

Temperature and humidity

Stella Lowry

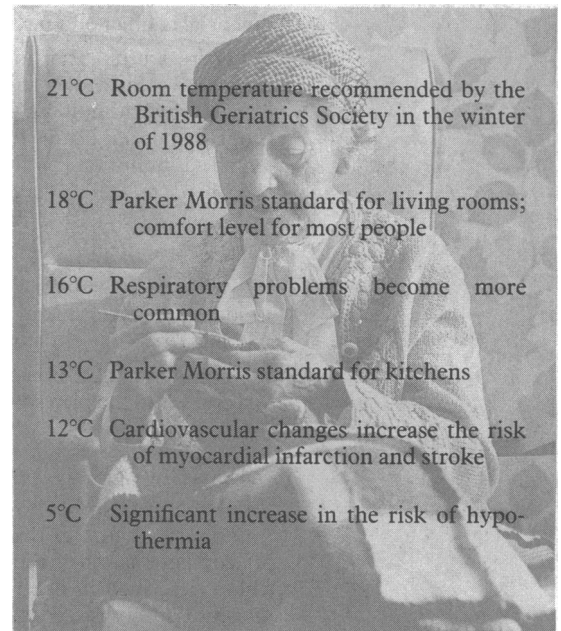
Most people believe that living in a cold damp house is bad for their health. The dangers of hypothermia in elderly people are well known, but how much are other people affected by temperature? How serious are the risks and how can we reduce them? (For practical purposes we do not need to consider excessive heat in reviewing housing and health in Britain, although very low humidity can cause irritation of mucous membranes and may predispose to respiratory tract infections.)

The idea that cold conditions are bad for health gets some support from the finding of an excess mortality in winter in Britain. Excess winter mortality is the difference between the number of deaths in the four winter months and the average of the numbers in the preceding autumn and following spring. A recent analysis shows that for each degree Celsius by which the winter is colder than average there are about 8000 excess deaths.¹ The figure shows second variations in mortality.

About 40 000 more people die in Britain in the winter than in the summer, and most of them are elderly. Very few of these excess deaths, however, are due to hypothermia—most are from respiratory and cardiovascular diseases. A recent report to the Building Research Establishment concluded that defining a safe limit for house temperatures was impossible, but the risks as temperature falls can be summarised (box).²

Affordable warmth

The Parker Morris standard has been used to set minimum temperatures for dwellings,³ but since 1980 there has been no definition of what constitutes an acceptable indoor temperature. Even less attention has been given to how much people should be expected to spend on heating. Many families in Britain live in "fuel poverty," which occurs when people cannot afford to heat their homes adequately. It does not necessarily equate with absolute poverty, but the two often occur together.

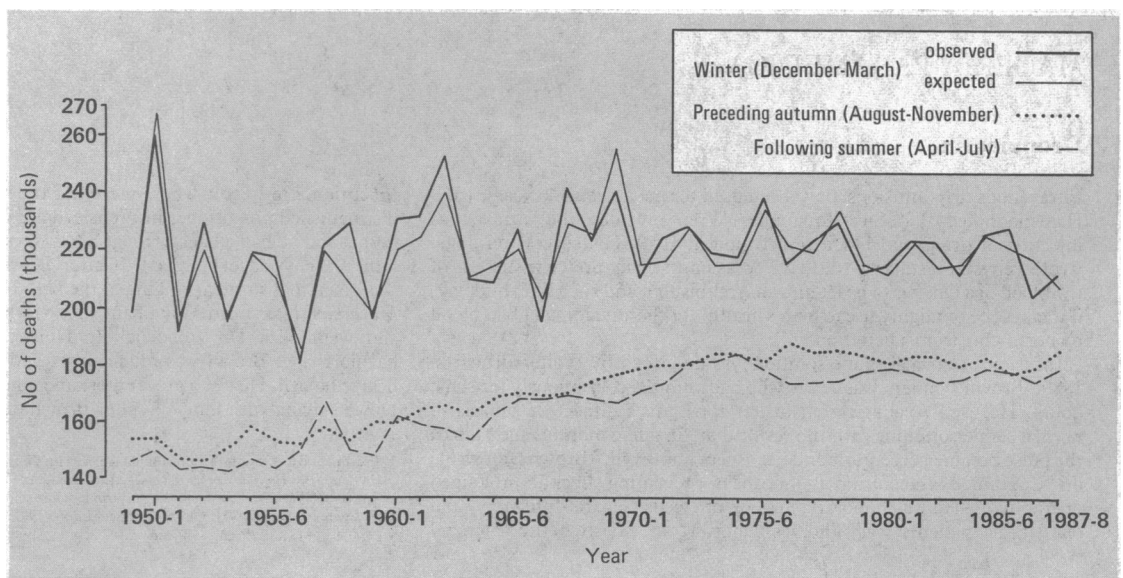


Unemployed, chronically sick, and elderly people are among the poorest in Britain. These groups spend most of each day at home, and have to heat their houses for longer than other people. The most effective and efficient way of heating a house is by central heating, but the people who can least afford to waste money on inefficient systems are also those least likely to have centrally heated homes. Attempts to economise by heating only part of the house cause temperature differentials that encourage condensation and mould growth. This may be compounded by water production from the heating source—paraffin heaters are notorious for this. About 7% of homes in Britain are damp,⁴ and damp houses are usually cold.

Fuel poverty exists because the people with least to spend on heating are often housed in the homes that are hardest to heat. Many low cost houses are prone to cold

British Medical Journal,
London WC1H 9JR
Stella Lowry, MB, assistant
editor

Br Med J 1989;299:1326-8



Seasonal mortality 1949-88.
(Reproduced from *Population Trends* 1988;54:18 (crown copyright))

and damp. Through beams in slab block constructions act as cold bridges and reduce the insulation of external walls; ill fitting doors and windows cause excessive ventilation; precast concrete slabs have a high thermal mass and are difficult to heat—a room will only feel warm when the air in it and its fabric have warmed.⁵

The poor spend twice as much (as a percentage of their total income) as the rest of the population on heating (table). Boardman has suggested that fuel costs

Weekly expenditure on fuel per household in Britain in 1985

	30% Of poorest households	Remaining 70% of households	Average
Actual amount spent (£)	8.06	10.76	9.95
Percentage of total income	11.0	5.4	6.1

Based on Boardman*

should not exceed 10% of the total household income.⁶ Residents are often blamed for their damp living conditions. Washing and drying clothes increases the moisture content of a house by about 5.5 kg per day and moisture emission rises with the number of people in a dwelling,⁷ but occupants can usually do little to reduce these factors. Sometimes the solutions offered are offensive as well as unhelpful such as the following advice given to a Glasgow resident who complained that her flat was damp.

... Keep your windows open when you make love. Heavy breathing causes condensation, you know.

Cold, damp homes and health

The dangers of very low indoor temperatures are well established, but it is harder to prove that at less extreme temperatures cold, damp houses affect health. Several studies have found an association between damp housing and respiratory disease, particularly wheeze, in children,^{8,9} and there is an association between asthma and sensitivity to allergens from moulds.¹⁰ But not all studies have found simple relations between damp housing and poor health.

In 1986 Strachan and Elton found an association between parents' reports of damp and mould in the home and respiratory problems in their children,¹¹ but there was a poor correlation between reported wheezing and recorded consultations with the general practitioner for respiratory problems. The researchers concluded that reporting bias might be operating. Parents of children with wheeze may be more likely to notice poor conditions at home, or people in poor houses may be more likely to report illness in their children.

In later studies Strachan found a significant association between reports of visible mould in the home and reported wheeze but no association between reports of mould and objective measurements of bronchial reactivity.^{12,13} He interpreted this as further support for the suggestion of reporting bias.

Self reported illness

A recent attempt to overcome the problem of reporting bias has been made by Martin and others in two studies in which environmental health officers surveyed houses for damp and mould independently of the assessment of the occupants' health.^{14,15} Damp conditions were significantly associated with reports of

respiratory illness in children, and there was also an association with vomiting and aches and pains. The housing conditions did not correlate with reports of adult ill health. These studies contained objective assessments of the housing conditions and controlled for social class, smoking, overcrowding, family income, and numbers of children in the home; but they still relied on self reporting of illness.

Strachan believes that self reporting is acceptable if the subject is unlikely to spot the hypothesis under test, but he believes that "It is difficult to mask an interest in the link between damp housing and respiratory illness." Martin believes that self reported illness is important. "People do not necessarily consult their doctor when they are ill. Health is much more than freedom from the need to consult a doctor." Certainly the World Health Organisation would agree with that.¹⁶

Conclusions

Living in cold, damp houses affects people's health. This is true within a strictly medical model, but the problems are even more serious if we look at a wider definition of health, akin to the WHO concept of emotional and physical well being. At extremely low temperatures cardiovascular problems occur and the risk of hypothermia rises. Less severe cold conditions encourage condensation, and parents report more respiratory problems in their children if they live in damp houses. This probably reflects some increased morbidity in the children, and certainly an increased amount of stress in the parents. The psychological consequences of having to scrape mould off the walls of your home every day are obvious.

Comment

Ray Ranson, the WHO's housing hygiene consultant, believes that it is often easier to get funding for

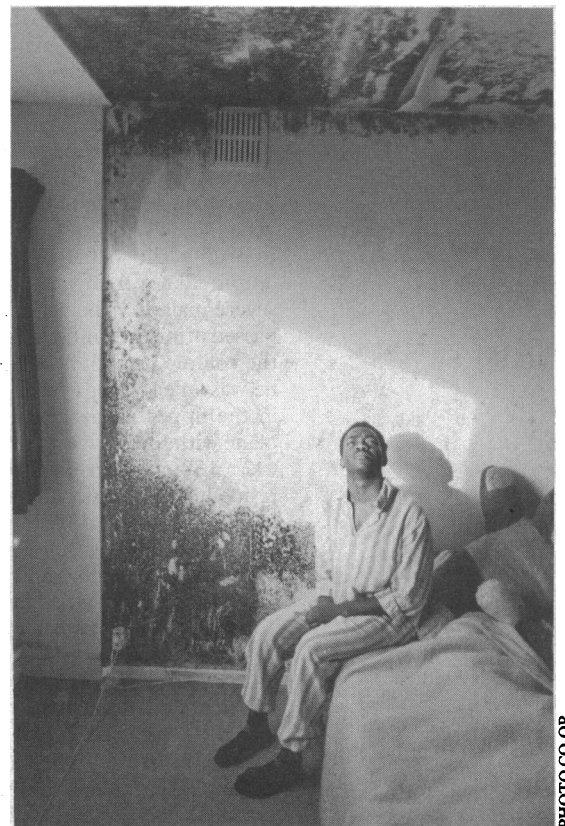


PHOTO CO-OP

Having to scrape mould off the walls of your home every day is deleterious to psychological well being

housing projects on grounds other than health. This should certainly be possible for cold, damp homes, which deteriorate rapidly through corrosion, timber decay, and electrical problems and are expensive to maintain.

The problem of cold damp houses should be tackled because of its effects on health and its economic effects on the housing stock. Standards should be set so that an acceptable safe indoor temperature, say 20°C, can be achieved at no more than 10% of the household income. Any excess needed should be provided in social payments.

Although most houses can be made warm and dry if enough is spent on heating, this is not the most economical solution. Where possible, structural defects that promote cold and condensation should be repaired so that properties can be brought up to the standard. Measures such as fungicidal washes and paints should be used only for temporary relief.¹⁷ Public sector houses should be improved with specially allocated funds, and grants should be available to encourage private owners to upgrade their properties. No family should be condemned to live in fuel poverty.

1 Curwen M, Devis T. Winter mortality, temperature and influenza: has the relationship changed in recent years? *Population Trends* 1988;54:17-20.

- 2 Mant DC, Gray JAM. *Building regulation and health*. Garston: Department of the Environment Building Research Establishment, 1986.
- 3 Parker M. *Homes for today and tomorrow*. London: HMSO, 1961. (Ministry of Housing and Local Government.)
- 4 Department of the Environment. *English house condition survey 1986*. London: HMSO, 1988.
- 5 Markus TA. *Cold, condensation, climate and poverty in Glasgow*. Warwick: Legal Research Institute, University of Warwick, 1987. (Unhealthy housing: prevention and remedies.)
- 6 Boardman B. *Defining affordable warmth*. Warwick: Legal Research Institute, University of Warwick, 1987. (Unhealthy housing: prevention and remedies.)
- 7 Institution of Environmental Health Officers. *Background notes on condensation*. London: IEHO, 1983.
- 8 Burr ML, St Leger AS, Yarnell JWG. Wheezing, dampness, and coal fires. *Community Med* 1981;3:205-9.
- 9 Burr ML, Miskelly FG, Butland BK, Merrett TG, Vaughan-Williams E. Environmental factors and symptoms in infants at high risk of allergy. *J Epidemiol Community Health* 1989;43:125-32.
- 10 Burr ML, Mullins J, Merrett TG, Stott NCH. Indoor moulds and asthma. *J R Soc Health* 1988;108:99-101.
- 11 Strachan DP, Elton RA. Relationship between respiratory morbidity in children and the home environment. *Family Practice* 1986;3:137-42.
- 12 Strachan DP. Damp housing and childhood asthma; validation of reporting of symptoms. *Br Med J* 1988;297:1223-6.
- 13 Strachan DP, Sanders CH. Damp housing and childhood asthma; respiratory effects of indoor air temperature and relative humidity. *J Epidemiol Community Health* 1989;43:7-14.
- 14 Martin CJ, Platt SD, Hunt SM. Housing conditions and ill health. *Br Med J* 1987;294:1125-7.
- 15 Platt SD, Martin CJ, Hunt SM, Lewis CW. Damp housing, mould growth, and symptomatic health state. *Br Med J* 1989;298:1673-8.
- 16 World Health Organisation. *Alma-Ata 1978; primary health care*. Geneva: WHO, 1978. (Health for all series. No 1.)
- 17 Bravery AF, Grant C, Sanders CH. *Controlling mould growth in housing*. Warwick: Legal Research Institute, University of Warwick, 1987. (Unhealthy housing: prevention and remedies.)

Letter from Brasilia

Growing problem of malaria

Philip D Marsden

At 2 30 am the telephone rang; it was a resident at a hospital in a satellite town of Brasilia worried about a case of malaria. Such calls have always been a feature of my life. Not just in endemic areas such as equatorial Africa, New Guinea, and Brazil but also in the big cities: London, New York, Sydney, etc. For today malaria travels fast, and it is a real emergency so I always get up and go. First, however, I wanted information. The resident thought he had seen malarial rings in a thin film stained with giemsa. I asked him to make a thick film and have the microscope focused on what he saw when I arrived. Then vital questions regarding the patient's mental state and his urine output. The brain and kidney are target organs in severe malaria. The patient was confused, but he had passed urine that unfortunately had not been saved and the volume had not been measured. His wife said that he was an engineer working on a hydroelectric project in the upper Amazon and had been taken ill on the plane with fever, rigors, and sweating.

At 3 30 am I was in front of the microscope. The resident was right for there was a fine blue ring with a purple nucleus in the centre of the erythrocyte. I saw few parasites in the thin film, but the thick film (a 20+ blood concentration) showed a profusion of fine rings and cytoplasmic streaks with one or two nuclei. No schizonts, no gametocytes; diagnosis *Plasmodium falciparum*, the most dangerous of the four parasites causing human malarial and the commonest here in Brasilia. I rated the density in the thick film as 15/1—that is, 15 parasites in one oil immersion field. To the resident's sorrow, for he was tired, I turned again to the thin film to look along the margin of the smear. Heavily parasitised erythrocytes such as schizonts and gametocytes get pushed to the edge of the smear with white cells, and I just wanted to check that there wasn't a

double infection with *P vivax* or *P malariae*. There wasn't.

Then we went to see the patient, who was restlessly tossing in bed with a hot, sweaty skin and staring unfocused eyes. He did not seem to be clinically anaemic, but jaundice could not be assessed in the artificial light. It was impossible to palpate his spleen for he could not cooperate. The bed sheet was wet with urine, which seemed to be normal in colour, a good sign. He had been in the ward for five hours and had not vomited so we gave him six tablets of mefloquine ground up through a gastric tube. I left the usual instructions about investigations in the morning, warned that blood parasites might disappear only on the second day, and got to bed at dawn. I was not contacted again.

Malariology like leprology is sufficiently complicated to be a discipline in its own right, and in a brief communication such as this I can touch on only some of the points relevant to Brasilia. There is a great movement of people in and out of the city, mainly by air from the Amazon regions. In Brazil 95% of malaria is contracted in the states of this region: Para, Amazonas, Roraima, Rondonia, Acre, Mato Grosso, Maranhao, etc. Often companies do not advise their employees of the risk of malaria or arrange chemoprophylaxis. But then this is a global problem. I think of a French baby of 18 months who died in the Gambia or an air hostess who slept in Lagos, Nigeria, for four hours and died in London two weeks later. Tourist companies are the worst culprits because it is bad for business if you make much of malaria in Malawi, yellow fever in Youndi, or kala-azar in Cannes. Much stronger international legislation is needed, and I hope that the European Community will take a lead on this matter. Outside the army things are equally bad in the United States.

Núcleo de Medicina
Tropical,
Universidade de Brasilia
CP 153121, 70.010 Brasilia
DF, Brazil
Philip D Marsden, MD,
professor

Br Med J 1989;299:1328-9