



THE SCOTTISH OFFICE

Central Research Unit

**POOR HOUSING AND ILL HEALTH
A SUMMARY OF RESEARCH EVIDENCE**

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POOR HOUSING AND ILL HEALTH: A SUMMARY OF RESEARCH EVIDENCE

Summary

- There is a correlation between poor housing and ill health but attempts to prove that poor housing actually **causes** ill health have often failed, and the research field is characterised by weak, and sometimes contradictory, empirical findings (*paragraphs 1 to 3*).
- The highest risks to health in housing are attached to cold, damp and mouldy conditions (*paragraphs 7 to 13*)
- The strength of evidence on the link between damp and mouldy housing and ill health varies, is sometimes inconsistent and often has to be qualified (*paragraphs 7 to 13*).
- The strongest links appear to be between (reported) illness in children and dampness and mould. A range of ailments appear more prevalent, including wheeze and other respiratory problems, aches and pains, nerves, diarrhoea, headaches and fever (*paragraphs 7 to 9*).
- Evidence for adults is more mixed, but several studies have linked damp and mould with a similar range of symptoms (*paragraphs 8, 10 to 12*).
- The prevalence of illness appears to increase with the level of dampness (*paragraphs 8 and 11*).
- Cold is statistically associated with an excess of winter deaths and Scotland has a disproportionate number of excess deaths compared with the rest of the UK (*paragraphs 14 to 16*).
- The number of excess deaths has been falling but the relationship with improved heating and housing conditions is speculative (*paragraph 17*).
- The relationship between radon in housing and lung cancer has been accepted (*paragraphs 18 and 19*).
- Some attributes of internal air quality in housing, particularly environmental tobacco smoke and carbon monoxide, are damaging to health (*paragraphs 19 to 21*).
- The relationship between lead water piping and neurological development in children has been accepted (*paragraph 23*).
- Overcrowding and living in high rise flats is associated with psychological symptoms including depression, although the influence of other confounding social and economic problems is agreed to be strong (*paragraphs 26 and 27*).
- Anxiety and depression increase with the number of housing problems (*paragraph 29*).

- There is some evidence that housing form and location has an effect on health (*paragraph 31*).
- To date, studies of home improvement “interventions” have not always demonstrated parallel improvements in health (*paragraphs 33 and 34*).
- The body of research conducted over the past 20 years, which shows that associations between housing and health do exist, supports the argument that good quality housing has a role to play in both physical and mental health (*paragraphs 37 and 38*).

Introduction

1. The relationship between housing and health has been investigated in hundreds of studies, and several major reviews have attempted to pull the disparate evidence, fragmented between different disciplines, togetherⁱ. All these reviews are prefaced with a "health warning" on the quality of the evidence, which draws attention to "confounding" factors i.e. people in poor housing suffer so many deprivations that assessment of any one risk factor is almost impossible; the direction of cause and effect, which is often unclear - for example people who already suffer from ill health may tend to live in substandard housing by virtue of low income; indices for measuring health and quality of housing are often insensitive; and, linked to all the above, methodological problems in designing and conducting appropriate research.

2. Part of these problems arise from the strict criteria inherent in bio-medical research, in particular in the establishment of causal mechanisms, clashing with the more qualitative nature of research on man-made or social causes of illness. Attempts to implicate housing in the aetiology of illness have often failed and the field is characterised by weak and sometimes contradictory empirical findings. This has led many commentators to take a more pragmatic approach to the research evidence which side-steps empirical uncertainty and accepts that proof of causality is not essential in demonstrating the importance of housing for health.

3. Recognising that there may be no such thing as "hard facts" in this area, this paper describes those studies - many based in Scotland - which have had most influence on the debate and/or typify a wider body of work and its contradictions. The structure and balance of the paper is dictated by the literature; thus there is a large section on the effects of dampness and mould which has been the focus of much debate, but much shorter sections on radon and lead, where evidence on health impacts is considered "proven", and on other risks where there appears to be little, if any, hard evidence. It does not purport to be a general review of the field. It concentrates on the impact of poor housing on health, not health on housing opportunities, and specifically excludes any consideration of the role of housing management in improving health e.g. through the medical allocation system. The relationship between homelessness and ill health is summarised in a separate Annex (A).

4. As an aid to navigation through the literature the paper takes as a starting point the 1995 BRE report on "Building Regulation and Health"ⁱⁱ which reviews the evidence on the effects on health of building fabric and services and compares the health **risks** of 18 different hazards in the home. Their methodology takes into account both the seriousness and probability of health outcomes and the strength of evidence relating the hazard to health effects. The highest risks were attached, in descending order of importance, to hygrothermal conditions (mainly dampness); radon; house dust mites; environmental tobacco smoke; carbon monoxide; fungal growth; security and the effects of crime; and lead.

Hygrothermal Conditions and Fungal Growth

5. Hygrothermal conditions are the factors that affect thermal comfort - temperature, humidity and air movement. The research literature tends to combine consideration of dampness and mould, and to treat cold separately.

6. Condensation, a consequence of inadequate heating, insulation and ventilation, encourages mould, fungi and other micro-organisms to grow. Many moulds in damp houses are allergenic and provide a food supply for house mites which are also potential allergens. At certain stages some fungi become toxic. Mould allergy is a recognised cause of asthma. In addition to identifying causal agents, associations between dampness/mould and ill health now meet most of the other criteria which medical researchers agree should be met in order to be indicative of causation, although the criterion of experimental evidence is difficult to meet, not least because there have been few longitudinal investigations linking improvement in housing conditions to improvement in health (see paragraphs 34 to 36).

7. Frequently quoted research in this field include a series of Scottish studies. The first was conducted in 1986 by Martin et alⁱⁱⁱ in an area of North Edinburgh where residents were already concerned about dampness and its effect on their health. The study collected data on households' own assessments of damp together with a standardised measure of perceived health problems, and a separate, independent, assessment of damp by the Council's Environmental Health Officers. The study found no clear evidence to support the hypothesis that damp housing has a detrimental effect on physical health of adults. There was no significant difference in health between those living in damp and non-damp homes, with the exception of emotional reaction scores which were higher in damp homes. However defective housing was strongly associated with ill health among children. Aches and pains, nerves, diarrhoea and headache were more prevalent among children in damp housing; 85% had experienced at least one respiratory problem in the previous 2 months compared with 60% of children in non damp housing. Children in homes with visible mould had higher symptom rates, vomiting and sore throats. Although criticised for respondent bias in terms of self reported health, its use of double blind design enabled objective and subjective assessments of damp to be compared. The research also addressed the confounding problems issue by having homogenous samples, and showed that smoking was not implicated.

8. The same research team set up a second study in winter 1988 to further explore the role of fungi.^{iv} Taking a larger and random sample of households containing children in selected council estates in Edinburgh, Glasgow, and London, this research again involved household interviews plus separate and independent assessments of housing conditions and health. This study reached firmer conclusions on the relationship between adult ill health and damp and mouldy housing. Adults in such housing had more symptoms and were more likely to have suffered nausea and vomiting, blocked nose, breathlessness, backache, fainting and bad nerves. As an example 21% of those in mouldy houses had blocked noses compared with 13% in damp and 14% in dry homes. Levels of nausea and vomiting were 4% in dry homes, 6% in damp and 10% in mouldy homes. Children in damp and mouldy houses showed a greater prevalence of respiratory symptoms and headaches and fever. A dose-response relationship was established between the number of symptoms and increasing severity of dampness and mould. These differences persisted after controlling for confounding factors and other sources of bias were ruled out.

9. Despite their double blind design, these studies have been criticised for their reliance on self reported i.e. "subjective" measures of illness, and their concentration on areas where levels of dampness and mould and ill health were particularly high. (In the second study 31% of dwellings were damp and 46% had fungal growth.) A 1987 Edinburgh study by Strachan^v tried to address these possible sources of bias by using "objective" measures of respiratory function and bedroom relative humidity and by drawing a city wide sample (from children in 1

in 3 primary schools). The relationship between parental reports of respiratory symptoms, bronchospasm measures after exercise, and the presence of visible fungal mould was assessed in a population of 873 7 year old children. After adjustment for tenure, overcrowding, smokers and gas cooking, children in homes with mould were three times as likely to have (reported) wheeze. There was a suggestion of dose response relation with mould in the child's bedroom. However there was no significant difference in the degree of clinically measured bronchospasm and, after considering other physiological explanations, the author concludes that awareness of dampness/mould may be a determinant of parental reporting. Because the sample was drawn from the general population it was possible to calculate excess cases of wheeze (a symptom of childhood asthma) caused by mould as 14%. Although no correlation between respiratory function and mould was found, it has been noted that this study only measured relative humidity in one bedroom, which may be a poor indicator of the microenvironment suitable for mould growth. The study methodology has also been criticised for maximising the possibility of respondent bias, and for a time lag of over a year between measurements of health and physical condition which could affect the interpretation of results.

10. Another regularly cited study is by Hyndman^{vi} among British Bengalis in Stepney using homogenous samples of 30 households in centrally heated homes, 30 in not. Perceptions of health and housing conditions were collected in interview, lung function was measured and objective information on dampness, relative humidity and temperature, and mould was recorded and spores collected. There were high levels of damp and cold in non centrally heated homes - all had damp, mouldy and cold rooms. The results of the survey were complex but found the most consistent health variable related to housing conditions - both subjective and objective - was reported hidden, i.e. not formally diagnosed, asthma (wheeziness, breathlessness, coughing and blocked up nose). People living in cold homes were two times as likely to report symptoms. Similarly mould growth increased relative risk 2.5 times. However dampness alone bore no significant relationship to chest health (though it did if combined with cold) reflecting confusion in the role of humidity in the aetiology of respiratory disease. Diarrhoea and vomiting were significantly associated with reported cold (increasing risk by a factor of 2), damp (*6) and mould (*2.1). Despite these associations, the study found no significant relationships between the objective measures of health (lung function) and objective measures of housing, a similar finding to Strachans.

11. The issue of self reported versus objective measures of health has dogged much of the research in this area. Self reported or "subjective" measures have been defended as being no more prone to measurement error than objective measures, as capturing the impacts on individual and family health and well being, and because self reported health is highly correlated with and predictive of future morbidity and mortality. For these reasons many commonly quoted studies use this questionnaire based methodology. For example Packer et al^{vii} conducted a postal survey of 2353 residents of Worcester to examine the relationship between reported health and dampness. People in damp housing were more likely to report long standing illness, disability or infirmity. The prevalence of long-standing illness was 37% among people in dry housing and 49% among those in damp housing, a disparity which widened after controlling for age, sex and social class, and increased with the severity of dampness i.e. showed a dose-response relationship. In a 1995/96 study of a mainly Bengali population in Stepney^{viii} monitored illness episodes over a five month period and established statistically significant correlations between damp and inadequate warmth and coughs/colds, digestive disorders and stress/depression. On average people felt ill 37% of the time and 60%

of respondents felt their illnesses were very closely related to housing and local environmental conditions.

12. A recent study in Glasgow^{ix} has demonstrated links between dampness and asthma. Patients aged 5 to 44 with diagnosed asthma and matched controls were recruited. A modified version of the Martin questionnaire was used; lung function and an asthma severity score calculated; and dampness assessed independently. The study found that asthmatic patients were two to three times more likely to live in a damp home and there were suggestions of a dose response relationship with asthma severity. The relationship persisted after controlling for socio-economic and other confounding variables. The higher odds ratio than in previous studies may in part be explained by the selection of patients with moderate to severe asthma.

13. The continuing debate about the role of housing conditions in the rising prevalence of childhood asthma and other allergies has led researchers to broaden their search for causal factors. A study in the Scottish Highlands^x based on a questionnaire survey of 1537 children aged 12 to 14 found no consistent relationship between respiratory symptoms and indoor environment although cough was associated with damp, double glazing and maternal smoking. The prevalence of wheeze, cough and atopy was higher in children in more mobile families leading the researchers to conclude that this factor may be more important than exposure to individual allergens of pollutants.

Cold

14. While it is common in Britain for low temperatures to be combined with high relative humidity, a body of research has focused on the effects of air temperature on health. Much of this has involved comparing statistical patterns of illness or death with temperature data. The hypothesis that cold can act independently as a determinant of health is supported by excess mortality in winter in Britain. For each degree Celsius by which the winter is colder than average, there are an excess 8,000 deaths. From January to March there are typically 20,000 more deaths in the UK than the average rate for the year, and this excess mortality is highest in the elderly and lower social classes. A report on health in the Lothians, examining health figures from 1974 to 1989, estimated the number of excess winter deaths in Scotland to lie in the range 4,000 to 7,500^{xi}.

15. The biggest causes of these winter deaths are cardiovascular and respiratory conditions. Hypothermia itself is relatively uncommon and accounts for an estimated 1% of excess deaths in the UK, though a study of admissions to hospitals in the West of Scotland in 1993/94^{xii} suggested that there could be considerable under-reporting. Results from that study were extrapolated to show that there could be as many as 4,000 cases in the UK and 1,000 deaths annually. An analysis of deaths mentioning hypothermia showed that mortality rates among the over 65s were three times higher in Scotland than in England and Wales.^{xiii} The incidence of domestic accidents also increases in winter, probably due to the effect of cold temperature on cerebral function.

16. Two analyses of hospital admissions for cold related illnesses in Edinburgh and Glasgow between 1970 and 1980 and between 1980 and 1985^{xiv} showed that cold weather explained at least 10% of admissions, with highest correlations with bronchitis/emphysema. Although the causal link with cold housing is not proved, other surveys have demonstrated the

extent of cold houses, for example Primrose and Smith 1981^{xv} found that 64% of over 65s surveyed had living rooms below 16 degrees c.

17. Although excess winter mortality may arise in part from exposure out of doors, it is argued that as the elderly spend so little time out of doors in winter, the indoor environment may be more influential. An analysis of "excess" winter mortality in Scotland between 1958 and 1987 showed a consistent drop over that period from 42.1% 1958-62 to 24.5% 1983-7 and it is suggested that this may, in part, be attributable to increased central heating and other home improvements. However this theory was refuted in a study by Keating^{xvi} of elderly residents in sheltered accommodation with continuous high daytime temperatures maintained, whose mortality rose by a percentage similar to general population.

Radon

18. Radon is a radioactive gas which enters buildings from underlying soil and rock. When radon and its decay products are inhaled, they irradiate tissues in the body with the largest dose being delivered to the lungs. The only established health effect of radon is lung cancer and radon has been estimated to be responsible for 2,500 deaths per year in the UK. Exposure varies considerably with geographical location.

House Dust Mites

19. Mite allergens can trigger Type I allergic reactions the most important of which is asthma. The growth of mites depends on a combination of temperature and humidity and on the age, cleaning and use of soft furnishings. This is not normally considered to be a house condition problem; most preventative measures involve cleaning. (The BRE report did not discuss pests but the effects of infestation have been documented elsewhere^{xvii})

Environmental Tobacco Smoke (ETS)

20. There is a large medical literature on the health risks of ETS. For example the lung cancer risk among non-smokers passively exposed to ETS at home is estimated to be 30% higher than the risk to non-smokers not exposed. A quarter of all lung cancers occurring in non-smokers (400 deaths per year in the UK) are attributable to ETS exposure. Again this is not primarily a house condition issue, though ventilation and air cleaning devices can play a role in prevention.

Carbon Monoxide

21. Carbon monoxide, a colourless, odourless gas produced by incomplete fuel combustion, is extremely toxic. Most deaths are self inflicted, and most fatal accidental poisoning is due to fires. In addition to fatal poisoning, exposure can cause long term damage with a wide variety of effects associated with chronic or recurrent low dose exposure. Hazards can be reduced by correctly installing and maintaining cooking and heating appliances and ensuring there is appropriate ventilation.

Security and the Effects of Crime

22. The risks to health from crime in the home range from direct injury to victims during burglaries, shock and ensuing depression, and for non-victims, fear of burglary, particularly among the elderly, women and poor. Because of the sheer scale of crime - a million people may suffer from the immediate after effects of burglary or fear of burglary - the BRE report identifies this as one of the leading hazards in housing, which can be mitigated by design and infrastructure improvements.

Lead

23. The main sources of lead are air, mainly from car exhaust fumes, leaded paint and lead pipes for drinking water. There is good epidemiological evidence of an adverse effect of lead on IQ through its effect on neurological development in childhood. Subtle intellectual impairment occurs with chronic low level exposure. The hypothesis that lead impairs children's IQ at low dose was strongly supported by quantitative review of 12 modern studies^{xviii}. It is worth noting that no similar review exists for other hazards.

Other Hazards considered in the BRE Report

24. The BRE report concluded that the following offered lower levels of health risk in the housing environment: sanitary accommodation and other sources of infection; space; volatile organic compounds; oxides of nitrogen; particulates; sulphur dioxide and smoke; landfill gas; and pesticides. They found no clear basis for risk assessment in lighting or electro-magnetic fields. For VOCs, oxides of nitrogen and particulates they suggested that their low ranking could be due to insufficient research, but that particulates, at least, could get a higher ranking in the future.

Accidents in The Home

25. Home accidents are a leading cause of death and injury especially to young children and the elderly. The UK Home Accident Surveillance Scheme (HASS) monitors trends in accidents. In 1988 3.2 million accidents occurred in the home of which 5,149 were fatal. Accidents associated with (but not necessarily caused by) constructional and architectural features e.g. stairs account for over 400,000 accidents per annum. The main cause of accidents to the elderly are falls, and risk increases with age. There is a close correlation between accidental death and social class; and between fire incidence and housing and social indicators. Again this is an area where the relationship between housing characteristics and accidents are confounded by other variables, including behaviour, supervision and state of health.

Space and overcrowding

26. Although the BRE report did not identify (lack of) space as a major health risk it has received some attention in the housing and health debate in the context of its relationship to overcrowding. Overcrowding is thought to increase vulnerability to airborne infections - the majority of respiratory infections including TB, and enteric diseases such as diarrhoea are often more frequent in overcrowded houses. However it is difficult to tease out other confounding factors such as poverty, poor nutrition, although the 1946 National Childhood Cohort Study found an independent association between childhood overcrowding and adult respiratory disease. Nowadays overcrowding is seen more as a threat to mental than physical health. An influential study of women in West London^{xix} showed a J shaped relationship

between internal density and psychological symptoms (i.e. symptoms initially fell then rose as density increased), a relationship which persisted when variables such as social class, unemployment and the presence of children were controlled.

High Rise Flats

27. Related to space is housing form, and some work has attempted to demonstrate the ill effects of flat living. An analysis relating data on income support to census variables shows that the proportion of children living in flats is still a predictor of children with long term illness after controlling for children living in households dependent on income support etc.^{xx} Numerous studies had identified depression in mothers living in flats, both low rise and high rise, but comparative studies have failed to agree whether neurotic symptoms are more or less common in flat dwellers compared with house dwellers; flat dwellers do consistently complain more. One study found reduced symptoms after families moved out of flats, while another concluded it was the area rather than the dwelling type which was more closely associated with psychological impairment. This body of research^{xxi} typifies the problems of confounding variables where housing characteristics are embedded with poverty, illness and social problems.

Housing, Neighbourhoods and Mental Health

28. Most of the BRE report focused on the effects of housing on physical health. However many of the studies quoted previously looked at both physical and mental health, and there is a continuing interest in the effects of housing on the latter, perhaps in part reflecting the difficulties of "proving" links with physical symptoms and because of the interaction between the two. Intuitively poor housing condition will have an effect on mental well being; the home provides more than shelter and the "meaning of home", for example as a haven of security, is an accepted psychological and social construct.

29. Much of the earlier research looked at the impact of relocation - to New Towns, to peripheral estates and to tower blocks - on mental health^{xxii}. As these types of mass movement have ceased attention has focused more on the impact of house condition on mental health. For example there is some evidence that the existence of dampness and mould is associated with mental illness. In 1988 Platt, Martin and Hunt^{xxiii} conducted a study of 823 women and children living in public housing estates in Edinburgh, Glasgow and London which used a double blind design of a health survey and a surveyors survey. They established a model linking mental health, defined as scoring 5 or more on the GHQ 30 point scale (and taken to indicate "caseness" i.e. the probability of being a psychiatric case exceeding 50%) to whether living with a partner, employment status, income and the presence of dampness and mould (which three quarters of the households recorded). Hopton and Hunt^{xxiv} explored this further in a survey on public sector housing estate on outskirts of Glasgow which found that a problem with dampness was significantly and independently associated with scoring more than 5 on the GHQ scale after controlling for possible confounding variables. Cold temperature and the house being an easy target for burglars were also significantly associated with score of 5+. Hunt's Liverpool study^{xxv} identified an increasing gradient of anxiety and depression with the number of housing problems.

Indirect Effects of Housing

30. One response to the "confounding factors" problem has been to consider the effects of housing on health more holistically. Ambrose^{xxvi} has listed indirect effects as including lowered resistance to physical and mental illness through living in a poor, stressful and uncongenial setting; unhealthy habits (possibly coping strategies); and reduced self-organisation.

31. A small body of work has considered housing in the context of its location. A 1985 study in the north east of England^{xxvii} analysed respiratory condition according to 5 independent variables; housing area - whether "good" or "bad"; dwelling type; smoking; working environment; and class. While the smoking variable emerged as the most powerful determinant of respiratory illness, when smoking, age and the other three variables were controlled for, people living in poor and particularly difficult to let housing areas still had more symptoms than those in good areas. Residents in the former were more likely to associate their chest condition with their housing circumstances. A comparison of residents in 2 deprived Belfast estates^{xxviii} found that the health of both adults and children was markedly worse in one than the other, and that even living in a good i.e. defect free house in the "bad" (systems built) estate was more risky to health than living in a defective house in the "better"(traditional) estate. The authors concluded that self assessed health could be explained more in terms of housing form and location than dwelling type and defects, something which other studies have tended to neglect.

32. Other research has looked at the effect of neighbourhood alone on health. Apart from a wider body of work on geographical patterns in morbidity and mortality, Ellaway and MacIntyre^{xxix}, for example, have argued that in addition to the direct effects of housing and neighbourhood conditions on health, there are indirect effects caused by lack of opportunities to access education, jobs, services etc. Her research in Glasgow has compared 4 socially contrasting neighbourhoods and found that health related behaviours (smoking, drinking, diet, exercise etc.) were independently associated with neighbourhood among adults after controlling for gender, age, social class and income. She has concluded that housing disadvantage, personal disadvantage and neighbourhood disadvantage are inextricably linked in ways which influence health.

Linking Housing Improvements to Health

33. Hunt, in a study of 3 priority housing action areas in Liverpool^{xxx}, explored the effects of housing improvement on health. The study compared health in "capitalised" i.e. extensively renovated and repaired, moderately improved and unimproved housing. The health survey collected reported symptoms in the previous 2 weeks and used the General Health Questionnaire for assessing mental health, with a separate survey of housing conditions i.e. a double blind design. In terms of the association between housing quality and long term health problems, statistically significant effects were limited to the 45-64 age group where differences were found for heart problems, high blood pressure and allergy between unimproved and partially improved on the one hand and capitalised improved on the other. (This age group contained an atypically large number of permanently sick, unemployed men). The relationship with children's health was much stronger, with diarrhoea, wheezing and persistent cough being significantly worse in unimproved housing. This research was carried out in an area with a history of housing problems, with high levels of poverty and poor health among adults, though the children's health was generally good.

34. As noted earlier, there have been few longitudinal, as opposed to retrospective, studies exploring the effects of housing “interventions” on health although growing interest in the wider benefits of housing investment has stimulated a number of new projects. A longitudinal study by Hopton and Hunt in 1996^{xxx1} assessed health before and after elimination of dampness/mould in Glasgow. The Electricity Board and the local authority joined forces to install a “Heat With Rent” scheme in dwellings on selected local authority estates, which provided controlled heating system in all rooms. The study used the same interview schedule as earlier Scottish studies (Hunt, Martin and Platt) with 3 interviews - before installation, and 6 months and a year later - in order to compare heat with rent with no heat with rent. The research actually showed a general deterioration in children’s symptomatic health over the year; some symptoms increased, others declined. The researchers suggested that benefits from the improved heating system might have been offset by other influences, especially disadvantage.

35. A new study of the effects of intervention, “The Glasgow Warm Homes Study”, is currently underway. This has sampled local authority rented houses and their occupants in 4 action and 4 control sites before (in 1995/96) and after (in 1997/98) the installation of full central heating and insulation. The study has a triple blind design with separate collection of socio-economic data through interview; physical surveys; and the collection of laboratory samples of fungi, mites etc. First results will be available at the end of 1998.

36. An evaluation of a £300,000 programme of housing improvement grants for children with asthma, funded by local health authorities in Cornwall, is also underway. The initiative involved the installation of central heating in houses which formerly had coal fires, often heating only one room. Interim (unpublished) results produced in 1997 showed significant reductions in children’s respiratory scores and days lost from school due to asthma.

Conclusions

37. The main conclusion of this review is that evidence that certain housing attributes have a direct effect on health is still limited. Evidence on the health effects of radon and of lead water pipes has been accepted and acted on through legislation. Statistical analyses of the relationship between cold and mortality rates show a strong association with excess deaths in winter, though causal links have not been demonstrated. The recent focus of attention has been on the role of cold, dampness and mould in housing. There appears to be enough evidence, from different studies, to suggest that this is linked with illness in children particularly respiratory symptoms. This link has been accepted to the extent that courts have awarded compensation for asthma aggravated by mould and damp^{xxxii}. Similarly some links with a range of adult symptoms have been identified, but with no consistent pattern between studies. Most studies have, understandably, been conducted in areas where both housing quality and health have been very poor.

38. There has been some debate in academic circles about why research has failed to prove a causal relationship between poor housing and ill health, concentrating particularly on methodological issues including the dichotomy between the subjective and objective and the role of confounding factors. There is a view that relating social causes of illness to physical symptoms is doomed to failure; social science and biology are simply too different. This suggests that it may be more productive to accept that associations exist, that housing has a

role to play in both physical and mental health, and that some types of house condition are more perilous than others.

ANNEX ON HOMELESSNESS AND ILL HEALTH

As with the relationship between poor housing and health, there are particular methodological problems in establishing causal links between homelessness and ill health. Samples representative of all the homeless, or the whole of a sub group, should be used to measure the prevalence of different diseases whereas most studies have in fact been limited to small groups; most studies have relied on retrospective examination of GP notes, few have used standardised examinations; most studies have examined mortality or morbidity, seldom both; identifying a suitable group for comparison with the homeless is difficult.

However, an authoritative review of the evidence about homelessness and ill health was made by a working party of the Royal College of Physicians (London) in 1994. This review was comprehensive, drew on foreign as well as British evidence, and assessed the relative reliability of different research studies. The review was limited to 2 groups of the homeless: first, statutorily accepted homeless individuals and households placed in temporary accommodation (including B & B) by local authorities; second, those sleeping rough or in night shelters or in direct-access hostels or self or agency referrals to B & B. The review did not cover other groups who are sometimes considered homeless (eg couples living with parents).

From the evidence the report concluded that the first group experience more mental, physical and obstetric health problems than comparable housed groups.

- those in B & B accommodation (who live, wash, eat and sleep in one room) have difficulty in maintaining good hygiene.
- partly because of difficulty in getting access to primary care, they make high but inappropriate use of hospital casualty departments.
- kitchen facilities in B & Bs are often poor; they make a lot of use of cafes and take away and their diet is generally poor;
- children born to mothers who have been in B & B for some time are more likely to be of low birth weight and to miss out on immunisations. Thereafter, they have a high rate of infection, particularly gastro-enteritis, skin disorders, and chest infections, and a high rate of accidents. Because they lack space to play their development is impaired, and frequent changes of school disrupt their education and their friendships with school friends.
- parents in B & B suffer stress from loneliness, boredom, loss of self-esteem, and relationship problems.

(It should be borne in mind that, in Scotland, the use of B & B accommodation for the homeless is not common).

The report finds that the second group (rough sleepers, hostel dwellers, etc) have a higher risk of death and disease than comparable housed people.

- the excess deaths are due to suicide, accidents and alcohol related and respiratory diseases.
- they are prone to a wide spectrum of physical illnesses, particularly bronchitis, foot problems, trauma, infestations, epilepsy, and tuberculosis (which presents a particular problem because it is difficult to ensure that treatment is complied with and drug-resistant strains may spread into the general population).
- they have high rates of alcohol and drug misuse;
- they are more likely than the general population to have a serious mental illness.

Having concluded that there is a strong relationship between homelessness and health, the report considers the question of causation. It describes, but does not quantify the relative importance of, three causal links.

1. **Poor health causes homelessness.** Those in poor health are less likely to get housing which meets their needs; they are more likely to be unemployed and this increases the risk of homelessness.
2. **Poor health is caused by homelessness.** Rough sleepers have inadequate shelter which exposes them to inclement weather and increases the risk of accidents; their lack of security increases the risk of violent attack and rape.

Those in communal dwellings have increased exposure to infectious diseases.

For both groups, poor sanitation leads to poor personal hygiene; poor diet causes reduced immunity to diseases; and becoming homeless can cause depression.

3. **Poor health is exacerbated by homelessness.** Many homeless people leave hospital with inadequate post-discharge arrangements. They have difficulty in obtaining health care; they may be at some distance from their own primary care services, and the roofless may have difficulty registering with a GP.

Alcohol and drug abuse and prostitution, each associated with homelessness, are liable to exacerbate physical disorders.

Inebriation, adverse environment, frequent changes of address, and difficulties in keeping appointments make compliance with treatment less likely.

¹ For example, Burrige R and Ormandy D ed (1993) "Unhealthy Housing. Research, Remedies and Reform"; Lowry S (1991) "Housing and Health" BMJ; Scottish Homes (1994) "Health and Housing" Working Paper; Scottish Office InterDepartmental Working Group (1992) "Housing and Health" (unpublished Note); Smith S (1989) "Housing and Health; A Review and Research Agenda" University of Glasgow Centre for Housing Research

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