconies. Most of these can be made relatively, but perhaps not completely, safe. However, some structural features may increase the risk of an accident. For example, horizontal bars to balcony guarding will provide a climbing frame for small children, a small change in floor levels in unexpected locations can be a trip hazard, and non-safety glass at the base of stairs will increase the severity of an injury if there is a fall.

It is necessary to ensure the following two lines of action: Home safety awareness campaigns and actions to ensure potentially dangerous dwelling features are removed or minimized.

Accessibility and usability of housing

Accessibility is of importance for enhancing older and/or disabled people possibilities to be able to live independently in society (Steinfeld, 1999[xxv]). In other terms, accessibility also includes the concept of complete use of the dwelling and immediate environment: it is not sufficient for a person to merely have access to the building, dwelling or environment, but she/he has to be able to make a complete use of the building and residential environment regardless of her/his age or physical condition.

Accessibility refers to the meeting between a person's or group's functional capacity and the environmental demands, i.e. person – environment fit (P-E fit). When it comes to accessibility research targeting the physical environment, the personal component should be described in terms of functional limitations and dependence on mobility devices, while the environmental component should be described in terms of environmental barriers (Iwarsson & Ståhl, 2003[xxvi]).

Research on housing accessibility as well as valid official statistics on such issues are scarce. However, there is some evidence that most elderly people live in dwellings with environmental barriers, and that the magnitude of accessibility problems increases with age (Iwarsson & Wilsson, submitted[xxvii]). Further, higher levels of housing accessibility problems are related to a dependence of activities of daily living like washing, cooking, or getting dressed (Fänge, 2004[xxviii], Nygren et al., 2004[xxix]; Sixsmith et al., 2004[xxx]), low subjective well-being (Iwarsson & Isacsson, 1998[xxxi]), poor perceived health, and poor psychological well-being (Oswald et al., 2004[xxxii]; Tomsone et al., 2004[xxxiii]).

The issue of accessibility problems is of importance for all frail groups of the society, for instance in Germany, one-third of the persons above 80 years have problems climbing staircases (German Ministry for families, elderly, women and youth 1996[xxxiv]). Housing accessibility therefore receives increasing attention, in particular since in most countries the proportion of elderly people increases – as well as the proportion of elderly living in their own dwelling.

Obesity and housing

The increasing prevalence of obesity in many countries means that it should now be considered a pandemic[xxxv]. Data from 20 European countries published between 1992 and 2001 have been reviewed recently about the prevalence of overweight and obesity among children and adolescents aged 2 to 18. The range goes from 9% in Slovakia to 39% in Crete. We can appreciate a geographical distribution, with prevalence being higher in the Mediterranean countries. In fact, recent data from the AVENA study in Spain indicate a prevalence of overweight and obesity of 19.1% and 5.7% in males and of 15.6% and 2.4% in females aged 13 to 18, respectively.

In virtually all parts of Europe for which comparable data are available, there is a consistent trend showing that childhood overweight is increasing rapidly. In Spain, mean total body fat in boys aged 14 has increased from 9% in 1980 to 14% in 1995. The distribution of percentage of body fat values in children and adolescents has shifted to higher body fat levels.

Seventy-five percent of obese children and adolescents are at risk of becoming an obese adult. The influence of genetic factors is of 40% and of environmental factors of 60%. Sedentarism being one of the very strong causal mechanism. Obesity is a known risk factor for the most prevalent chronic diseases in adulthood, as diabetes type 2, cardiovascular disease and cancer. There are also data indicating that the prevalence of type 2 diabetes is increasing among children and adolescent. Diabetes has both short-term consequences (hyper-/hypoglycaemia) and long-term complications (retinopathy, nephropathy, neuropathy and large vessels atherosclerotic disease), and represent an important cause of premature mortality, mainly due to coronary heart disease.

Physical activity is a major determinant of morbidity and mortality[xxxvi]. All the facts mentioned have occurred in the face of increasing knowledge, awareness, and education about obesity, nutrition, and exercise. It has been suggested that a paradigm shift is necessary if future progress is to be made[xxxvii].

The ecological model for understanding overfatness and obesity proposes three main influences on equilibrium levels of body fat – biological, behavioural, and environmental – mediated through energy intake or energy expenditure, or both, but moderated by physiological adjustments during periods of energy imbalance. The level of body fat is seen not as a “set point” like a thermostat fixed on an exact temperature but as a “settling point” that depends on the net effects of the other components of the model and that changes as they change. This places obesity in an ecological context which calls for more than simple education about risk factors and needs a collaborative strategy with the multiple sectors which impact on the problem, that is, the “obesogenic” environment. An ecological approach regards obesity as a normal response to an abnormal environment, rather than vice versa.

The environmental influences on the amount and type of food eaten and the amount and type of physical activity taken are vast and underrated. There are many interconnecting environmental influences. In this sense, policy recommendations are not only to do investments in parks, recreational activities, cycle ways and walkways[xxxviii], but to facilitate the use of all these installations[xxxix]. Physical activity, nutrition and lifestyle education should be much more emphasized at schools and linked to the whole family.

Obesity presents us with two challenges: to treat people who are currently obese and to prevent obesity in people who are still lean. Neither of these challenges is currently being met; hence it is important to re-examine the paradigms on which treatment and prevention programmes are based. Without a supportive environment, treatment programmes are likely to be ineffective and preventive programmes will be restricted to mass education strategies. A paradigm shift to understanding obesity as "normal physiology within a pathological environment" signposts the directions for a wider public health approach to the obesity pandemic. Understanding, measuring and altering the "obesogenic" environment is critical to success. Housing policies have a crucial role to play.

Mould growth

There is increasing evidence that mould growth indoors in damp buildings is an important risk factor for respiratory illness. Mould-related symptoms are likely the result of irritation, allergy or infection (Chapman et al., 2003[xl]).

Certain housing conditions and factors play important role in mould growth. Mould spores are present in all kinds of indoor environment. Normal building materials and furnishings provide ample nutrition for many species of moulds, but they can grow and amplify indoors only when there is an adequate supply of moisture. Older houses with recent water damage are frequently the favourite sites for mould growth. Poor social conditions (large household size, state rental housing and financial difficulty with housing costs) were found to be also significant predictors of damp, mouldy homes (Butler et al., 2003 [xli]).

Though in most cases a dose-response relationship could not be derived between the measured concentration of fungi and the registered health problems (Moriske et al, 2003[xlii]), irritations of the throat and eyes, allergies (most frequently allergic rhinitis), lower respiratory symptoms (dry or productive cough, wheeze) and asthma, as well as increased incidence of respiratory infections have been repeatedly observed. Some studies show a relation between dampness or mould and objective measures of lung function. Apart from respiratory symptoms, depression and the presence of general symptoms like fatigue, headache, dizziness and difficulties in concentration were also reported (Rylander and Etzel, 1999, Moriske et al, 2003 [xliii]).

Hygrothermal conditions and perception

Fanger (1970)[xliv] states "Thermal comfort is that condition of mind that expresses satisfaction with the thermal environment". What this shows is that thermal comfort is subjective. However, he also found that thermal comfort is dependent on six main variables, air temperature, relative humidity, radiant temperature, air speed, clothing level and metabolic rate (activity level).

There are many references in the literature to ill health related to temperature, one important study shows a minima in cardiovascular mortality at a daily mean temperature of about 20 °C and a increase in mortality both as the temperature drops from this point and also as it rises, (Wilkinson, Armstrong 2001)[xlv]. This relationship has been shown for many cities around the world with the minima consistently near 20 °C except for some tropical countries that have higher minima. In this report Wilkinson et al. found five major determinants of cold indoor temperatures for United Kingdom properties, these were:

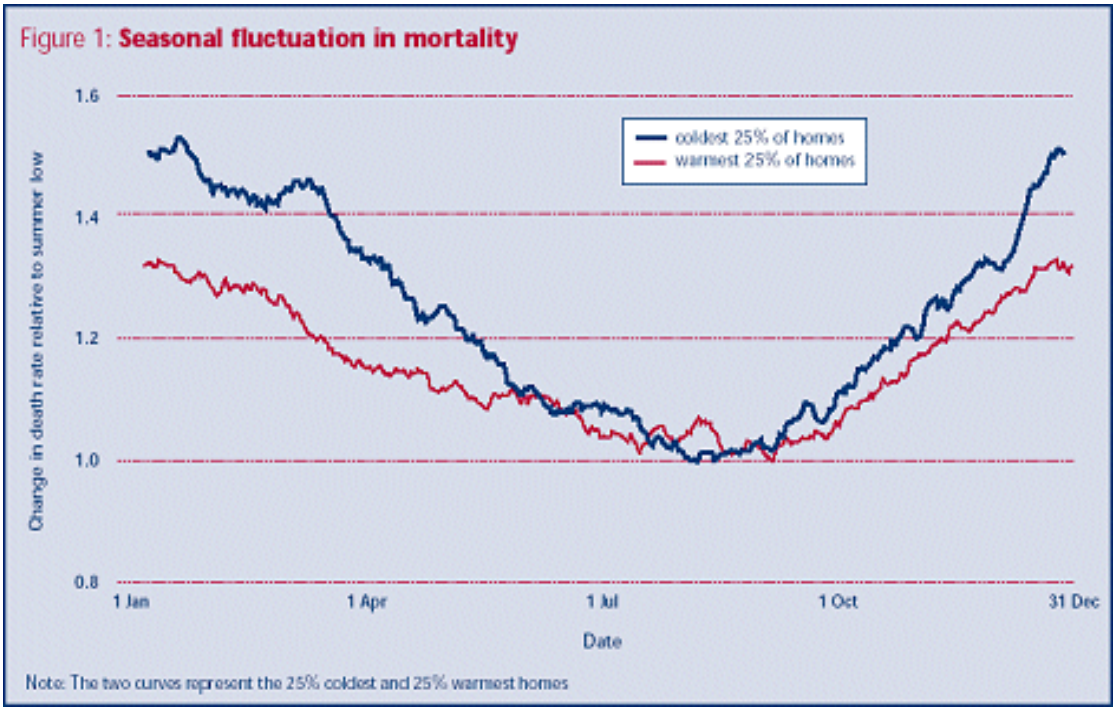
- age of dwelling (the older, the colder)

- absence of/dissatisfaction with the heating system
- cost of heating the dwelling (highest is colder)
- low household income (less is colder)
- household size (smaller is colder).

Studies have indicated that rheumatic pain is linked to climatic conditions, specifically humidity and temperature (Strusberg et al 2002[xlvi]).

In the United Kingdom alone the number of excess winter deaths is on average in the range of 40 to 50 000 a year. The number of those that can be attributed to cold homes remains unclear although some attempts to quantify have shown figures in the range of 6%. A major portion of these excess deaths can be explained by insufficient immunization against flue and unhealthy behaviours. It remains that the in-house temperature must be partly responsible. This has to be linked to fuel poverty phenomena as much as structural dysfunction of the dwelling.

A very preliminary unpublished calculation, based on the English model, of the possible excess winter death in eastern Europe and new independent states has led to a figure of 240 000 excess winter death, 48 000 of them being possibly related to housing conditions.



From Wilkinson et al., (2001)

Energy and socioeconomic aspects

In Europe, energy consumption for domestic purposes in homes account for nearly 50% of the total energy consumption, the other half being used for transport, agriculture and industry purposes. Thus saving energy in homes is an efficient mean to reduce pollutions associated with energy production. In addition it helps generating savings for the resident's budget! These energy savings are limited, as homes have to be kept within an adequate range of temperature for

maintenance reasons and to protect the health of the residents. The current demographic trends in Europe, an ageing of the population, a reduction in the size of households, the prevailing economic situation of many risk groups call for a special attention to be paid to the question of access to energy to all at acceptable conditions, protection of public health is at this cost.

Moreover, the household energy and appliances uses must be taken in account in terms of health and comfort. Cooking and heating can affect respiratory health, in particular in children (Triche, 2002)[xlvii]. Use of some heating sources and fumes from certain heating fuels may have adverse health effects (Dejmek et al. 2002[xlviii]). Acceptable levels, from a health point of view, of indoor air pollutants related to energy production can be achieved by eliminating or controlling the sources of these compounds and by maintaining adequate ventilation in the dwelling, however providing adequate ventilation also carries an energy penalty as the incoming air needs to be heated. (Engvall, 2003)[xlix].

Perception of safety and fear of crime

There are two relevant concepts for public safety issues, which strongly overlap: a) the more general perception of safety; and b) the more specific fear of crime (Austin et al. 2002).[l] Looking at the subjective perception of safety, it is especially the occurrence of physical or environmental cues in the residential environment that leads to insecurity and feelings of not being safe (Mozingo 1995)[li]. Such cues that raise concerns about safety issues can, e.g. be physical incivilities such as deterioration of neighbourhoods, trash or graffiti (indicating a low community spirit and, in effect, a low social control), and social incivilities such as conspicuous youth groups or persons with strange behaviour (questioning the degree to which social norms and customs may be kept) (Halpern 1995)[i].

Looking at fear of crime, the 2002/2003 British Crime Survey estimates that fear of crime has major impact on the quality of life of 7% of the population, with a lesser impact on an additional third of people. Previous findings from this other research have demonstrated that fear of crime is strongly associated with prior victimization and with the prevailing rate of crime in the city or the immediate vicinity. Other important factors affecting feelings of safety and fear of crime include having windows that close properly, being able to escape in case of fire, having adequate and working lights in the common areas, and being able to overlook the street from some part of the dwelling. Knowing the importance of this condition on quality of life, reducing “fear of crime” though actions at housing level will improve the health and overall well-being of the population.

Housing and residential environment

Research indicates that residents’ perceptions of urban environmental quality and satisfaction with their residential situation are determined by a large number of different residential aspects (e.g. by physical, social and physical planning aspects). The most important residential quality aspects appearing in the literature are social ties in the neighbourhood, safety risks (e.g. crime, traffic), environmental hygiene (e.g. noise, air pollution), and the presence of facilities (e.g. shops, greenery). Personal characteristics studied (age, gender and socioeconomic status) appear to influence quality judgements only marginally. It is not only the measurable “objective” aspects of the living environment that determine whether people are satisfied, but also the perceptions of these. These do not always parallel each other. Seldom objective and subjective aspects are studied in combination. Empirical evidence is still limited and there is no integrated

model yet available. However consensus exists that the field requires an interdisciplinary approach, that integrates physical, spatial, social and environmental aspects. Most studies have been performed at local/neighbourhood level.

The survey performed in eight cities

The existing body of evidence on the relationship between housing and health remains clearly insufficient, and in the recent years, a variety of research projects targeted at identifying links between housing and health have been carried out, both by national governments, local authorities and research institutions.

However, these research programs were having the following limitations.

- The studies tended to be sectorial, focusing on specific issues such as noise, indoor air quality, targeting specific pollutants or looking into a single health effect.
- Exposures to volatile organic compounds, asbestos and lead were predominant when discussing housing and health.
- Assessments of combined housing risks ("Cocktail effect") have been very limited.
- The impact of inadequate housing conditions on mental health has been poorly covered, even neglected.

Due to these limited approaches, only short-term and small-scale solutions were proposed. It remains very difficult, even impossible, to compare on a global scale the existing health risks associated with housing conditions and to identify priorities. Housing markets, and housing and rehabilitation authorities were left with the market conditions as main driving force for designing their policies and ignored the health impact of their production.

The WHO housing and health program therefore decided to carry out a large European housing and health survey, aiming at a comprehensive understanding of housing and health.[1.] The perception of the housing quality by the residents has been an essential part of the study. However, undertaking a holistic and general assessment of the burden of disease due to housing is far from being realistic at the moment.

The objectives of the WHO LARES (Large Analysis and Review of European housing and health Status) were:

- to oversee and assess the quality of the housing stock in a holistic way;
- to identify avenues that would allow to set priorities among the individual problem areas of housing and health;
- to design a tool that would allow local authorities to assess the prevailing housing and health conditions within their cities or regions;
- To produce a more comprehensive evidence database;
- And to develop guidelines and recommendations for policy-making.

[1] Due to limited data availability within European countries on housing conditions and health effects, the realization of a pan-European housing survey was the first recommendation made by a housing and health expert meeting convened by WHO in Paris in 2000 (WHO 2000: Integrated approaches to housing and health. Meeting Report).

The LARES database is compiled from eight empirical housing and health studies in:

- Forli, Italy
- Bonn, Germany
- Vilnius, Lithuania
- Geneva, Switzerland
- Angers, France
- Bratislava, Slovakia
- Ferreira do Alentejo, Portugal
- Budapest, Hungary

and contains in total a number of 8519 individual residents in 3373 households.

An independent research aimed at reviewing the strength and weaknesses of the survey has been undertaken. The main conclusions are the following.

- Samples were selected according to good practices.
- There is some response bias, which can be corrected for.
- Harmonized training of the surveyors, and thorough quality control at every stage of the work have guaranteed a high data quality.
- Sample size are too small for comparing neighbourhood in each of the cities surveyed, so there are some limitations on analysis and conclusions.
- It is a very useful start obtaining a reliable picture of the size and nature of the housing and health problems in the surveyed cities.

A full detailed analysis of the survey methodology will be published in the coming weeks.

The first findings of the WHO LARES are extremely promising and can be summarized the following way.

Mental health

The data gathered from the survey show that people are significantly more depressed and more anxious when they live in a dwelling that:

- does not offer sufficient protection against external aggressions: noise, vibrations, dampness, moulds, draughts, cold in winter;
- do allow space for isolate oneself (overcrowding or poor architectural design), or to feel free in one’s home;
- lack light and/or does not offer a nice view on the outside environment;
- does not facilitate socialization (absence or parks and gardens);
- is prone to vandalism.

A low SES, fear to loose one's dwelling or conversely lack of financial capacity to change of place of residence, a bad image of the neighbourhood, are also all linked with depression and anxiety of the inhabitants.

Asthma and allergies

As suggested by the literature[lii], available data show that dampness and visible mould growth as assessed by a technician were significantly related to:

- asthma (ever, attacks in the past year) even when it was diagnosed by a doctor
- nasal allergies
- eczema.

This corresponded to a report of poor air quality in the dwelling. Furthermore, environmental tobacco smoking was less frequent in dwellings where there was at least an inhabitant affected by asthma or allergy, which could be due to the healthy smoker effect. Unexpectedly, no effects of having ventilation on such diseases were observed. Problems of dust in the house did not affect the health of the subject. Further analyses are needed.

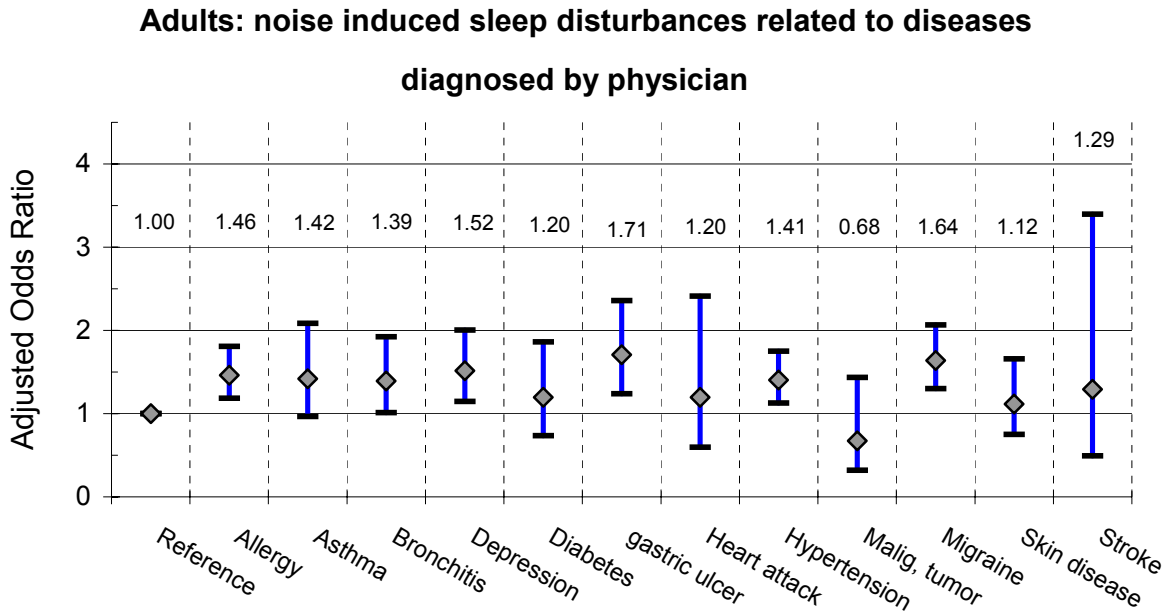
There was also a significantly increased risk for chronic bronchitis diagnosed by a doctor among people living in damp or mouldy houses. Cold throat illness during the last year was also significantly associated with mould growth in the home.

Noise

Strong annoyance from noise is clearly associated with health. This is an important conclusion, if confirmed it will allow to use the body of evidence derived from the many annoyance studies to calculate a global burden of diseases from noise.

Night noise exposure disturbs sleep, and is a relevant risk factor for stress related diseases.

The association between noise induced sleep disturbance and ill health are comparable with the association between annoyance induced by daytime noise and health, nevertheless, in the sample surveyed, there are more people affected by night time noise than by day time noise. Particular attention should therefore be paid to night time noise in homes.



Relative disease risks for adults who indicated noise induced sleep disturbances within the last four weeks in comparison with adults without noise induced sleep disturbances. Diseases diagnosed by physician. Adjusted for “age”, “gender”, “socioeconomic state”, “consumption of alcohol”, “smoking behaviour”, “sports”, “body mass index", “size of town”, “established or new in EU”, “marital status” and flat problems, problems with living environment, etc. (N=4221).

Accidents

The results suggest that the likelihood of any accident is increased where:

- there was dissatisfaction with the dwelling size and/or layout;
- bedrooms were shared;
- the home was considered too warm or too cold;
- there was poor natural lighting or glare; and
- there is dissatisfaction with the kitchen or insufficient workspace.

The results also show that the incident of an accident is significantly greater where the individual was tired all the time or most of the time. There also appeared to be a link between sleep disturbance and accidents, with 22% of those reporting an accident also reported having their sleep disturbed during the previous four weeks. This constitutes a very interesting development that will deserve further research in order to identify the accident related burden of diseases attributable to noise during night time, which is currently quite overlooked in the scientific literature.

Accessibility and environmental design

- The majority of the participants that have been surveyed is satisfied with their dwelling and this satisfaction increases with age. However, only 27% of the participants view their residential building as easily accessible, and the same amount view their dwelling as accessible. A more frightening figure would be that three fourth of the buildings and three fourth of the dwellings seem not to be easily accessible for persons with functional limitations.
- The frequency of reported functional limitations is high and complex. This calls for an integrated approach of the house, that studies the complex "dwelling" and "inhabitants".
- Most of the low accessibility in housing is related to entrances and staircases, and there are quite many elderly living in floor levels above the third floor with a relevant share living in houses without lift or other supportive equipment.

Mould related diseases

Besides the allergic and respiratory symptoms, in accordance with the literature data, *fatigue, headache, chronic anxiety and depression* were also significantly associated with mouldy homes. The observed increased risk for arthritis may be rather due to the dampness than to the mould growth. The odds ratios of *cerebral stroke, heart attack and hypertension* adjusted to age, sex, socioeconomic status, city, smoking and marital status indicated significantly increased risk associated with mouldy homes but these results require further confirmation because other studies did not mention (if investigated at all) such effects A possible link may be explained by the common link with depression.

Despite the fact that diarrhea is not a specific symptom of an allergic condition, both the crude and the adjusted odds ratios for diarrhoeal disease during the last twelve months are also significantly associated with mould growth at home. This has been rarely mentioned in the literature (mostly as an indication of allergy).

Hygrothermal conditions and perception

The following factors were found to be statistically significant.

- Respiratory health is affected by dissatisfaction with heating system and persistent damp and condensation factors, it is also higher in areas with high relative humidity (after compensating for age, height, SES and smoking).
- Cardiovascular problems are affected by the number of temperature related complaints in winter, persistent mould, owner occupied accommodation, and fuel poverty (after compensating for age, height, weight and gender).
- Arthritic problems seem linked to temperature complaints and the annual mean outdoor temperature (after compensating for age, gender, weight and smoking).
- The most frequent temperature complaints were about thermal insulation, not tight windows, and poor heating system.
- Homes with mould problems are more likely in areas with high absolute humidity, and having a high number of occupants (generating moisture). The building related factors, in order of effect, are homes that: a) report dissatisfaction with thermal insulation; b)

dissatisfaction with heating systems; and c) those with draught problems; all of which are more likely to have mould (after compensating for climate).

- Building related risk factors for those people believing that their home was affecting aspects of their health (poor sleep, low interest in activities, low self esteem, decreased appetite), were in order, dissatisfaction with insulation, persistent damp, and dissatisfaction with heating system, (after compensating for high number of inhabitants, low SES, gender, RH% of the area, height and smoking).

The high number of participants enables statistically significant factors relating to housing that affect the health of occupants to be identified even after compensating for the major personal factors. This will allow ministers of health, ministers of environment and ministers of housing to join forces to identify common avenues for developing guidance in order to improve health through improving housing thermal comfort.

Fear of crime

People feeling unsafe or insecure is in itself a problem that requires investigation and action. Although these are not “illnesses” as such, they are negative mental states which influence quality of life and overall well-being. Initial analysis indicates that there are links between general health and feelings of safety and fear of crime, however these are difficult to unravel because:

- heightened anxiety is a symptom of some illnesses; and
- people in poor general health tend to be more anxious.

Further analysis will aim to establish the real impact of factors relating to building design, configuration, management and condition on feelings of personal safety. This can be used to enable responsible authorities to produce simple guidance for landlords and those managing homes.

Residential environment quality

The objective of the LARES analysis was to identify and quantify the impact of environmental aspects such as green spaces, safety, amenities and noise, and perceived environmental quality (air, light, view, dust, dampness, etc.) on the individual residential satisfaction and quality of life of the residents.

Preliminary results show that there are a variety of associations between general environmental quality, and residential satisfaction or quality of life indicators. In addition, associations are found between residential satisfaction and quality of life indicators, showing that increased satisfaction with the living conditions supports a better quality of life and well-being.

Satisfaction with the dwelling is significantly related to the perception of air quality, and the visual appearance of the neighbourhood. Satisfaction with the residential area is associated with the level of noise exposure, perceived annoyance due to environmental problems, and the presence and quality of greenery and vegetation. Quality of life is most strongly linked to the overall satisfaction with the residential environment, air quality, and dampness.

Residential neighbourhood and building types strongly influence quality of life, which is especially true for panel block buildings that are associated with significantly low levels of quality of life.

Looking at the age of the building, the analysis shows that residents of housing built before or just after the Second World War are less satisfied with their neighbourhood and complain mostly about the visual appearance, light, and lack of greenery. Still, this perception does not impact on the quality of life of residents, and it seems that it does not influence the perception of their housing conditions in general.

More detailed analysis is still to be performed. The first results show good prospects for identifying relevant links between either housing or residential quality, and either perception of residential satisfaction or quality of life. The associations between these aspects exist throughout all surveyed cities and are very little influenced by the city characteristics.

Housing scores

It is now likely that this exercise will allow the development of housing scores. Their reading will need more definition work, nevertheless they will certainly help in identifying priority areas that would deserve more attention from the authorities for protecting public health.

Conclusion

It is critical that health authorities emphasize the importance of the housing environment on health and that environmental and housing authorities recognize that the built environment is a vital factor in human health.

Poor housing increases rates of asthma, respiratory and skin allergies, and other lung diseases. It is linked to physical accidents and injuries, to social and mental effects including depression, isolation, anxiety or aggressions. Noise-related stress, exposure to toxins, lead, asbestos or carbon monoxide can have very severe health impact. Poor urban design, that lacks trees, parks and walking areas has been associated with lack of physical exercise, obesity, loss of ability to socialize, and increased motor transport. Some significant factors are difficult to influence as they relate mainly to occupant behaviour, how they “use” the building and its immediate environment, factors including window openings, door openings, cooking habits, use of extract fans, bathing habits, all influence indoor air quality, dampness and mouldiness and can either support or work against ventilation systems, heating systems and the insulation construct of the building fabric.

The home is and will always be the shelter against aggression, the place where privacy can take place, where social bounds are created with the neighbours, and the place where boundaries are materialized for allowing the construction of each individual identity. It is in this environment that all physical and biological stressors exercise their deleterious or favourable impact on the health of the resident. The home is a special place, and cannot be, for standard setting purposes, assimilated or compared to a laboratory where one could expose a rat to some chemical compound. It is much more complex, the interactions are so multiple that ministries of health and ministries of environment should use all their influence to ensure that safety factors are enforced

for all the homes of their citizens, be they young children, elderly, handicapped, poor or rich and healthy.

The Council of Europe Development Bank, over the last five years, has disbursed an amount of eight billions euros through loans for social projects. Housing projects account for 22%, health projects for 10% and environment for 14%. That means that together "Housing", "Health" and "Environment" are among the most important fields of activity of the bank and represent half of its disbursements. This is a major reason why the decision to be made in Budapest in those fields will be very important.

The Council of Europe Development Bank is increasingly intervening in transition countries where we all know that the stock of housing units ("blocks") is much deteriorated. To illustrate this point, the Housing Ministerial Conference for South and Eastern Europe (SEE), jointly organized with the World Bank in April 2002 in Paris, the issue of the impacts on health of the very bad living conditions in SEE has been stressed as well as its consequences on social cohesion.

The conclusion of the French NEHAP could be the one of this paper: … (in the domain of housing and health) … Each risk is being envisaged according to a sectorial approach, this is not satisfactory and a global approach of the problems associated with domestic environment, which has major difficulties to emerge, is absolutely needed … A close dialogue must be initiated between ministries of health and ministries of housing. A logic for allocating regulation to the housing code and to the public health code should be identified. It is necessary to envisage, independently of the respective mandates of both ministries, all categories of dangers, including those belonging to the traditionally classified as "security", being opposed to the category "health"[2].

[2] Rapport de la commission d'orientation du plan National Santé Environnement, 12 février 2004, www.premier-ministre.gouv.fr/ressources/fichiers/rapport_PNSE.pdf

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