

Airs, waters and places 3—the enclosed environment

A meeting was arranged by the Research Committee at the Royal College of General Practitioners on 20 September, 1973

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Opening the symposium, Dr G. I. Watson, *O.B.E.*, Deputy President, referred to the success of the two previous meetings held under the same general title. They formed a continuing dialogue about man in his environment in which it had been proved that the family doctor could make a unique contribution.

Airs

Mr G. Spurr

Mr G. Spurr, of the Central Electricity Generating Board, felt it appropriate in dealing with the theme *Man the Intruder* that he should be the first speaker. In travelling round the country one saw many tall chimneys belonging to the Generating Board and one's first reaction might well be that here was a case of 'nature polluted.' Without question the Board was a major emitter but it was not necessarily a major polluter.

Dealing with the manifold problems of dispersion he concentrated on three basic points. Firstly what do we mean by clean or polluted air? The atmosphere always contains trace constituents, some of these are man-made and may therefore be considered pollutants. However, more than half the sulphur dioxide in the atmosphere is of natural origin. Air purity is one of degree—not of kind. The most important factor is the concentration of a particular substance. Engineers must look to the medical profession to determine what is meant by harmful concentrations.

Secondly, he pointed out that we are mostly concerned with a layer of air a few feet from the ground, whether in open country, city streets, or our own homes. Success of control measures can only be judged by how much they improve the quality of the air we breathe. Before the Clean Air Act (1956) domestic coal smoke was the most serious problem, particularly as the discharge from low-level sources such as houses was trapped near ground level, not being able to get away into the atmosphere. In 1956 also, control of emission from large industrial plants was transferred to the Alkali and Clean Air Inspectorate. The benefits of this measure have been spectacular as shown by the absence of smog from London for the last ten years and an increase of 70 per cent of winter sunshine in urban areas. It is no longer possible to correlate respiratory illness with atmospheric smoke pollution. This reduction is associated with 30 to 40 per cent reduction of SO₂ pollution in urban areas, despite a rise in total SO₂ emission. The drop coincided with reductions in low-level emission and had occurred despite increasing high-level emission—mostly power stations. This had all been achieved at a cost as low as £1 per person per year.

In large power stations the normal practice is now to erect chimneys at least 195 metres (650 feet) high. The discharge contains a large amount of heat which provides an effective chimney height of 600 metres (2,000 feet) or more. Consequently there is massive dilution before the discharge eventually reaches the ground. Largely thanks to the westerly winds, weather conditions are relatively favourable in this country, there being only about 60 days in the year when problems were liable to occur, in contrast to the United States of America and central Europe.

Finally, the 'best practical means approach' adopted in this country in preference to control by legal numerical standards had been clearly successful in achieving control without crippling cost—a progressive approach in which advantage can be taken of new developments in technology as they arise rather than by a 'mandate to pollute up to a certain level.'

Mr F. B. Hawes

Mr F. B. Hawes, also of the Central Electricity Generating Board, explained his special concern

for the effects of pollution on agriculture, both from amenity and economic points of view. In dispersing gases to the atmosphere in the 'open environment', the effects were greatly reduced, but it is important to remember that dispersal of gases into the atmosphere was entirely different from that into water or on land. In the former it was out of control, beyond the point of emission, and hence control must be achieved in the original design and operation of the point of discharge.

Plants take up anything in the atmosphere, having a good tolerance to most gases. Where excess occurs leaves are damaged and show necrosis. A peculiarity of plants is the relationship of degree of damage with rate of growth at the time of exposure. Fortunately in this country the peak of gaseous discharge occurs when the plants are dormant, the exception being the conifers.

In addition to obvious plant injury causing loss of economic value there is cryptic damage which is more difficult to define or establish. This might be shown, for instance, by reduced yield of seed from an apparently undamaged plant.

Discussion

Dr Ian Gregg (Richmond) then opened the discussion with a comprehensive review of the effects of various forms of pollution on the respiratory tract of man and emphasised the importance of remembering the importance of the host factors.

In reply to a question by Dr Blakeney-Edwards (Cheddar) about the extent of monitoring of the effluent from their stacks by the Central Electricity Generating Board, Mr Spurr said there were two types: firstly long-term detailed surveys at two large stations where SO₂ records were recorded continuously in the neighbourhood, secondly pH was monitored before and after the construction of other stations.

Dr B. E. Davies (University of Aberystwyth) wondered whether high altitude discharge might simply be exporting the problem? Mr Hawes agreed that this was a reasonable assumption, but SO₂ had a short life. It was converted to unknown substances in the atmosphere, mainly ammonia derived compounds and he did not believe that it returned to earth as unchanged SO₂. In answer to a question on fuel policy, Mr Spurr thought that nuclear fuel would be predominant by the end of the century.

Waters

Dr P. Spaander

Illustrating the water problems of the Netherlands, Dr P. Spaander, Director, Department of Environmental Hygiene of the Netherlands National Institute of Public Health, said that current requirements in his country were 220,000,000 gallons per year. This would increase fourfold by the year 2000 A.D. At present 60 per cent was obtained from ground water and 40 per cent surface water, but by 2000 A.D. these would be reversed. This indicated the importance of surface water in the Netherlands. As to chemical contents, iron and manganese in ground water were easily removed the problem, however, was the hardness.

The Rhine brought enough water for all needs but quality was not always very good. For the other main river, the Maas, from Belgium, the opposite situation was true.

In the area of greatest population density the ground water is saline. A plan had been proposed to collect fresh water and store it in the sand dune system where sea water had previously been, and also in fresh-water lakes. One serious problem in the Rhine was the chloride level which is increasing. This is derived from effluent from potassium mines near the origins of the river in Germany, France and Luxembourg and the problem became worse when flow was reduced.

An international commission first set up 30 years ago for the protection of the Rhine against pollution was at first powerless but is now gaining strength to compel certain measures against pollution.

Even when this and other problems like the presence of phenols have been improved there will be problems of organic materials. Little attention has been paid to this in the past but this is now receiving increasing attention, as also is the presence of heavy metals like mercury and the pesticides. A further problem is radio-nucleides which are however absorbed on particulate matter and therefore removed by filtering.

Despite the fact that hepatitis has been shown to be spread by drinking water in other countries, there is no epidemiological cause for alarm in the Netherlands. Dr Watson wondered

if perhaps in medicine a measure of progress of any community might be the purity of its water supply?

Discussion

Dr Blakeney-Edwards (Cheddar) welcomed the changing locale of research in scientific medicine from the laboratory to the field, and also welcomed the greater public interest in the problems of conservation and the environment. No opportunity should be missed to cultivate this interest.

The Deputy President reminded the audience that one of the College's greatest contributions to medical research had been the creation of a mechanism for recording in standard fashion day-to-day clinical data. Dr Pinsent and his colleagues had given us the means of looking at morbidity as opposed to mortality. He announced that recently a benefactress, Mrs Beckwith-Smith, had given a very large donation to the College to take this work into another orbit of activity, so that morbidity may be corrected with the micro-environment and other factors.

Remarking on the apparent correlation between water hardness and coronary artery disease, observed by some workers in the United Kingdom, Professor M. Howe, University of Strathclyde, said he had undertaken a detailed study of coronary artery disease in the 37 wards of the city of Glasgow and that he had found that the variation of coronary artery disease experience within the city was greater than the rest of the United Kingdom—although all get the same soft water supply. Dr A. C. Martin, Department of Health and Social Security, commenting that "epidemiology is a crude tool" noted that the USA, Canada and Sweden had recorded this correlation, while other countries had not noticed it. An investigation in London showed no positive result. It was not known what factor it was in the water which was important. As far as softening was concerned, policy now was to discourage introduction of water softening equipment unless hardness was so bad as to be 'impossible'. Where water softeners were in use, the drinking water should be taken off from the mains direct.

Dr B. E. Peacock (Birmingham) asked about the economics of a dual water supply. Dr Spaander thought this was too costly. This led to a discussion on the future possibility of returning to the distribution of bottled drinking water.

Dr B. Davies attacked the assumption that what comes out of the tap is what counts. He felt that the way the water was subsequently used, for example in making tea, or cooking, might be more important than the original content of the water. Professor Bryce-Smith pointed out that small amounts of phosphates are added to public water supplies in some parts of the country. Dr Spaander replied that this was not done in the Netherlands, although it did happen accidentally by contamination from waste from washing machines. Purification plants needed to be evolved to eliminate phosphates. This was particularly a problem in many lakes.

Dr R. Drew felt that the political and social implications of obtaining pure water supplies should not be overshadowed by the more technical considerations. Dr Spaander agreed and mentioned the problems of salt being deposited from potassium mines in the upper Rhine, despite the offer by the Dutch to help pay for its more appropriate disposal.

Places—the space dimension

Dr D. U. Hawkes

Dr D. U. Hawkes, Department of Land Use and Built Forms, Cambridge, described the enormous amount of research currently going on to determine human needs which designers tried to build into the 'created' environment. In the housing field the major problems since the war have been to provide homes of good standard at densities high enough to maximise use of expensive land. The form most commonly adopted in recent years has been the high-rise flat. Having ceased to be regarded as a satisfactory solution, more recently there has been a move towards exploration of other forms of high density dwelling—now with the aim of getting as many families as possible on or near to the ground. A recent study suggested that advantages of this form of development were not as great as would be theoretically expected and much more research was necessary before a definite correlation could be demonstrated between such things as nervous illness and type of dwelling.

Further explorations of the ways of use of space between dwellings also needed further study; for instance rows of three storey semidetached houses with short back gardens grouped round public open spaces can provide housing densities of 200 per acre with an environment which has many of the qualities of a low rise scheme.

In the working environment, there is increasing emphasis on artificial control. The traditional aim has been to keep at bay the worst elements, allowing in beneficial ones (such as sunlight and fresh air) any deficiency being made up artificially by heating and lighting, but the external environment is characterised by its intrinsic variability. In traditional-type building much of the responsibility for the maintenance of an acceptable working environment rests on the occupants using blinds when the sun shines, or switching on the light when it was too dark. There had been a recent rejection of this view of environmental design principally because of developments in building technology; for instance the all-glass wall with its high solar heat gain. The artificial environment which can be achieved nowadays can be characterised by its uniformity of temperature, illumination and humidity. The building envelope is regarded as a hermetic enclosure which keeps at bay everything and then gives maximum efficiency to the system.

Also relevant is the advent of the deep-plan office building. Enthusiasts for this idea would argue that the well-being of the occupants is well catered for, but for overall desirability of the windowless environment did produce many questions for which there are at present few answers.

Miller at the Tavistock Institute has suggested that the physiology and psychology of man needs constantly varying external stimuli. It had been pointed out by climatologists that there is a correlation between establishment and maintenance of the world's principal civilisations and climates with perceptible, but not excessive, seasonal rhythms.

Places—the time dimension

Dr P. B. Dickens

Dr P. B. Dickens, University of Sussex, described work carried out at Cambridge. We should be giving more attention to the effects that different physical and social factors have on behaviour and the medical profession should be more involved in this. We have concern for purely physical aspects of urban life but little understanding of relationships between these and social life. It was increasingly clear that innovations which were intended to do good for the community sometimes widen the gulf between poor and rich, i.e. urban motorways.

There are a number of issues concerned with medical welfare which have hardly been recognised, let alone tackled. These include a wide range of human and 'nervous' problems, the results of the stress of urban living, competing demands for time, conflicts between externally imposed schedules on the human physiology, work hours, shop and opening hours, holidays. The adverse effects of tampering with physiological cycles were, however, now being recognised.

Although official planners do not take these considerations into much account, at a more popular level there is interest in the 'flex-time' innovation which allowed people to come and go to work when they like—some indication that people wish to escape from the more harrowing effects of city life. 'Flex-time' experiments have already been widely introduced in Germany; and in the USA there is the four-day working week. These kinds of experiments need cautious evaluation because of possible adverse effects on other groups of the population.

Describing computer-model experiments carried out in Cambridge, which attempted to generate patterns of activity that replicate patterns of city life through the day, Dr Dickens said it was possible to look at different kinds of policy in managing an urban area; for instance, you can change time and location of different activities and see the effects of alternative decisions on such factors as traffic flow.

This kind of research will continue but planning will require greater understanding of use of time by such groups as the present audience to help decide whether the alternative solutions being offered were sound from a health point of view. Finally, better understanding would help individuals to decide for themselves how they will use their own lives.

Dr R. Lefever complimented Drs Hawkes and Dickens on tempering the professional expertise of their papers with humanity.

Practices

Dr M. Goodman

Dr Mervyn Goodman, Liverpool, thought that technocracy too often overlooked the needs of the individual when providing what it considered were the requirements of the community. He described the slum clearance housing estate in which he has practised for 4½ years, consisting

of houses and mid-rise blocks of deck-access flats. Failure of development of supporting services has been a source of dissatisfaction. The appearance of mobile food shops, not subject to local authority by-laws, were a health hazard. During a six month period there had been an eight per cent incidence of diahoea compared with 2·3 per cent recorded by the College Research Unit nationally, with a significantly increased incidence of food poisoning.

Various forms of social isolation were common-place, including the 'captive' wife who sometimes developed the 'house-bound wife syndrome', of which he had four cases. The elderly were even more tragic, often being housed in mid-rise blocks but living below access level, having to descend 16 stairs to their 'cellars in the sky.' This was an illustration of how little thought had been given to the elderly by planners, housing architects and health officials alike.

Illness rates are higher in flat and maisonette dwellers than in those living in houses. This new estate built to redress the poor housing in the city centre had been designed with lack of thought for basic social amenities, creating a hard-core of dissatisfied residents.

Discussion

Commenting that there is the same kind of problem in Glasgow, Newcastle, Birmingham and other cities, Professor M. Howe wondered whether Netherley provided a microcosm of conditions of all British new housing estates or was it in fact unique? Putting things in broader perspective, Professor Howe said it cannot be emphasised too strongly that Britain has a remarkable variety of physical and other forms of environment. The Tees-Exe line is surprisingly meaningful dividing the 'Celtic fringe' from the lowland South East. The environmental contrast between these two zones is still important despite general levelling influences.

After a masterly review of many regional medico-geographical variables he indicated the vast differences existing between the many practices which have contributed data to the second morbidity study. These differences might provide pointers to causation of some diseases which at present await elucidation. As the medical profession becomes increasingly disenchanted with the high technology of medical engineering, the pendulum would swing back to a more detailed study of those factors in the environment, social and otherwise, which produce pathological conditions. The treatise *Airs, Waters and Places* is no less true now than when Hippocrates wrote it in the fourth century B.C.

SOME TRENDS IN FOOD CONSUMPTION IN GREAT BRITAIN 1955-1971

Most striking is a steady increase in the proportion of calories derived from fat, alongside a fall in that from carbohydrate and little change in that from protein. These figures are based on the National Food Survey (NFS) which is a continuous sampling enquiry into domestic food consumption and the expenditure of private households in Great Britain. Each housewife, who agrees to take part, records household food purchases and the food obtained without payment during the week of participation.

Energy and nutrients are assessed by means of tables of food composition; no allowance is made at this stage for wastage of edible foods.

REFERENCE

Marr, Jean W. (1973). *Health Trends*, 5, 37-39.

SMOKING AND HEALTH

. . . It is sickening to learn that after a reduction of 4·3 per cent in cigarette sales in 1971, that there was a sales increase of 6·5 per cent in 1972. This can only be regarded as a major defeat for the health of the British people.

REFERENCE

Godber, Sir George (1973). *Health Trends*, 5, 21.