Environmental Health Aspects of Human Settlements

Report on a Study

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REGIONAL OFFICE FOR EUROPE
World Health Organization
COPENHAGEN
1978

ICP/BSM 002

Note

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This report is also issued in French and Russian.

CONTENTS

1. INTRODUCTION

The global aspects of health problems of human settlements were the subject of papers submitted by WHO to "Habitat: the United Nations Conference on Human Settlements" held in Vancouver in May/June 1976. Just before that Conference the Technical Discussions held during the Twenty-ninth World Health Assembly had been concerned with the administrative and technical medical problems of the subject. It was apparent that many countries in Europe and elsewhere, under pressure of increasing populations, growing population movements and the application of modern scientific and industrial technology, were facing new and serious problems.

In the European Region a consultative meeting was held in December 1976, when priority items identified for further study were given in an annex to the report of the meeting (also annexed hereto). It is now necessary to consider these subjects with a view to formulating a more definitive plan for the European Region.

In previous work on human settlements, housing and planning, individual topics such as air pollution, water supplies, sewage or refuse disposal have often been dealt with in isolation, and many countries have no legal standards which will assist control. Other matters have been left in the hands of local government bodies and their trained architects, planners and technicians, and the efficiency of local control has varied from country to country and place to place. Advice from medical and public health bodies has rarely been asked for in determining the effectiveness of controls.

During the past two to three years it has become apparent that it is important to consider the environment and the interactions between its components as a whole. Thus, topography and climate, urban planning in relation to population density, nearby industrial developments, open spaces, recreational areas, economic development, social, educational and other factors and facilities cannot be divorced from a consideration of the physical structure and hygiene aspects of individual dwellings. Their interactions combine to determine the quality of life and the resulting health situation of society and the public health. Differing climatic and demographic factors in the various subregions and areas of Europe result in great differences in health, housing and planning requirements. Moreover, the position is essentially dynamic. Changes are taking place rapidly and in planning for the future an attempt must be made to forecast requirements and developments and to ensure that lessons learned from one area are given consideration in planning elsewhere.

2. SOCIAL ASPECTS OF HOUSING AND ENVIRONMENTAL HEALTH

Health and social wellbeing are closely linked and depend greatly on the immediate physical and social environment, i.e., the dwelling and the family. As a gross estimate, man spends about three-quarters of his life within dwellings and in the immediate neighbourhood of dwellings. The quality of life at certain periods is, however, of crucial importance. The first years of life, especially, have to be taken into account, for this is a time when human body growth, brain functions and character are rapidly developing and are much more subject to environmental influences than at any later age. While at this time of life the social environment of the mother and family are of paramount importance, the dwelling and its neighbourhood form the most important element of the physical surroundings, since they influence the health and behaviour of all members of the family and thus directly and indirectly influence the physical, psychological and social development of the child as well.

At no later phase of life is the developing human ever again so flexible and vulnerable, so full of positive and negative potential; no later period is so decisive for a happy and fulfilled life or a lifetime of unhappiness as are the first few years of life. To some degree this is true for the whole of childhood when, despite the increasing importance of educational institutions, a major influence on child development rests with the family. Childhood should therefore receive first priority in all considerations concerning the health and social aspects of housing and the immediate environment.

Another high priority should be allocated to mothers with young children, since they are the most influential social factor in child development and, in the home, are a risk group in themselves. As children and mothers also form the most vulnerable groups in large families with low per capita incomes, such families have to be given serious consideration.

Another priority will be the elderly and the handicapped, who, because of reduced physical capacity and/or mental agility, have become high-risk groups. Under certain housing conditions and social circumstances, such as those accompanying low income and home-moving, they will be especially prone to accidents, social isolation and neglect.

Social aspects of housing have been discussed at the United Nations General Assembly on various occasions since 1957. These discussions have already covered a wide range of topics, including the following:

- the need to redistribute housing resources and provide housing for the lower-income and weaker sections of the population;
- the need for housing standards flexible enough to satisfy the requirements of different sizes and types of families;

- the need for standards for community facilities and services;
- the need to promote community participation in the planning and implementation of housing programmes (*1*).

In times of dwindling resources and new economic restraints we should feel more obliged to concentrate on the more essential human needs, and to make it more difficult to waste scarce resources for superfluous prestige purposes. In various respects greater modesty and realism in the identification and accomplishment of essential needs and a more reasonable use of resources would lead to better results without any higher costs. Such modesty would involve not only the use of modern technological expertise, but also draw on the large amount of experience and know-how of our ancestors, which represents our cultural heritage in literature, documents and ideas, in some traditional habits and customs, in buildings and town design, etc.

In drawing up political guidelines for the long-term and balanced development of society in all fields, including property, land distribution and housing, it is most important to take into consideration the role of the family, and the social changes which have led to new types of hardship, especially for many young and large families. Without a knowledge of this social background, fundamental problems of the present-day housing situation in European countries and elsewhere cannot be understood. With the transition from a traditional and predominantly rural society to one that is industrialized and predominantly urban, the family and family household ceased to be the social and economic microcosm in society. Until that happened the European family was often a self-sufficient unit of production and consumption, providing human and capital investment, and modest social security for all family members in need of support, especially for small children, the sick, the handicapped, and the elderly. Family members of every generation, married and unmarried, kinsmen and possibly servants, legitimate and illegitimate children, frequently lived together in a large household, be this a farm or a workshop with some garden and land.

All family members, including children who, at an early age, gradually became more useful members of the family labour force, contributed to the family welfare according to their capacities, and usually received subsistence according to their needs. Though the hardships of life were obvious (including the patriarchal powers of the head of the family, the rigorous marriage prohibitions for all but the heir to an estate, and other restrictions on personal independence), they were shared hardships. Social status and the economic situation of the individual were based mainly on the economic strength and the means of existence of the whole family. In principle, the family household was by design a socially, economically and ecologically rather well-balanced permanent system.

The situation that has grown up since the early years of industrialization and has existed until the present day, and that led to the small two-generation

family of parents and children as well as to many small households without any children, has resulted in the family losing some of its major functions. Foremost of these is the production of goods and the provision of social security for the sick, the disabled and the elderly. Because of increasing educational requirements the years of dependency of children have also increased, as have family living expenses. Thus in economic terms, children are no longer an advantage to their parents, but merely a cost factor. They will neither increase the productive capacity of the family nor be a long-term investment for the benefit of their parents when the latter reach old age. Instead, the family will pay most of the direct and indirect expenses of having children; income derived from the working capacity of either or both parents will be devoted to the care of the children instead of providing additional funds. It is society as a whole which will benefit from the yield on this human investment in the form of economic productivity when the child starts work, and in the form of capital interest arising out of taxation and social insurance contributions. Moreover, those adult members of society who through fate or deliberately remain without children, will have the economic advantages of higher per capita income during their working years and, if they have made additional savings, in their old age too. Fundamentally, however, social security for each generation of the elderly is based not only on capital investment but even more on the productivity of successive generations, and on the preceding investment in the health, education and character of these generations. Thus, those without children can save part of their income, which they would otherwise have to spend on their supporters in their old age; and they can do so at the expense of those others in their own generation who raise more than the average number of children. In summary, a large-scale social parasitism is evident, hidden behind an opaque curtain of complex legislation and organization, money transactions and cashless benefits. A minority of the community is already deliberately taking advantage of this situation.

This basically wrong concept within the social system is revealing itself indirectly in various symptoms of social imbalance. This is why, as opposed to the preindustrial situation in Europe, children are no longer an indispensable source of family wealth, but the main reason for individual poverty. Not only do low-income families suffer but also large families in the middle-income brackets. Even the large majority of the elderly living on a low subsistence do so because they have had a large family, and have used most of their lifetime's income to raise children.

The consequences for the housing situation are obvious: many single adults and couples without children can afford dwellings with a surplus of space and luxury. In most European countries a majority of young families with small children, and also of large families (three or more children) in the low- and middle-income brackets – some of them with a substantial single income, but nevertheless a low per capita income – will have to live in dwellings

less satisfying with regard to indoor space, sanitary equipment, noise protection, individual and public green space and other facilities. Quite often spacious family houses with gardens, which would be the optimum environment for a family with children, are occupied by middle-aged or elderly couples with no children at all, while families with small and school-age children live in rather confined conditions in flats without gardens, or in old dwellings requiring modernization, or in emergency dwellings with a minimum of space and sanitary equipment which present serious health risks.

In view not only of the symptoms, but also of their underlying reasons, it is obviously necessary to examine land distribution, housing policies, taxation and subsidies in the light of the unfulfilled demands of those most in need; this appraisal must include a more adequate assessment of the often underrated needs of children. Even in free-market economies, which generally have adaptable fiscal policies, there is no need to leave any risk group to the mercy of the market.

In this respect, special consideration should also be given to land reform, since in some European countries private property and speculation in real estate and premises has become one of the major reasons for cost inflation in housing and therefore discriminates against large families and the poor elderly in the housing market. It is obvious that all land and premises keep or even increase their value only because of total population numbers and, in consequence, the demand for better housing. Thus it is mainly families with children who guarantee the lasting value of all properties, especially of real estate. Therefore, land reform, which has already been carried out in some European countries with good results and which gives families with children and thereby the younger generation, a better chance to participate in the wealth of the nation, is justified and totally necessary.

2.1 Space and population density

Ample living space is important for human well-being. It is obvious that high population density can lead to unhygienic conditions and to a high risk of various diseases, as in old slum quarters and in more recent phenomena of shanty-town squatter settlements.

Reports on the relationship between population density and disease are, however, ambiguous. Comparisons and interpretations are possible only if density is made distinct from other specific environmental differences between urban and rural life, and if density is divided into more specific components, so as to discriminate between population density and crowding.

Population density may be measured by the number of people living within a defined area, for instance persons per hectare or acre, per square kilometre or square mile, of per "half hour's walking radius" (i.e., $r = 2.5–3$ km, i.e., about 25 km^2). Other important measures are the average number of people living in a single building, dwelling unit (house or flat) or room,

average indoor floor space and air space per capita. Measures which also should be taken into account are garden space per person, public pedestrian space and public recreation area space per person in a residential area. There are a number of other measures, mostly of minor importance.

It is obvious that only by a combination of such measures can a realistic assessment of residential quality be obtained. It is also obvious that developing residential areas can show almost identical overall population densities (e.g., the number of people per square kilometre) but at the same time may offer rather different levels of residential quality. One such alternative would be a group of large high-rise buildings without proper small neighbourhood structures, surrounded by heavily used large roads, large parking places and little used large, open park land, within a large metropolitan area. Another would be a large number of individual houses in rows or clusters, with small, intensively used individual gardens closely connected to a number of small parks and a system of roads designed for occasional low-speed use only by essential transport, with parking space on the fringe area, within a medium-sized town and with easy access to open landscape. There are examples of both types of residential area which have identical densities (e.g., 150 persons per hectare).

Some studies on the relations between population density and pathology did not reveal a convincing correlation between overall population density and health status (*2, 3, 4*). Other studies, however, indicate a positive correlation between population density and overall mortality, and between population density and mortality from lung cancer and cardiovascular diseases (*4*). The more specific such density measures are, the more precise are the correlations that can be identified. Some studies reveal clear correlation between overcrowding in dwellings, as measured by the numbers of persons per room and of square metres per person, and respiratory symptoms, e.g., chronic bronchitis (*5*) or infectious diseases. The same measures were found to show low correlation between crowding and behavioural and psychosocial disturbances, including child neglect and child ill-treatment (*3*).

A more recent study, dealing with adults aged 45–64 years only, revealed no correlation at all between the number of square metres of living space per capita and the overall mortality and only ambiguous results in regard to some health conditions such as peptic ulcer and obesity (*4*). Other studies have shown no correlation between living space in dwellings and the rate of heart infarction, but a conspicuous correlation between motor traffic density and this condition (*6. 7*).

The degree of crowding expressed in terms of air space per capita would appear to be an indicator of the risk of airborne infections. Indeed, in some studies on crowded living space a reverse correlation between air space per capita and airborne infectious diseases become quite obvious; in other studies the sharing of beds by family members was even far more correlated to the transmission rate of airborne infections than was the per capita air space in the dwelling (*8*).

A density measure of quite another kind is that relating to the number of dwellings in a building. This measure shows a positive correlation, however weak, with the admission rate to psychiatric institutions (*3*). Police reports from various large cities suggest that there may be some connexion between the physical and social environment in large blocks of dwellings and the risk of being victimized by criminals. There is, however, insufficient evidence to enable definite conclusions to be drawn at present.

A number of studies in eastern and western Europe have revealed the phenomenon that persons living in high-rise buildings, especially in the upper storeys, are exposed to greater risk of respiratory infections transmitted by indoor air currents and by germ-carrying droplets and dust particles. Such air currents have a prevailing tendency to flow from the lower to the higher storeys of buildings. This phenomenon has been identified as a risk factor involved in the spread of infectious diseases in multiple-occupation buildings (including hospitals) of from four storeys (*9*) to 12 storeys (*10*).

When considering density and crowding, long-term consequences should be taken into account, and it is self-evident that in this respect children form the group that is most at risk. One study revealed a retardation of skeletal maturation in schoolchildren living in overcrowded dwellings (*11*). Another reported a correlation between psychoneurotic disorders in adult life and the experience of living in crowded dwellings in childhood (*12*).

In all epidemiological work on density and crowding, the interpretation of findings has to take into consideration the following aspects:

(a) Density is only one variant, which is closely linked with various other socioeconomic and cultural factors. In all research on housing conditions and ecological conditions in towns, none of these factors should be dealt with or interpreted in isolation from the others (*8*).

(b) Statistical correlations can be accidental correlations and therefore may not necessarily be causal ones. If, for instance, social segregation takes place, certain groups when moving house may take certain specific risk factors to their new dwellings and their new district.

(c) It has been pointed out that there may be no causal link between crowding and specific diseases. Instead, the occurrence of specific diseases may depend on individual predispositions and a combination of physical, chemical and microbiological factors.

There are obviously many unsolved problems with regard to the relationship between population density and health. This field is, moreover, important and one in which further research could be rewarding. One research priority could be a study of the influence of space and specific qualities of the dwelling and the immediate environment on the behavioural habits of residents, especially leisure-time social and physical activities which have either a good

or a bad effect on health. Some observations indicate that there may be a marked difference in such activities between occupants of houses and occupants of flats, and between the occupants of ground-floor flats and those living on higher floors. It would seem to be particularly important to check the everyday behaviour of those groups who spend more hours per day in their dwellings and the immediate environment than any other group, i.e., children, young mothers and the elderly. Some research in this field, based on questionnaires and interviews, has already been performed by sociologists (*13, 14*). Such sociological studies could be extended to include detailed time-budget studies, and could be combined with physiological studies of physical activities (e.g., by telemetric monitoring) and regular medical observation. Because weather has a marked influence on outdoor activities, such studies should cover activities in various climatic and weather conditions, if possible in all seasons of the year.

While the correlations between crowding or housing density and infectious disease may be regarded as proven, a more detailed examination of these factors would nevertheless be desirable. Since immunological defence develops in early life and decreases again in old age and in certain groups of chronically ill persons, it would appear important to study the health implications of life in high-rise buildings for individual age-groups and the risk of their being affected by airborne infections. Medical observation of such groups would have to be combined with a thorough examination of the whole environmental situation, including living space and air space per capita and essential parameters of air quality.

2.2 Past experience and lessons for the future

The need for further research is no excuse for delaying reasonable decisions on matters of urgency. This applies especially to the already established need to give families with children protection from overcrowding and from the hazards of life in high-rise flats.

Our present knowledge is already sufficient to devise a reasonable and comprehensive long-term concept of land use, housing and town planning, taking into account the economic and environmental advantages of density, but avoiding the health risks of crowding and certain hazardous aspects of density.

Thus, low density – and to a minor degree medium density as well – will often create problems relating to the establishment of the essential technical and social infrastructure and an efficient transport system. High-rise buildings and high density of dwellings, on the other hand, will result in some calculable and various incalculable health risks. In any pattern of high density, whether high-rise or other types of building are involved, a low standard of environmental hygiene is no longer tolerable. The pattern of low-rise, high-density development in limited areas, providing easy access to open countryside and a high standard of environmental hygiene, will obviously give the best

possible chances in urban development. Such a concept could be based on the vast experience of ancient and medieval European town planning and on more recent urban development, including modern experiments with "car-adapted towns", pedestrian zones, etc.

Before industrialization and the introduction of fast transport, all towns in Europe and most other parts of the world were densely built-up areas, but generally with no high-rise residential buildings and with no overspill into the countryside. The growth of towns was usually limited by the economic capacity of the surrounding rural areas to feed the urban population. Urban development was decentralized, resulting in a pattern of a few large and many medium-sized or smaller towns, and even more villages and hamlets, all separated from each other by a countryside of cultivated land and forests. This decentralized pattern, wherever it still exists, should be carefully preserved. Some concentration of the population of rural areas in fewer but economically more viable places will, however, be inevitable.

With only very few exceptions in the late eighteenth century, the size of European towns before the late nineteenth century was restricted to the "pedestrian radius", i.e., most large towns could usually be crossed by a pedestrian in less than half an hour. Except for a few coaches for high-ranking persons there was no need for any passenger transport in town. Goods transport in town, on the other hand, was sometimes difficult, but economical.

The narrow streets and lanes, the squares and the courtyards were not intended solely for vehicular traffic and parking; they were places for trade, social gatherings, games and amusement. Drivers of coaches and carts and persons on horseback were not always mindful of pedestrians but their chances of behaving recklessly or dangerously were comparatively limited. This principle of the multi-purpose use of public space has fortunately been revitalized in many European towns which have pedestrian streets and districts and also some areas for common use by pedestrians and slow-moving vehicular traffic. This system has so far been introduced almost exclusively in shopping areas. It could be introduced, however, with the same justification in many residential areas.

The basic elements of European urban society were the family house and the family. Until the late eighteenth and early nineteenth century most building sites in European towns belonged to the feudal lord or to the town authorities. As well-intentioned new legislation was passed in the period of enlightened absolutism and early liberalism most premises became freeholds, and all too often the object of land speculation. The same applied to land on the urban fringes, and private enterprise and speculators were soon dominating an ever growing sector of the real estate market, extracting large profits from the rising prices of land. In most of the new and fast-growing towns the workers' families had a negligible chance of acquiring a small building-site, and the family house ceased to be the basic element of these towns. Instead, large blocks containing numerous tiny dwellings were built, and these constituted a major health risk for tenants from the very beginning.

In Britain, with the exception of London and Scotland, which had an early tradition of providing tenement housing, the custom of building cottages for working-class families, each with a tiny garden or backyard, continued and only recently have three- or multi-storey flats become common in other parts of the country. After the First World War local authorities built large housing estates, consisting mainly of semi-detached houses, for rent to working-class families, and private developers built similar large estates for sale by hire-purchase.

In the Netherlands the land reform and housing policies of the early twentieth century partially restored the preindustrial European legal situation and the protection of families against the arbitrariness of the real-estate market. The family house was preserved as the prevailing family dwelling, in dimensions compatible with the economic means of most families in these countries.

The practice of giving priority to economically priced family houses owned by individual families, while keeping most of the land in built-up areas in public ownership, and the British model of council houses for rent to low-income families, could well be applied in most other European countries too. This would be the most effective way of improving the often unfavourable housing situation of young parents and large families.

The family house of the European town used to be integrated in, and not separated from, the neighbourhood. This applied to the imposing houses of the wealthy and to the palaces of the nobility, as it did to the homes of ordinary citizens. Only from the late nineteenth century were an increasing number of semi-detached and detached houses and bungalows (the typical country houses) built in towns, resulting in an increasing demand for space and for transport. The final results were, as we now know, the urban sprawl, the rise of the motor car, the tremendous increase in the area covered by roads, traffic congestion, noise and air pollution, accidents, and an increasing waste of time and money involved in rush-hour transport. It cannot be determined with accuracy which is the prime cause of the situation: the country house on a large estate in the urban area, or individual fast-transport vehicles, which are more appropriate for extensive underpopulated rural areas. Like the egg and the hen, both of them are the cause and consequence of the other, and both of them combined are the "explosives" which ruin both the towns and their formerly rural vicinity. Indeed, most large cities – and even many medium-sized towns – nowadays resemble a chaos of debris scattered over the countryside after a heavy explosion. This unrestricted centrifugal form of growth has been severely criticized and described as "cancer-like" (*15*).

In the light of recent experience, and reconsidering the reasonable principles of town planning in former centuries, it would be advisable to give priority to houses in rows and clusters on small sites and to impose at least some financial penalties on detached houses and the use of cars in urban areas, since both these elements are, either directly or indirectly, creating serious economic difficulties and environmental health risks.

3. PRESENT PROBLEMS OF HOUSING HYGIENE IN EUROPE

3.1 Indoor microclimate and air quality, including heating, air conditioning, air circulation and pollution

The optimum microclimatic conditions for the home, and standards for air quality, have already been dealt with extensively elsewhere. This paper will discuss only a few selected environmental health and ecological aspects.

The introduction of various modern building materials, modern technologies and new designs has not always been to the advantage of environmental health and ecology, and in most cases has not even resulted in greater economy. The centralization of economic investment and building activity in large cities and urban areas has favoured big building companies and promoted capital investment in large-scale production technologies. The production of cement and prefabricated building materials has also become more centralized and increases the volume of heavy transport in built-up areas. Local natural resources, on the other hand, have become less important, since most of them are not sufficient for centralized large-scale production, or are situated in unsuitable places.

However, the walls of older houses, consisting of a wide range of materials, from brick through timber-frame structures with brick in-filling to half timbered frames with plaster in-filling, often have a good heat insulation capacity, sometimes much better than that of new buildings. Moreover, the modern fashion of designing buildings with large windows and glass walls often overdoes the need for natural light, and creates the need for more heating and even for air conditioning. Air conditioning, however, is an expensive investment and requires even more energy than heating. It also calls for regular expert supervision to control the risk of germs breeding in the washing chambers and thus spreading airborne infections. Therefore, some experts consider artificial air-conditioning in countries with a temperate climate, and in ordinary dwellings and offices, to be about as reasonable as refrigerators in the Arctic and central heating in the tropics.

Even in countries with a Mediterranean or a cold to moderate climate, the careful selection of building materials and housing design, combined with economical ventilation and heating devices, will provide a comfortable indoor climate almost all the year. Simple ways of keeping a moderate indoor climate are, depending on the outdoor climate: wooden walls with insulation-filling, thick walls of brick or mud with an insulation space, walls with a common insulation space between houses, double windows and window shutters, rather small window space in warmer climates and moderate window space in moderate climates (about one-seventh of the floor space), ventilation slits and ventilation shafts for natural air circulation, etc. There are also modern building materials with very good heat insulating capacities, e.g., blocks of gas

concrete, various prefabricated wall-elements with heat insulating fillings, insulating materials made from plastic or mineral compounds (especially useful for insulating attics), compound double-glazing or even triple-glazing (used in some Scandinavian areas).

Authorities can provide help of various kinds to tenants in maintaining a healthy and comfortable indoor climate at moderate cost. They can give advice on the optimum physiological indoor temperature in the 17°– 20°C range. They can encourage heat insulation measures and more economical and clean heating systems, such as district heating. They can also establish a service to provide a thermography check on the individual heat insulation properties of all buildings in their district and to give individual advice to proprietors concerning insulation shortcomings.

A very important step forward would be for residents, building companies and the authorities alike, to acknowledge the capacity of nature to assist man in maintaining a comfortable climate in his home. Trees, especially large deciduous trees, are probably the most efficient air-conditioning devices, giving shadow and cool fresh air in the warm period of the year and allowing the pale sunshine to enter homes in the winter. If houses of moderate size (generally no higher than three storeys) are built and there are enough large trees in their immediate environment, effective shelter will be provided against excessive heat radiation, including the sometimes rather unpleasant over-heating of walls during the long hours of sunshine in midsummer.

Furthermore, houses with gardens and terraces offer their occupants a large range of temperatures and conditions, giving them great latitude in choosing the places of optimal individual comfort. Flats, with only a few exceptions (ground-floor flats with garden-terraces), have no equivalents, and a balcony is a poor substitute.

3.2 Illumination and natural sunlight

Problems of adequate window space have already been mentioned in the previous chapter. One reason why architects place so much emphasis on large window space is that they are no longer aware of the basic requirements formulated by hygienists in the late nineteenth and early twentieth century. Lack of sunlight and open space in many dwellings of working families was a major cause of rickets and various infectious diseases in the past. In the meantime, most health requirements related to sufficient insulation of dwellings have been complied with through reasonable enlargement of the window space.

Some architects, however, adhere to the philosophy: "The more sunshine and daylight, the healthier the dwelling". Large windows and glass walls have thus become a matter of prestige, but it is the occupants rather than the dwelling that need sufficient sunlight. This can better be acquired outdoors in the immediate neighbourhood of the dwelling. On the other hand, it is an advantage if dwellings have not only sunny rooms, but at least one or two cool and shady rooms as well.

3.3 Building structure and fittings, and environmental safety

Despite strict building safety regulations in most countries of the European Region, domestic accidents are a major health risk, especially for old people and young children. Attention should be paid to the design and state of repair of dwellings and the planning of their immediate environment, to the design and safety of furnishings and domestic appliances, and to protection from fire, drowning and accidental poisoning. Economic constraints are often responsible for poor design, such as staircases that are too narrow and too steep, sometimes with steps of differing width, or kitchens and bathrooms that are too small. Other faults stem from fashion or from mere thoughtlessness, like balustrades and banisters that are too low or provided on only one side of the stairs, sliding rugs, etc. Since falls are the most common domestic accidents, everything should be done to avoid accident risks. Though accidents from falls are less common in large multiple occupancy buildings, new accident risks have been created by the construction of high-rise buildings. One major concern is fire prevention, since high-rise buildings will not consist of fire-resistant building materials only, but will usually be furnished with many flammable fittings. A fire starting in one part of such a large building can easily develop into a fire-storm as a result of increasing heat and vertical draught.

In the event of a gas-explosion in a flat forming part of a high-rise building of some types of construction, a whole series of walls below and above the blown-off wall may collapse, endangering occupants and passers-by. Also, accidental explosions of stored explosives or sabotage are no longer out of the question (since terrorist movements that are forming in industrialized countries and usually seeking maximum anonymity, often prefer high-rise flats as inconspicuous operational bases). On a minor scale of crime, assaults may easily take place in escalators of high-rise buildings, as well as in some other places difficult to survey, like big garages and pedestrian subways in high-density areas. Such events may become more common, as is already the case in some big American cities, along with the increasing complexity of the physical environment, the ever-growing number of broken homes and psychosocial disorders, and the rise in unemployment among the urban population.

Major problems of the present include how to encourage private house-owners to modernize old houses and keep houses in good repair, how to prevent private investors from demolishing basically sound old residential buildings and replacing them by expensive high-rise buildings, and how to enable large families and young families with small children to rent or buy a decent dwelling. The policy of rent controls for old dwellings and investment subsidies for new buildings is obviously responsible for some of the present problems, while rent subsidies to families do not always take the needs of the families into account.

3.4 Immediate natural environment and nearby recreation and leisure facilities

Back gardens and kitchen-gardens are obviously the most intensively used green space in settlements. A garden terrace and lawn with sunny and shadowy places side by side, while offering a diversified and comfortable microclimate most of the year, will also encourage a large variety of recreative and healthy leisure-time activities. Gardens are of paramount importance, especially to small children, who need both easy access to some pleasant and secure open space for the good of their physical health, and constant proximity to the mother and family for easy contact and interaction for the good of their psychosocial development. Thus, for small children there is no adequate substitute for a garden, however small (or a shady atrium in a warmer climate) as an extremely useful extension of the house into the immediate environment. Streets which are used occasionally by slow-moving vehicles only, and which have some trees and maybe a fountain here and there for improving the microclimate, will also make good places for some leisure-time social activities. In such residential streets, without significant traffic hazards or nuisances, there would not be much need for wide front gardens or front gardens at all.

While children are growing up, their physical activities are also increasing; they will prefer to play more often in groups in larger play areas. If the human longing for healthy physical exercise is not suppressed and finally killed off by a disadvantageous environment (rather common in many large towns today) it will last for almost the whole of a person's lifetime. Of foremost importance for the health of the child and adults is strenuous physical exercise to improve all body functions, especially cardiac function, which helps reduce the rate of cardiovascular diseases. First priority should be given to sports activities and facilities which promote physiological training of the entire body without involving any major risk of accidents, or wearing out of joints, etc. Most favourable activities from the health point of view will be swimming-pools, playgrounds, tennis-courts and squash-courts, all within reasonable walking distance of the inhabitants of each residential area. Also essential is a system of pedestrian paths and cycle lanes crossing the residential area and leading into open countryside. All such nearby facilities, including gardens, will substantially reduce the use of private motor cars in leisure time (*14*), thus reducing the waste of money, space, scarce energy resources, human health and human lives in superfluous road traffic.

From the economic point of view there is a need to develop a more comprehensive cost/benefit concept of housing and town planning investment, taking into account not only the often misleading figures of direct economic costs and benefits, but also the indirect costs and benefits which by the same measures will originate in the fields of environment and health. Behavioural sciences, ergonomics and health economics would have to contribute

to the solution of this complex problem, e.g., by long-term studies of population groups in intervention areas and control areas.

3.5 Communications and transport in residential areas

Studies in recent years have shown that capital investment, current expenditure and the amount of road space occupied by private cars in a population depends on whether alternative types of transport are available. Similarly, where the number of private cars used is high and other transport is not used, street accidents, total energy consumption, air pollution and noise production also rise. To achieve the same transport output (in person-kilometres travelled) private motor vehicles require at least 25 times the road space required by conventional public transport (street cars and buses) (*16*). In terms of person-kilometres, there are about eight times more persons killed or injured in private motor vehicle accidents, and about 150 times more people killed in motor cycle or moped accidents, as than those killed in accidents involving public transport (*17*).

The energy consumption by cars per person-kilometre is about three to four times that of public street cars and buses (*18*), and the amount of air pollution caused by one modern bus capable of carrying up to 90 passengers is no greater on average (*16*) than that caused by one car carrying 1.4 persons.

Thus any superfluous car traffic within and outside settlements obviously represents an irresponsible waste of resources, and contributes significantly to the deterioration of the environment. In urban areas especially, where land is scarce, it would be more reasonable to utilize more land and tax revenue to improve the housing situation and provide garden space and various leisure facilities, instead of further increasing road space and enlarging parking areas for cars. Some deliberately planned inconvenience for car traffic should always be an intrinsic element of town planning, since for the individual car-driver convenience is often more important than cost.

On the other hand, despite some advantages of public transport, the first priority in urban transportation should be given to secure and pleasant walking and cycling facilities. Bicycles, while limited in speed, should be recognized as being the most economical, ecologically acceptable and healthy form of transport, and time spent walking and cycling is not wasted like the time spent waiting in a traffic jam or standing in a crowded bus, but, on the contrary, is an investment in health. In seasons when there are frequent epidemics of influenza and catarrhal diseases, the utilization of public transport can even become a major health risk, and walking in proper clothing would often be a better alternative.

A number of new towns and other residential developments in Europe have already proved the advantages of a separate system of pedestrian lanes. Pedestrian bridges and subways are, however, expensive and it is more economical to establish pedestrian zones and zones with drastically reduced speed

limits in old and new residential districts of medium and high density, instead of building extensive separate traffic circulation systems for motor vehicles and for pedestrians, with their attendant crossings. Another possibility would be for car-owners to have their parking places or garages not in front of their houses, but a few hundred yards away in an interstitial area between residential streets and a main road or industrial area. On the other hand, there should be easy accommodation for bicycles, prams and handcarts in house entrances or nearby, so as to encourage occupants to use them in preference to the car whenever this is a reasonable alternative. Pedestrian lanes should preferably have soft surfaces (rolled slag, etc.) so as to prevent excessive fatigue during walking and running.

3.6 Energy conservation and environmental health in houses and settlements

Until quite recently, increased consumption of energy was a yardstick of development; for exapmle, a twofold rise in the consumption of electricity every ten years was an objective to be achieved. The main problem of energy consumption in this period was pollution: air pollution from individual heating systems and air pollution and thermal pollution from power stations using fossil fuels.

In the past few years, however, new problems have arisen since reserves of mineral oil and gas may be exhausted in the forseeable future. The massive increase in the price of hydrocarbons on the world market and temporary shortages of fuel -- which, according to OECD, will be followed by even greater crises within the next decade – have been the incentives for two forms of action: the development and use of new energy sources, and more economical energy utilization (*19*). On the whole, both forms of action can help to improve the environment by reducing pollution.

While recent government and private activities in nuclear energy are giving rise to extensive controversial discussions and often serious public resistance, there is an increasing common awareness of various "soft technology," non-nuclear sources of energy and of various methods of energy conservation.

Energy conservation achieved by not exceeding the optimum physiological indoor temperature (17°– 20°C) and by better heat insulation of individual buildings has already been mentioned (see section 3.1). In a temperate climate, a drop of 1°C in indoor temperature leads to a saving in heating of 7%. The potential for energy conservation created by improved heat insulation of buildings is exemplified in the fact that the per capita consumption of energy for heating purposes is higher in the Netherlands than in Norway, for though Norway is the colder country, housing is better insulated (*19*). The same applies to protection from excessive solar radiation and outdoor temperature, since lowering the indoor temperature by 1°C by air conditioning requires about five times the energy needed to increase the temperature by the same amount (*20*). There are also fine examples for maintaining agreeable indoor

temperatures in warm climates without depending on energy-consuming technology – merely by good design of individual buildings and by taking advantage of the specific climate, the sun and the winds (*21*). In temperate and cold climates terrace-houses will give each other better protection against heat loss, while a detached house will need up to 40% more energy for heating purposes than a terrace-house of same indoor-space. But energy waste and energy conservation can be seen right at the construction phase of buildings: one Canadian study of the energy consumed in producing the major construction materials concluded that the energy requirements to build various types of dwellings are least for a timber frame house bungalow in Canada. About twice the amount of energy is needed to build a conventional house bungalow, 2.6 times the amount for a high-rise flat and 3.3 times the amount for a low-rise flat of same size (*21*). Consequently, a timber frame terrace-house (not included in the Canadian study) would be the most economical dwelling in terms of energy conservation and pollution control, even more if good use were made of heat-insulating materials and surrounding vegetation (see section 3.1 above).

Urban settlement patterns and shapes in relation to energy consumption have been the subject of a number of studies. Although it is difficult to synthesize all the studies and their conclusions, it would appear that if the population size and distribution can be managed, then the most efficient pattern is one of small to medium-sized rectangular or concentric settlements arranged in polynuclear fashion (i.e., concentration of dwellings in settlements, decentralization of settlements in the countryside). The linear or concentric pattern (fewer and larger centres) would be the second best solution, while urban sprawl must be less energy-efficient than any planned approach (*22*). Other papers have suggested that medium-sized towns or urban districts (25 000–100 000 population) offer energy conservation advantages over smaller and larger centres (*23*). A Canadian investigation has found that district heating, if compared to individual heating systems, is economically viable in any new community with a planned population of 2300 or greater if an industrial sector is included, or 4500 people or more if the settlement does not have an industrial sector (*23*). Since air pollution control is easier in one larger unit than in many small units, and since 60% of the energy consumption of thermal power stations goes on heat waste, a medium-size power station in the vicinity of a settlement combined with district heating could be the optimum solution for energy economy and air pollution control. Small and medium-sized settlements of the low-rise, high-density type will also yield great benefits in energy conservation and pollution control from communications and transport, since pedestrian traffic will be encouraged and public transport will be more economical (see section 3.5).

Economies might also be achieved by using solar, wind and geothermal energy and heat pumps, or heat from the cooling water of thermal power stations and industrial plants. Such resources are more economic when designed as a number of small units (*22*), and they could therefore help reverse the trend

towards more centralized power generation from very large stations. This would therefore be an added argument in favour of encouraging the development of small and medium-sized towns in place of the current trend towards the growth of increasingly large metropoli.

3.7 Legal incentives to improve housing and environmental health

The fact that money and redistribution of wealth – by taxation, public loans and subsidies, etc. – can be the most efficient steering instruments or the reason of major disturbance in a society, becomes most obvious in land use, housing and town planning, and a far-sighted use should be made of such instruments to control them.

For instance private ownership of land with an excessive right of disposal will often lead to excessive profits in land speculation, which must be heavily paid for by the general public and by young families in need of a dwelling. Furthermore, residential development will not always follow social and ecological requirements, but will take place where land is cheapest for the communities and building companies, on unfavourable places near industrial sites and noisy traffic lanes, or on remote sites with poor communications to town centres and amenities, or on valuable timberland, etc. Land reform can bring into public ownership all the land that is needed for town development, and thus facilitate reasonable planning. Just compensation to former land owners should meet the value which the given land would have without any planning and development permission. Developed and yet unused building land should stay in public ownership or should be taxed in such a way as to discourage land speculation.

In the planning of buildings, legal incentives can encourage reasonable use of space and improvement of environmental quality, including energy conservation. Modernization of old dwellings which would otherwise have been demolished, is already more common because of more aid from public funds.

In some European countries, various systems of housing subsidy have combined with rising building prices to produce a situation where tenants in dwellings of identical location, size and quality have to pay extremely different rents, irrespective of their individual financial situation. Housing subsidies to individual families only partially compensate for these inequalities. Better solutions should be found, whereby rents could be adapted to real values of individual dwellings (if supply and demand are in balance: the market-price) and more equal distribution of living space could be encouraged by efficient housing subsidies to low-income families and large families with low per capita income. Taxation of owner-occupied dwellings can also reduce extremely unequal distribution of living space, if it takes into account per capita living space, for instance by granting tax exemptions to a certain moderate living space per capita and a higher tax on the surplus, instead of indiscriminate gross taxation of real estate.

3.8 Experimental housing settlements

With the vast experience of former generations to build upon, together with the multitude of different housing customs existing in different parts of the world, and so much scientific and technological expertise to hand, it should be possible to produce better housing by combining all existing knowledge.

First of all there should be an evaluation of experience and expertise in a number of countries within a certain climatic zone, i.e., in the European Region one such study should deal with the moderate maritime and continental climate of northern Europe, and another with the Mediterranean climate of southern Europe.

The second stage would be to bring together this expertise to one or a few experimental settlements of limited size (preferably closely attached to an established community), so as to find an optimum comprehensive solution for the major ecological and environmental health issues of today, without, however, neglecting the psychosocial and economical aspects. Priority should be given to simple economic measures which will not create major maintenance problems and which will keep the building costs and maintenance costs within (and long-term costs possibly below) the limits of conventional settlements of that size. As for heat conservation and energy economy, the prospective future increase of energy prices would justify some additional investment. Modern medium-scale and small-scale technologies like integrated energy and heating systems, including district heating and the use of non-exhaustible energy sources, could possibly be tested side by side. But the most technically advanced or the most expensive systems are not necessarily the ones to be preferred, as is the case in some experimental housing projects for demonstration purposes; instead, simpler systems that are easier to maintain and less liable to break down should have priority.

Self-help should be encouraged in the building and maintenance of houses, for which constant advice and supervision by building experts should be to hand. As the ideal pattern of a low-rise high-density settlement would provide small back gardens for individual houses, larger gardens should be provided for renting near the built-up area.

Unlike trends from former decades towards the fragmentation of various population groups, the experimental settlements could enable more integration of the wealthy and the poor, small and large families, and the younger and older generations. There might even be a good chance of rehabilitating the underprivileged and unemployed, by helping them to help themselves.

If the whole concept of such an experimental settlement were labour-intensive instead of capital-intensive, it would create more long-term and possibly permanent places of work without necessarily more gross expenditure.

4. THE HOUSING ENVIRONMENT AND URBAN PLANNING

4.1 Slum problems of city centres

Many long-established European cities have congested centres with narrow streets and tall buildings, a legacy from times when they were hemmed in by defensive walls. Although the more affluent members of the population often moved out to more spacious housing at the urban periphery, these central areas are still overcrowded. In some cases this may be the result of the natural increase of the population in areas where there may be a tightly knit community of similar ethnic origin with strong bonds of friendship and blood relationship. Some families may have a reasonable standard of living and others may be poverty stricken, but there is usually a considerable amount of mutual help in such a community. In other cities, particularly the larger ones, there has been a considerable influx of population from outside, and the area has deteriorated. At best, these older areas are a threat to the health of the inhabitants due to overcrowding, defective physical structure of the buildings resulting in dampness, sanitary defects, increased home accidents and lack of suitable outdoor play areas for children with a consequent increase in street accidents and in children being kept indoors. At worst, the influence of less desirable members of the population results in an increase in crime, juvenile delinquency and immorality. A reasonable standard of family life in such areas becomes impossible.

Another type of inner city slum can be seen in many towns where there was a large increase in the industrial population in the late nineteenth and early twentieth centuries. Such towns expanded rapidly with large areas of cheap, shoddy, rapidly deteriorating housing. These areas have similar problems to those outlined in the preceding paragraph. They are inhabited almost entirely by the poorer members of the urban community, with considerable numbers of immigrants, often of different ethnic origin and with different social cultures and customs. In such areas there are many psychosocial problems. Many individuals and families live in isolation, having little contact with their neighbours. Crime, juvenile delinquency and immorality rates are high, and ethnic feuds and outbreaks of violence sometimes occur.

4.2 Suburban housing for the affluent

One of the two types of peripheral development occurring as towns expand is the areas of high class housing with resulting high land values. Expensive detached houses, flats or apartment blocks are built. The population consists either of the more affluent members of the city community who have moved out of the central area, or similar persons and families from other parts of the country attracted by the opportunities offered by certain types of industry or commerce.

4.3 Shanty towns and mobile homes

Less desirable developments also tend to occur at the edge of cities in areas where land is relatively cheap: sometimes adjacent to industrial areas, possibly subject to industrial noise and air pollution, or possibly beyond the city boundaries outside the control of the urban authority. Such settlements can vary greatly in their amenities and in the hazards to health. Hutment settlements, often erected by the occupants themselves, are more likely to be found in the warmer Mediterranean and south-east Europe. Of recent years there has been an increased tendency towards the use of mobile homes (caravans) which once placed in position, are seldom moved. Unless such structures have properly insulated walls, roof and floor, they give inadequate protection against extremes of temperature. Old people and infants in particular are likely to suffer from excessive heat in hot weather and hypothermia in cold. Outbreaks of communicable disease are liable to occur particularly when sanitary facilities are poor. Such outbreaks may have a high mortality rate on account of the numbers of malnourished infants and children. Overcrowding is common within such dwellings and there is frequently insufficient space between the dwelling units. In the better types of such settlements a safe water supply, sewage and refuse disposal facilities and an electricity supply may be available and there may be a public wash-house and toilets, but more frequently these facilities are inadequate or absent. Much depends on the local public health authority, the stringency of their regulations and the degree to which the rules are enforced.

4.4 Remedial action

Action by local housing authorities has taken two forms:

(1) the alleviation of overcrowding by the erection of large numbers of new housing units so that existing housing is less crowded; in some cases this has included the creation of new towns;

(2) the rehousing of the entire population of designated areas so that existing houses can be pulled down or more rarely renovated and reallocated.

In many European countries such policies have been pursued for many years with the result that much of the new housing may be owned by the local housing authority. Private enterprise has usually played little part in these schemes.

The types of development may be broadly classified as follows:

(1) *Low-rise/low-density housing.* This is usually provided by privat initiative for the affluent members of the community.

(2) *Low-rise/medium-density housing.* The commonest and most successful form, extensively used for large housing estates developed by local housing authorities. Such estates are apt to be very monotonous when large areas of land have been used for this purpose on the outskirts of big cities. Some of the points on which modern town planning places particular emphasis are:

(a) The maximum distance between houses and community facilities such as shops, schools, churches, social centres, etc., is important; on large estates several community centres or foci should be planned so that mothers and young children do not have to travel long distances for essential family purposes, and so that there are convenient centres for social activities at hand.

(b) The rehousing of large numbers of people on new estates is particularly difficult for the family and careful planning of social services is needed to counteract the social trauma caused by the move. Shopping centres, social welfare and health facilities and indoor and outdoor social facilities should be available when the first families move in.

(c) Working members of the family, particularly the principal breadwinner, should not be required to live too far from their work. Housing may often be planned reasonably close to industrial areas. The provision of pedestrian paths and cycle ways separate from the road system may reduce daily commuting and render it safer.

(d) Road systems on and through estates should provide the maximum safety, segregating through traffic and allowing a minimum of vehicles in the residential streets. Cul-de-sacs are safer than through roads.

In the metropolitan areas such estates are found to utilize considerable areas of land and the tendency is to construct these estates with a somewhat higher housing density.

(3) *Low- or medium-rise high-density housing.* In large cities land for housing development is often scarce, and even if available would involve the occupants in long journeys to and from work. Rehousing near the city centre is therefore often necessary, and blocks of flats or apartments 3—4 storeys high have been erected. It is important that they should be positioned in such a manner as to give optimum ventilation and sunlight. Play areas are essential and the planning should be such that as far as possible children are protected from road traffic. In other areas somewhat further from the city centre land shortage and the need for residents to be near the places of work has resulted in the erection of high-density low-rise housing of a different character. This is often in the form of two storey houses in short terraces with small gardens to provide family privacy and playing area for children.

(4) *High-rise buildings.* The erection of very tall blocks of apartments in congested cities was popular some two decades ago and seemed at first to provide a solution to land shortage in large cities. Subsequently, however, such buildings were found to have serious disadvantages. Important psychosocial problems were found to occur in the residents of the middle and upper floors. Single people, particularly the elderly, tended to live in isolation with few opportunities to make friends with other residents. Mothers of young families were under heavy strain as they were unable to see and control their children in the play areas at ground level. Many children were found to be spending too much time in their homes, and in consequence were restricted in their opportunities for friendship and social contact with others of their own age. Such buildings are now being erected less frequently and some are being used for other purposes than housing. On account of the closeness to their work some office workers and business executives find high-rise flats useful when they are single or when they are married without children and when the wife also goes out to work.

(5) *New towns.* During the nineteen-fifties it began to be realized that there was an optimum size for cities, above which members of the community spent too much time travelling to and from their homes, their workplaces, schools, shops and places of recreation. If too large, cities are difficult to govern and create excessive social problems. A solution adopted extensively in some countries has been to establish new satellite towns, specific industries and their working people being encouraged to move *en bloc* to these towns.

The experiments have on the whole been successful; the residents find their residential and working environment more pleasant than the cities and less time is taken in commuting to and from the home. The main difficulties have been the psychosocial ones connected with the move, the feelings of isolation, difficulties in establishing new friendships and adapting to the new environment. The problems and solutions discussed under (2) above applied, and the first 2–3 years were critical in determining whether specific families would settle happily. Recent policy in the United Kingdom has been to redevelop existing medium-sized towns. Thus a town of 50 000–60 000 population situated 40–100 miles from a large city may be developed and expanded using and modifying its existing facilities so that it can be enlarged into a well-designed town of a few hundred thousand.

One disadvantage of new or satellite towns has been the disproportionate age groupings. In the early years the towns contain few old people and disproportionately larger numbers of young adults and children. Schools, social services and social facilities have to be modified as the town approaches the normal age and social class distribution.

The effects on the parent cities must also be considered. If too high a proportion of old people are left behind, serious problems are created. Excessive depopulation must be avoided, the city centre if necessary re-planned, derelict

or deteriorating housing, industrial and other buildings must be removed and new development encouraged to allow the city to retain its place as a large viable urban area.

5. PRIORITY HEALTH PROBLEMS

5.1 Mothers and children

As indicated in section 2 above, mothers and children are the most vital and most susceptible members of the community and careful health, social and environmental planning is needed to protect them. Expectant mothers require special health care services and social security benefits, and clinics should be readily accessible and should not require lengthy journeys. In the planning of clinics and schools on new housing estates, access by footpaths away from main roads should be planned where possible to reduce traffic accident risks. Preventive health care services should continue through childhood.

The provision of adequate outdoor and indoor playing space is important, and recreation facilities for all ages must be considered. A mother with a young family needs somewhere to sit and relax while she watches her family at play. For a family with small children, a garden attached to the dwelling will be the solution of choice (see section 3.4 above). If adequate recreation space is not available in the vicinity for school-age children and adolescents, youth clubs or schools should organize games further away. Where tall multistorey or high-rise housing exists, the employment of playground wardens, possibly on a voluntary basis, is needed to relieve mothers of the worry of children playing out of sight and unsupervised. Youth clubs, child or youth guidance services can be organized in depressed areas to assist in social development and in reducing juvenile delinquency rates. Protection of children from traffic accidents, now usually the highest cause of child mortality, must always be borne in mind.

5.2 The elderly

Although many problems of the elderly are well known, and though the numbers of old people in the population are growing rapidly as a result of increased life expectancy, adequate provision for their care and welfare is frequently lacking.

In one survey (*24*) it was noted that three out of four accidents in the home involved people aged 65 or over, and that more than half the victims were over 75. A characteristic feature of many such accidents is that they consist of falls, during which an old person's balance, when once it has begun to

be lost, cannot be regained, and the person in addition is unable to take action to break the fall (*25*). The importance of designing houses and equipment to reduce accidents has already been discussed (section 3.3) and such provisions are even more important in the case of the elderly. The stairs are a particular danger area; adequate handrails should be provided and defective surfaces and poor carpeting avoided. Other safety measures include the avoidance of high shelves and cupboards requiring the use of step-ladders or involving over-stretching; cooking apparatus should be carefully designed and positioned to reduce the chances of burns and scalds; bathrooms and lavatories should have handrails at appropriate points. Out-of-doors, slippery or defective paving should be remedied, and on housing estates the roads should have sufficient pedestrian crossings, bearing in mind that old people as well as children, are unable to judge the speed of modern traffic.

In the community, old people are frequently found to be living alone, often in old dilapidated housing originally used as the family house, but which, now the children have departed, is too large. Lack of finance, the inertia of old age, and other difficulties all make old people reluctant to move. Every effort should be made to get them into more suitable housing where they can retain their independence, be close to their relatives, and have an adequate view of community activities from their windows (e.g., children playing) to help combat the loneliness of old age.

Some municipalities provide special single-storey housing for the elderly, which has the advantage that it can incorporate the most suitable modern views on design. Such houses may include features (e.g., absence of steps, or wide doors for use with wheel-chairs) which would also make them suitable for use by the physically handicapped.

The provision of adequate social facilities is important. This should include social clubs for old people, meals at a club or in the home, entertainments, and coach excursions during the summer. Public health nurses find an increasing amount of their time devoted to old people; special social workers may be employed. The dangers of hypothermia in the old make it necessary to ensure adequate heating in their homes. Every effort should, moreover, be made to keep old people mobile so that they do not become bed-fast.

5.3 The physically handicapped

In many aspects the housing and care of the physically handicapped in the community resembles that of the elderly, excepting of course that they include many young members of the community. Every effort must therefore be made to provide them with all the facilities necessary to enable them to pursue as active, productive and satisfying a life as is possible. In some cases houses may need to be adapted to provide the necessary facilities such as wider doorways for wheel-chairs, special furniture for use with wheel-chairs and special toilet fittings; in some a housing authority may find it more convenient

to build special single-storey housing. There is sometimes an advantage in arranging for a small group of the handicapped to be housed in close proximity so they can share the necessary facilities.

With both the handicapped and the elderly in some countries either the authorities or voluntary organizations have published literature and even plans of houses and designs of furniture and appliances most suitable for use with both the elderly and the handicapped.

5.4 Mental health

In contradistinction to the great advances in understanding the links between the environment and physical health, little progress has been made in psychosocial or mental health problems. There is much literature on the subject, yet positive facts are difficult to elicit.

The difficulties lie in the subjective nature of the symptoms, resulting in inaccurate quantifications of mental symptoms for epidemiological purposes, coupled with numerous etiological factors which both combine and interact with each other to produce specific states of mind or to precipitate mental illness. These relationships have been discussed in many WHO documents (*26, 27, 28*) and were considered in great detail at the Technical Discussions on "the role of the health services in preserving or restoring the full effectiveness of the human environment in the promotion of health", held during the Twenty-seventh World Health Assembly, May 1974 (*29*). The discussions demonstrated that it was not so much the environment itself as the associated or superimposed personal, social, socioeconomic, educational and other conditions which created stressful situations affecting man's behaviour towards his fellow human beings, and his state of mental health and well-being.

The subject in all its interrelationships is so complex that attempts to investigate it by epidemiological means have frequently resulted in conflicting results.

Some investigators have felt that the most promising line of approach is through the epidemiological study of population groups moved from unsatisfactory slum conditions to modern housing. Many surveys failed to obtain positive evidence of either beneficial or harmful effects resulting from such a move (*30, 31, 32, 33, 34, 35*). An early survey by Faies and Dunham (*36*), however, found a higher incidence of mental hospital admissions from the congested downtown areas of Chicago than from the more salubrious outer zones and were able to deduce the social and environmental relationships of a number of specific mental illnesses. A study by Martin et al. in 1957 (*37*) also found evidence of an increased incidence of psychoses and neuro-psychoses resulting from such a move. Fanning (*38*) in his study of occupants of high-rise buildings found some evidence of increased psychoneurotic disorders. Crowding is a condition which might be expected to have some effect on the

incidence of mental ill-health, yet even in the very severe overcrowded conditions he investigated in Hong Kong, Mitchell (*39*) was unable to find positive correlations.

These and other papers are discussed in the Report of the WHO Expert Committee on Housing and Health (*26*). A reasonable explanation for the diversity in findings would seem to be that too simplistic a view has been taken of the subject. As was indicated during the WHA Technical Discussions referred to above (*29*), the cardinal feature in the precipitation of a neurotic, psychoneurotic or psychotic episode is most often some form of stress, operating frequently on a person who has some preexisting latent susceptibility. Moreover, individuals react differently. One person accustomed to life in a crowd may react badly to the upheaval of a move to new housing or to the loneliness which he or she may experience in the new environment. Another person's reactions may be the opposite. In addition people will take different lengths of time to get accustomed to a new environment. The picture is not therefore likely to be consistent, and in our present state of knowledge the epidemiological method does not yield a true answer. The solution at the present time may be in a combination of clinical and environmental studies.

5.5 Psychosocial problems

Because of the larger numbers of people affected, psychosocial problems of housing and the housing environment may well be of even greater importance to the community than open cases of mental illness.

Overcrowding, particularly where the same accommodation is shared by members of two or more families, creates much mental stress (*39*).

The psychosocial problems of living on the upper floors of high-rise buildings have already been mentioned. Single people are oppressed by the loneliness and the lack of contact with others and mothers of families feel concerned about their children when the latter are playing at ground level far below, so that many of the children spend the greater part of their time indoors (*38*).

The more general psychosocial effects of life in slums were summarized as follows in the WHO document prepared for Habitat, the UN Conference on Human Settlements held in 1976 (*26*):

"In the poorer areas of cities there is not only the bad physical environment, the dilapidated structures, the depressing visual outlook, the noise from traffic, industry and fellow mankind, and the overcrowding, but there is also the associated poverty that has led a family to take up residence in such an area. There are often accompanying feelings of friendlessness, alienation and frustration. Some members of the community, however, retain the enterprise and ambition to continue efforts to move up the social scale. The community is composed of many types of mankind and crime rates and alcohol and drug abuse are more in evidence. The population is unstable and badly integrated as compared with rural areas and better quality urban districts. In some slum

areas, however, particularly in older cities, there is a surprising element of stability, families having remained in close, friendly proximity to each other for many years, and the forced relocation of such families is likely to result in considerable stress and loneliness as a consequence of the disruption of the community".

A particularly bad example of the psychosocial effects was described in a paper (*40*), describing conditions in the South Bronx area of New York, a deteriorated high-density slum with few green spaces and where organized recreational facilities for children were minimal. To the residents the streets were to be feared, crime rate and attacks on persons and property were frequent and childhood accident rates were high. The response of many adults was to keep their children indoors, and the children responded by a distinct behavioural pattern becoming hyperactive in school hours and non-TV hours at home, and at the same time listless, restless and inattentive.

Conditions such as the above may be an extreme example but they are to be found, often to a somewhat lesser degree, in the slums of many large cities. Without exceptionally strong influence on the part of the parents, children brought up in these conditions can scarcely be expected to develop healthy, fully balanced personalities, and in adult life are unlikely to have the capability or desire to extricate themselves from this environment. Many of these children make undesirable friendships, become juvenile delinquents and subsequently lead a life of crime.

In large cities attempts to remedy the situation have usually been through rehousing in large modern apartment blocks. Such measures have often been a failure and the apartment blocks have themselves become modern slums. In several European cities some of these new modern slum apartment blocks have already had to be pulled down.

No easy solution is apparent and more research and experimentation is needed to determine the ultimate remedies. Over-large blocks of apartments are obviously unsatisfactory. With good town planning such communities may be broken up into smaller units where life may be more tolerable. Children and adolescents themselves need specially trained youth leaders who can succeed in winning friendship among young people in the community and can mould and guide them in their leisure pursuits.

When rehousing is carried out on new housing estates near the periphery of towns, psychosocial troubles are also likely to be met. The parents and children are separated from their friends and pastimes of the city, they may have to travel long distances to and from work, or to the shops and schools. There is often an absence of indoor and outdoor recreational facilities. If mothers do not go out to work they find time hanging heavily on their hands. With suitable planning and adequate social and other supportive services these estates can develop into happy thriving communities, but without adequate help the community can become depressed, and crime, juvenile delinquency, alcoholism and suicide rates rise as high or higher than the areas from which the population came.

5.6 Rural-urban migrants, foreign immigrants and workers

The mechanization of many agricultural activities and the poorer wages often paid in rural areas have led in many countries to an unbalanced depopulation of villages, when the younger adults, frequently accompanied by their families, move to the towns leaving behind a predominantly elderly population in the villages. This results in economic problems, since with the passage of time old people die, the villages become further depopulated and agriculture is neglected. To avoid such troubles, careful planning is needed, small industries need to be encouraged in the villages, housing, social and recreational facilities improved with the object of producing more viable village communities.

In the towns the young migrants experience many difficulties. Housing is scarce and they are likely to find themselves in the slums or shanty towns, where disillusioned, depressed, and possibly friendless, they will find it hard to maintain a reasonable standard of life. The provision of light industry in small towns and villages as suggested above would therefore to some extent help the cities with their problems by slightly reducing their rate of expansion.

Where city industries with their large factories and labour demands are expanding, an influx of workers is inevitable and this, in addition to being drawn from rural areas, may be met by importing foreign labour, usually from less developed countries. This will further add to a rapidly growing city's difficulties by adding to the overcrowding of the slums, shanty towns and estates of mobile homes. It is important that such cities should have good town planing departments working closely in touch with the health departments and that attempts should be made to ensure that new housing is erected at the same time as industrial installations are expanded.

Many of the foreign workers who swell the population of large cities come with the intention of saving money and then returning to their own countries; many stay permanently and are absorbed into the community. Another type of immigrant are refugees forced out of their countries by political pressures.

Both groups often form large alien minorities in a city and have considerable difficulty in acclimatizing themselves to the customs and language of the new country. Special efforts may be needed to provide tuition for these groups. Difficulties occur with some racial groups whose customs demand that girls are kept close in the home environment until marriage, and who therefore have little opportunity to learn the customs and language of their new country. Although the law demands that they attend school, their absentee rates are high.

Many of the immigrants are hard and conscientious workers who become an asset to the country of their adoption. Although it may be the law of the country and the desire of most of the population to avoid racial discrimination, antagonisms leading sometimes to violence develop in some areas. There is thus unhappiness and feelings of oppression and victimization among the alien community and some, particularly among the younger age groups, are drawn to violence and crime.

If such difficulties are to be avoided, careful thought and planning must be given to social services to assist in integrating these communities smoothly and without troubles.

5.7 Air pollution and environmental noise

These are both the subject of separate Regional Office projects and need not be considered in detail in this document.

The importance of environmental air pollution as a threat to both health and amenity has been realized increasingly over the past 25 years and efforts are being directed both towards reducing pollution from motor vehicles, chimneys, factories, etc., and to reducing its effects by good town planning.

Environmental noise pollution has received serious consideration only in very recent years. With certain exceptions the intensity of such noise is not sufficient to produce deafness of the type associated with long and continual exposure to certain industrial noises. Nevertheless, some mental effects of environmental noise may occur. A person living near to a busy airport may experience difficulty in concentration, or in a person with a neurotic personality the noise may be a factor in precipitating an attack of mental illness. The effects, however, are complex and difficult to assess and may be the opposite of what might be expected; in fact, a person used to excessive environmental noise for many years may suffer from depression if he moves to a quiet environment.

6. CONCLUSIONS

1. The study of the health aspects of human settlements involves consideration of a large number of factors, not only those related to the planning and physical structure of the home and its environment, but also those such as social class, occupational status, unemployment, poverty, state of nutrition, mental capacity, general ability, and efficiency of the delivery of health care, all of which in addition to influencing health directly, interact with each other to produce the final overall effect on health.

2. In early days, public health workers concentrated on the direct effects of factors such as physical structure and overcrowding, which had an important influence on mortality and morbidity, including communicable disease incidence and on infant and child mortality. With changing standards of living, including improvements in nutritional status and in health care, it has become apparent that, for instance, one family can live in a poor housing environment without apparent ill effect on health and another family with a less satisfactory background will be found to react badly to the same environment.

3. The European Region contains a great variety of topographic and climatic influences and numerous ethnic groupings each with its own customs and ways of life. Countries are therefore found with widely differing housing and environmental problems, varying in degree from place to place. Nevertheless it is apparent that these problems have an important effect on health in every country of the Region.

4. It is suggested in the first place that a comparative study might be undertaken of a number of selected towns of differing types with the object of determining the varieties of problems, their respective importance, and the ways in which the various countries have sought to deal with them. It is important to know the mistakes made in the past, and the methods used by countries to overcome them. The experience of one country will benefit another.

5. The results of such a comparative study would provide a useful objective and factual background for a European expert committee or workshop to determine the major needs of individual countries in establishing research and development projects to improve housing conditions.

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Annex

SUBJECTS IDENTIFIED FOR FUTURE STUDY
(Detailed Narratives)

Psychosocial aspects of poor housing and of urban development including considerations of space and density

A subject for research is the consideration that poor houses are not poor only from the point of view of standards of hygienic criteria, but mostly because of their psychosocial implications. In all cities there is evidence of a concentration of psychotics with schizophrenia in areas where misery and social deprivation are present. It was recognized that the minimum tolerable living space for a mental balance could be reckoned in square metres. A critical area of almost continuous dissatisfaction and mental tension is to be found below ten square metres per capita. This area corresponds to a crowding index (in Europe) of 2 to 2.5 inhabitants per room. Cohabitation enhances the problems connected with physical and mental intimacy, denies children the space for active movement which they need, condemns individuals to a continuous reciprocal comparison and scrutiny and ends in an intensification of intolerance towards the weaker and less protected.

It is necessary to build houses with simpler and less expensive materials which at the same time provide the necessary space and above all are not built (because of lower costs) in zones outside the so-called residential areas. It should be possible to create an interrelationship favouring the abolition of excessive social differences.

Physiological aspects of poor housing and of urban development including considerations of space and density

While the physiological requirements for indoor air quality, climate, illumination and noise protection are well established and generally agreed upon, they nevertheless are not always met to a satisfactory extent (see "Health aspects of housing materials, new construction methods and architecture of buildings" below, etc.). Some other categories of physiological requirements need even more attention. These are sufficient space for physical indoor activities such as efficient housekeeping and playing by children, or a large diversity of other activities and hobbies for all members within a family. The physiological, psychological and social needs of inhabitants should be met in such a way that individuals do not cause too much disturbance to other members of the family or even to neighbours. Another physiological requirement of major

importance not yet adequately recognized is the need for easy access to some undisturbed outdoor space, so as to experience the animating physiological influences of changing temperature, air movement, skylight, herbal smells etc., which are of both physiological and psychological importance. Easy access to larger open air space and the encouragement of a variety of recreation and sports activities is also of great importance, especially for the prevention of cardiovascular diseases.

Health aspects of peri-urban settlements

Peri-urban settlements are often low-income areas. But, in certain post-industrial metropolitan areas, these settlements may constitute the high income bracket. Each of these has different health implications and requirements.

Generally peri-urban settlements have poor housing and lack basic sanitary health and welfare services which create conditions leading to potential health risks and to possible damage to the intellectual growth of the young age-group.

A community programme to improve the quality of life in congested low-income settlements around urban fringe areas involves delivery of basic health and infrastructural services through the involvement of the residents with government and local authorities.

The high-income bracket population living in fringe areas which are usually inadequately planned, require extension of sanitary services to their dwellings and accessibility to health services. Regulated development of these communities involves metropolitan planning and creation of suburban authorities for their management.

Health authorities need to stimulate cross-sectoral integration of activities of several agencies in partnership with the local communities for the management of peri-urban settlements. Innovations in reducing the peri-urban settlements, particularly the low-income migratory population, require particular assessment.

Health problems of risk groups such as children, young mothers, the elderly and the handicapped

As a gross estimate, man spends about three-quarters of his life within dwellings and within the close neighbourhood district of his dwelling. The quality of different periods of life is, however, of even more importance than quantity. The first years of life, especially, have to be taken into regard, when human body growth, brain functions and character are developing and are subject to environmental influences to a much greater extent than at any later period of life. While in this period of life the social environment of the mother and family are of paramount importance, the dwelling and its neighbouhood are the most important physical environment, influencing the health and behaviour of all the members and thus directly and indirectly influencing the

physical, psychological and social development of the child. Small children need the constant contact and assurance of a familiar adult; on the other hand, at about the end of their first year of life they develop fast, increasing physical activities, favouring their physical development but giving rise to a lot of dangers and thus the need for constant supervision as well. A house with a small garden will meet most of such requirements, while a flat, by isolating the family from the neighbourhood and from open space, may cause some problems. Space within the house and in close connexion with the house is also of great importance to children of school age. For school-age children a room of their own is also desirable. Young mothers should have mutual support by good relations within the close neighbourhood instead of being isolated in high-rise flats. For all inhabitants, especially for the elderly and the handicapped, the dwelling must be easy to manage and accident-proof; a substantial number of all dwellings should be planned in a way that they can easily be equipped with additional items, so that they can be used by persons who develop handicaps, without forcing them to move.

Within most societies a majority of low income households and large families with low per capita income have to live in dwellings less satisfying in regard to indoor space, sanitary facilities, noise protection, individual and public green space and any facilities of the habitat. In terms of health it would be of no use to provide healthful dwellings and quarters to adults with high per capita income only, and have families with children in such crucial age-groups at the mercy of the market. There is an obvious need to examine land distribution, housing policies, taxation and subsidies according to the unfulfilled demands of those most in need, including better assessment of the often underrated needs of children.

Health aspects of urban transportation (excluding road traffic accidents)

Justification. It is known that overcrowded mass transportation in urban areas such as underground railways, buses and trams, play a key role, especially during winter time, in spreading respiratory diseases such as influenza. On the other hand, commuting in a private car implies a number of even more important health risks. Driving in heavy traffic and queues, experiencing the careless and risky manoeuvres of other drivers, and being isolated and immobilized in one's own car is equivalent to major pathological stress and may promote cardiovascular disease. Inhaling of motor exhausts and evaporating fuel may also promote chronic diseases. Walking and cycling over reasonable distances would be the most healthful of all urban transportation, if there were always sufficient pedestrian space and separate cycle paths, and no substantial accident risk or air pollution by motoring.

There is no need to list health effects of urban transportation such as spreading of communicable diseases, adverse effects of chronic diseases and risks of accidents. This listing should be followed by discussions on prevention possibilities.

Comments. Road traffic accidents are omitted from this study because they are already the subject of a specific WHO programme.

The review of present knowledge of health hazards in urban transportation may be made by a consultant whose report would be discussed by a working group which would recommend preventive measures if possible.

Health aspects of urbanization on migrants

Justification. Highly developed countries of Europe with low mortality rates and already limited rural populations attract large numbers of migrant workers coming either from less developed European countries or from overseas. Large cities of the other European countries attract national migrants from rural areas. These migrants house themselves in the lower quality buildings available and come into an urban environment to which they are not socially or culturally accustomed. This results in them being the main victims of health problems related to poor housing and poor town planning. Several discussions have already been carried out on the specific health problems of migrant workers in Europe (for example by the Algiers Working Group in November 1973). Paragraph 4.2 of the Algiers Working Group final report[a] deals with housing problems of migrants, but the recommendations of this final report do not stress housing aspects, so it might be advisable to add to the list of future meetings recommended by the Algiers Working Group another one, the results of which should be to recommend guidelines for improving housing conditions of migrant workers and specifically for foreign migrants who have also the handicap of quite different cultural habits.

Much more favourable in terms of health would be moving machines to people instead of moving people to machines. If, for instance, social costs and benefits were calculated for migration and metropolitan growth versus development of a large number of settlements within the whole territory of the nation or even on international scale, the latter alternatives might appear more favourable in socioeconomic terms as well.

Comments. The Working Group recommendations will utilize the results of the follow-up studies recommended by the Algiers Working Group and propose practical means to improve the housing conditions of migrant workers in order to protect their own and their family's health.

Health aspects of noise in housing and outside the house

Justification. Generally, noise levels inside houses are not so high that they affect hearing functions, as can be the case in some workplaces. However,

[a] Document EURO 4003

too noisy an environment, especially at night, affects the wellbeing of people and spoils their rest and sleeping time with adverse effects on their mental and physical make-up. Some countries have developed standards for acceptable noise levels inside houses during the day and during the night. It is recommended to use the experience of the European countries which have already studied criteria and standards for noise control in housing and in the surroundings, in order to help the other European countries to do the same for their own national needs. For this, a seminar may be recommended using the knowledge of the more advanced countries to the advantage of participants from European countries which have not yet developed noise criteria or standards.

Comments. The Federal Republic of Germany, for example, has studied the noise problems in and around houses and may provide a lecturer to the proposed seminar.

This seminar would be coordinated with the WHO Regional Office for Europe general programme on noise control, which also concerns transportation and the working environment.

Health implications of population density (including consideration of space and arrangements in human dwellings)

Population density may be measured by the number of people living within a defined area (persons per square hectare/acre, per kilometre/mile, per "one hour's walking radius", i.e., r = 4–5 km, i.e., 50 square kilometres) or by the average number of people living in one building, in one dwelling unit (house or flat), or in one room. Other important measurement categories are the average indoor space per person, garden space per person, public pedestrian space and public recreation area space per person in square metres. There are a number of other measures, mostly of less importance.

It is obvious that only by a combination of such measures, can a realistic assessment of residential quality be given. It is also obvious that land use for developing residential areas can result in almost identical overall population densities (for instance number of people per square kilometre) but at the same time may result in different residential quality. Examples of alternatives of major importance are: a few large high-rise buildings without proper small neighbourhood structures, surrounded by heavily-used large roads, large parking spaces and scarcely-used large, open green park, within a large metropolitan area – or a large number of individual houses in close rows or clusters, closely connected to small and intensively used individual gardens, a number of small open green parks and a system of small pedestrian lanes designed for occasional low-speed use only by essential transport with parking space on the fringe area, within a medium-sized town and with easy access to open landscape. There are examples of both alternatives with identical densities of, for instance, 150 persons per square hectare.

Health effects of indoor air quality, including air conditioning

Justification. Very often air quality inside buildings and housing is worse than outside, more so during winter time. The causes of low air quality in old buildings are poor ventilation or inefficient domestic heating. In new buildings another source of problem is air conditioning which brings an influx of air of different temperature and humidity which is not free of suspended particulates. In high-rise buildings, used not only by healthy adults, movement of warming air ascending from lower to higher flats by way of staircase, elevator shaft, etc., may spread airborne germs and domestic dust, thus transmitting airborne respiratory infections and allergic conditions. Effects on highly susceptible risk groups, such as infants, children, the elderly and the chronically ill should be studied.

Poor domestic heating is also a major cause of domestic accidents and poisonings. It is recommended that a consultant list present knowledge in the European situation regarding indoor air quality, after which a working group could discuss the consultant report and suggest preventive measures.

Comments. This subject was previously included in the WHO Regional Office for Europe's long-term programme on environmental pollution control, but, for financial reasons, has not been developed.

Health aspects of housing materials, new construction methods and architecture of buildings

New materials are being continuously introduced in the building and furnishing of houses. These may create health hazards. For example, plastic materials may liberate toxic particles or gases, cause allergy reactions and unusual electrostatic conditions.

Construction methods or techniques are also continuously changing. Prefabricated houses and mobile homes are often designed for specific climatic conditions and the materials used for such construction are often poor in acoustic quality and susceptible to hazards. In areas liable to earthquake, special techniques must be adopted to minimize damage.

Architectural planning and design of buildings are guided more often by aesthetic considerations than by local requirements. Optimum utilization of direct sunlight, natural ventilation, minimum structure-borne noise and risks of accidents are some important considerations in this respect.

Health criteria for town planning and regional planning in Europe

Of all measures for the overall quality of an environment, mortality and morbidity (including preliminary symptoms, i.e., clinical risk factors) are the most objective ones. Analysis of diagnoses by prevalence and incidence,

by age and sex distribution for populations in different habitats, gives some reference to factors in the environment and to habits formed by the environment. By epidemiological studies, and in particular by the technique of factor analysis, a number of environmental factors most relevant to health would be better identified. In the case of most diseases and handicaps there is a multifactorial and no "one case – one effect" relationship. There is, for example, a high probability of there existing a multifactorial relationship with increasing numbers of psychoneurotic and mental disorders, of addiction and suicide, of arteriosclerotic conditions and early myocardial infarctions on the one hand, and metropolitan growth, increase of complexity in all ranges of the technical and social environment, disintegration of neighbourhood and family relations, alienation and physical inactivity on the other hand.

One practical consequence for town planning would be, as the Conference on Health Aspects of Urban Development (Stuttgart, 1973) stated, to control unrestricted "cancer-like" urban growth, and to secure easy access of the population to all necessary facilities, including green spaces and recreation facilities. Another consequence would be to stop the growth of big towns altogether or even to reverse it, and to encourage urban development in the less developed and less populated areas.

Special studies should deal with the health effects (including microclimate and ecology) of individual gardens and backyards attached to houses, and district garden allotments attached to quarters. Such studies should examine the thesis that individual gardens are more intensely used for manifold recreation and physical activities, and are more suitable for creating good neighbourhood relations than most large public green areas. At the same time the importance of such garden areas to the ecology and climatology of the settlement as a whole should be studied.

Environmental considerations in regional planning (including the planning and management of air, water and land resources)

Air, water, land and other resources are finite. Rapidly increasing urbanization and industrialization make it essential to use the available resources most economically and effectively. If population and industrial growth outrun the availability of resources the quality of life will deteriorate.

Development of new settlements and industries should be regulated to limit pollution of all forms, air, water, soil, sea contamination of food and toxicity in consumer products. Assessment of impact on man's environment should precede each and every urban or industrial development. In existing problem areas, present environmental quality should be assessed, standards of quality established, legislation and bye-laws promulgated to enforce control measures so as to optimize the benefits in relation to the costs of control. Development of organization, legislation, monitoring systems and enforcement methods with due regard to available technology and economic incentives are essential considerations.

In Europe, several approaches and strategies are being followed and these are being constantly improved upon. Pooling of this experience should be of benefit in introducing new planning and policy methods and in improving environmental quality.

Mental health criteria for housing and town planning

One subject of research could be a definition of the best indices for ensuring that houses and towns should be built for man and not vice-versa.

Criteria must be supplied taking into account ethnic, social and cultural factors, on the basis of which society can establish interlocking links with man's habitat.

These criteria, given individual mental health dynamics, must not be conceived from a rigid point of view but must be adaptable to the social and geographical mobility of man.

The planning of housing and towns must not be studied only from the conventional general hygienic point of view but must also keep in mind the relations between house and child, old people and house, handicapped and house, and must also use the same criteria as regards the planning of the town in general.

This will help in establishing the psychophysical balance that will imply more complete health planning, rather than a "lack of disease".

The borderline between "need and necessity" has to be defined.

Guidelines for improvement of substandard housing areas in Europe

A subject of research could be the general study of pull factors (in terms of workplaces, civic rights, etc.) and push factors (in terms of famines, poverty, lack of services, etc.) that cause the migration of workers in Europe.

Average housing criteria will have to be established taking into account as much as possible the different ethnic and social states, in order to create such psychophysical welfare as might diminish the frustration-aggression syndrome so important in the social deprivation of the emigrant, or of those who are forced, although living in their own country, to remain on the outskirts of the town.

It is suggested that for those living in substandard housing areas, the architects, the administrative and health authorities do the interdisciplinary work where all the components having an important role are taken into due account. Special efforts should be made to educate and to inform the population on how to use new facilities safely.

Noise and thermal insulation of buildings

Justification. It is recognized that excess noise in and around housing is a major health problem in low cost dwellings of recent human settlements in

Europe, with adverse effects on physiological and psychological balance of urban dwellers. It is also recognized that domestic heating represents 40% of energy consumption in advanced European countries and that the world energy crisis will not permit even the richest European countries to go on with such high energy consumptions for domestic heating; thus a major effort is needed for better thermal insulation of buildings. A happy situation is that measures such as increasing the thickness and thermal cavity of walls or using double windows of limited size, are efficient in achieving both good sound insulation and good thermal insulation. It is therefore suggested that WHO recommends action along these lines using the results of activities already proposed in the field of noise control or heat criteria for housing.

Comments. This question being more an engineering and architectural subject than a public health one, we do not recommend a specific WHO working group to discuss it.

Improvement of the role of health authorities in drafting and implementing legislations on development of human settlements

A subject of research would be conditioned by the often secondary role played by health authorities in planning human settlements in general.

It is necessary that administrative authorities keep better account of the health authorities' advice, and that they together submit proposals for a better formulation and interpretation of laws, rules, codices, that govern the development of human settlements.

Study of legal strategies for providing healthy housing for the segment of population most in need (especially large families, young couples with children, low income elderly population)

Providing the best and most healthy dwelling on the housing market will not guarantee making such dwellings available to those most in need. Because of soaring estate and construction prices in most European countries, it is the young couples and families that depend on acquiring the more expensive new dwellings, while most of the older low-cost dwellings, usually in good condition, are kept by elderly people who are in a better economic situation. There is a need for a strategy to control estate prices by decentralizing urban development and by controlling speculation (for instance by public ownership of estates within towns and long-term lending to private families) and a policy of taxation and public subsidies to make it easier for large families to acquire a decent dwelling, while making it more expensive for small households to live in very large dwellings.

Study of institutional mechanisms which will provide for optimum participation by health authorities in decision-making in the realm of human settlements

The study proposed is intended to probe in particular into the organizational set-up, the capacity and potential of health administrations to play a useful role in human settlements programmes.

As far back as 1962, a WHO Expert Committee on Public Health Administration[a] listed six essential factors as regards the incorporation of public health elements in the conception, execution and evaluation of plans for human settlements. These factors may be summarized as follows:

(1) the adoption of a clear national commitment to protect all the people against the hazards of disease, especially communicable disease to prevent needless suffering, and to help people to live and enjoy healthful lives;

(2) the creation of suitable machinery of government and of administrative cadres, backed by appropriate legislation;

(3) the appointment of trained manpower;

(4) financial support of health programmes;

(5) the direct participation, at the national, regional and local levels, of senior public health executives in the preparation of economic plans and in the formulation of plans for human settlements;

(6) the provision of a continually developing series of direct contacts between the public health staffs and the public generally.

These factors seem logical enough, yet they do not seem to be generally accepted or applied in most countries. The question arises as to why this is so. Have the mechanisms involved been tried and found wanting or inefficient in any respect? Are health authorities properly equipped (in terms, e.g., of qualified and appropriate personnel, legislation, or technical orientation) to deal effectively with physical planners, economists and financial planners? Or is the opposite the real problem? Which are the institutional mechanisms likely to produce the desired public health impact under European conditions? How, and to what extent can community participation be secured in the formulation of plans for human settlements? Such are the questions which the proposed study might elucidate for the greatest benefit of all parties concerned.

Study of mechanisms for cooperation between health authorities and other agencies responsible for housing, city and regional planning

This proposed study is intended to investigate the legal and administrative mechanisms necessary for adequate and effective interdepartmental

[a] WHO Technical Report Series, No. 250, p. 23 (*Urban health services*)

cooperation and coordination. As the number of programmes (including those related to health and environmental health) dealing with, and affecting, human settlements and the environment has increased in recent years, there has also been a growing recognition of the unusually complex interrelationships which exist among these programmes. As a result, there is an emerging interest in greater coordination among such programmes and the development of an integrated system of environmental (including environmental health) planning and management. This subject was discussed in 1964 by the WHO Expert Committee on Environmental Health Aspects of Metropolitan Planning and Development,[a] and by the Regional Office Seminar on the Health Aspects of Urban Development.[b] Both groups made several recommendations[a] which have yet to be applied in most developed nations. Instead, since 1970 the trend has been towards the set-up of new institutions in the form of "Departments of Environment" which are taking over most of the health departments' functions in environmental health without, however, paying full attention, or giving priority in their work, to man's health. The new institutions seem to be more concerned with the ecology and the protection of nature.

The question arises as to (1) why this development has taken place, (2) whether and how health departments may have failed in their mission, and (3) how the balance of priorities may be re-established through new mechanisms for cooperation and coordination. The study will endeavour to identify and evaluate some of the major techniques which may be employed in the pursuit of such integration and coordination.

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[a] WHO Technical Report Series, No. 297, p. 57 (*Environmental health aspects of metropolitan planning and development*)

[b] **WHO Regional Office for Europe.** *Health aspects of urban development:* Report on a Seminar. Copenhagen, 1974 (EURO 4108)