

Environmental Health Problems Related to Urban Decentralization*

As Observed in a Typical Metropolitan Community

LEONARD M. BOARD, M.P.H., F.A.P.H.A., AND
HERBERT J. DUNSMORE, M.P.H., F.A.P.H.A.

*Senior Assistant Sanitary Engineer, U. S. Public Health Service, Ann Arbor, Mich.;
and Director, Division of Sanitation, Calhoun County Health Department,
Battle Creek, Mich.*

THE decentralization trend of population from central cities to fringe areas presents a growth pattern encountered in the majority of American cities, small and large, and is a reversal of the trend responsible for the growth of our cities. Planners and municipal authorities have emphasized the gravity of the shrinking tax base of the core city, the economic obstacles to adequate servicing of satellite developments with schools, fire and police protection, water, sewers, refuse collection, the need for effective controls of suburban areas, and other readily apparent difficulties accompanying the changing growth tendency. Students of local government, including leaders in public health administration, have been advocating consolidation of many functions and services, a measure which suggests the urgency for state and local public health engineers to contemplate the environmental health problems and needs in suburban areas.

A reconnaissance study of a fairly typical metropolitan community was conducted by the authors, as a portion of a comprehensive planning project. The

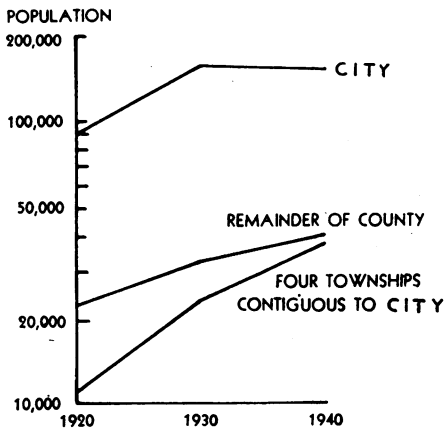
authors' participation was limited to environmental health factors of public health significance, including some which were the responsibility of agencies other than the health department, in an effort to indicate the public health engineering functions and responsibilities as they relate to metropolitan community planning and administration.†

The community in question includes a central city with a 1940 population of 150,000 and a density of 1,900 per sq. mi. The four surrounding townships contained in the U. S. Census Metropolitan District had a 1940 population of approximately 40,000. However, the density in census tracts adjacent to the city varied from 40 to 1,800 per sq. mi. Figure 1 depicts the relative growth of the city, the contiguous townships, and the county. Neither townships nor census tracts were utilized to delimit the metropolitan area for the purpose of this study, since it was directed primarily at the existing community rather than the anticipated ultimate growth. The criteria applied included population density, as measured by lot size and frontage, topography, platted subdivi-

* Presented before a Joint Session of the Municipal Public Health Engineers and the Engineering Section of the American Public Health Association at the Seventy-fifth Annual Meeting in Atlantic City, N. J., October 6, 1947.

† Several environmental health factors were not included in this study because of time limitations and their poorly defined relationship to the decentralization movement, i.e., rodent control, atmospheric pollution.

FIGURE 18—Relative Population Trends of Fringe Area Around City Compared to Rest of County, 1920–1940.



sions, and other land uses—chosen for their relation to problems of environmental health. The population of the suburban area thus defined was approximately 21,000, with a density of 1,300 per sq. mi.

The community's environmental health status may be divided into three major categories: physical facilities, services, and administration.

PHYSICAL FACILITIES

Water Supply—

a. The city-owned water supply conforms to State Health Department quality standards but is inadequate in quantity to satisfy the current demand. The department of public works, responsible for the water supply, is considering development of a new source, which may entail an expenditure of some 18 million dollars. Numerous private supplies are in use, partly because city water summer temperatures reach 76°F. Increasing industrial demands rather than population growth are responsible for the shortage. A city policy of long standing opposes any plan to serve contiguous unincorporated areas, and the expansion plans now under consideration contemplate no change in this pol-

icy, although water mains are adequate, in most cases, to supply the populous areas adjoining the city. Anticipation of future demands is limited to growth within the corporate city limits.

b. Uncontrolled speculative development during previous boom periods accounts for the anomaly of thousands of vacant subdivided lots served by water mains (sufficient to accommodate housing for the entire county 1940 population in single family dwellings), while approximately 5,000 city residents occupy homes located in unserved areas. The city has been unnecessarily burdened with the cost of unused extensions, and the widely scattered houses that have been constructed in remote developments impose a disproportionate maintenance and operating cost on the water department.

c. Collaboration between the city health and water departments has been ineffective, despite excellent professional relationships. The health department is rarely consulted in matters of main extensions, improvements, installation of cross-connections, and similar problems. No sampling is conducted by the health department.

d. Almost one-half the population of the suburban area included in this study is included in two water districts. The economic difficulties that so frequently harass such projects, serving small residential developments, are evident in these cases. Inadequate financing forestalls the construction of lines to serve some 25 per cent of the population included in the corporate districts. Moreover, while water rates are comparable to city rates, the district supply is untreated well water with a hardness of 170 p.p.m., as compared to 85 p.p.m. for the softened city supply. The districts levy an additional tax for hydrant rental. When it is considered that city water revenue sustains the cost of operation of the sewage treatment plant, it is obvious that there is a marked dis-

parity between city and district water costs to the consumers.

e. County health department supervision of the district supplies is limited to periodic sampling, despite the fact that they are operated by untrained men. A considerable number of private wells dried up when the district wells were drilled, creating a pollution threat to the district wells and other private supplies, but no program for sealing of dry wells has been undertaken.

f. More than 12,000 persons in the

area studied depend on private wells, many located on small lots which also function as sewage disposal sites.

Sewerage—

a. Over 90 per cent of the city's population live on sewered streets, but 2,600 privies and a like number of septic tanks and cesspools are in use. The large proportion of "temporary" and substandard dwellings constructed during former periods of rapid expansion poses a difficult obstacle to enforcement

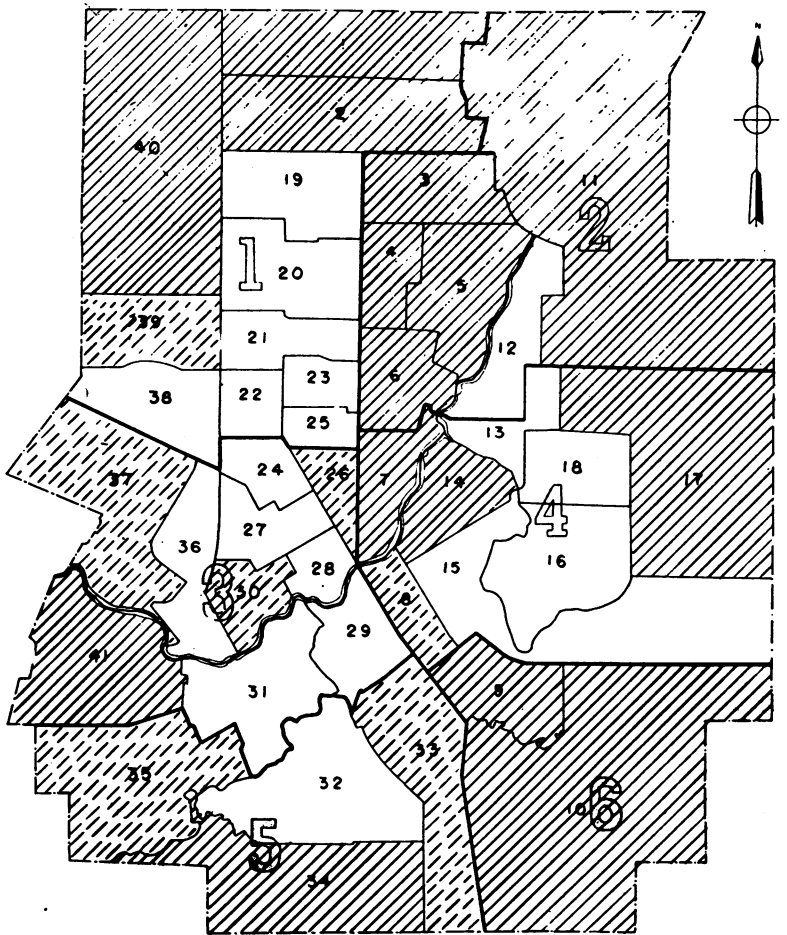




FIGURE 2—Tracts Exceeding City Average in Public Health Problem Indices

 MARKED
 SLIGHTLY

SCALE OF MILES

 LEGEND
 TRACT NUMBER 10
 PART-NUMBER 1

programs designed to improve plumbing and sewerage facilities.

b. The principal watercourse in the community provides insufficient dilution to assimilate the sewage load satisfactorily. Treatment plant effluent, with 85 per cent of B. O. D. removed, occasionally equals twice the stream flow. Untreated industrial wastes are estimated to equal the plant effluent volume. Tributary drainage courses contribute an unknown quantity of wastes from private septic tanks and cesspools. The feasibility of small community treatment plants to serve outlying developments is severely handicapped by the lack of dilution available.

c. As in the case of water supply, city policy prevents the use of city sewers by non-residents. Within the city, sewers have been extended to subdivisions containing many thousands of vacant lots and a few scattered houses.

d. There are no public sanitary sewers in the metropolitan area outside the city. Effluent from individual treatment installations pollutes open drains and ditches, which course the city from all sides. The resulting nuisance conditions are serious blighting influences, in addition to the hazard created by gross pollution of a surface reservoir which serves as an emergency water supply. Efforts to solve this problem have lacked concerted support and have been fruitless.

e. City and county health departments exercise rigid control over the construction of new septic tanks by a combination of licensing, permits, and inspection. Effective as this measure has proved, it falls far short of achieving the needed solution.

Housing—

a. Based on the combined indices of overcrowding, need of major repairs, and lack of private bath, public health problems existed in 15 of 41 census tracts, when overall city averages were

taken as standards.¹ Of these 15 problem tracts, 8 are along the city limits and consist of sparsely developed subdivisions. All of the 7 remaining problem tracts include or adjoin industrial areas (see Figure 2). There were only three tracts fulfilling the combined conditions of more-than-average new construction, less-than-average density, and fringe location, which did not show definite excesses over averages in the three indices of housing problems.

b. A partial explanation for the choice of suburban homesites by the majority of new home owners during recent years may be found in the picture of outlying residential areas within the city, possessing many natural attractions, but permitted to become prematurely blighted. The progress of blight, and its associated substandard health conditions, has been accelerated by at least 20 years in the newer residential sections, as compared with tracts containing older structures, if census data on housing conditions can be taken as a crude measure of blight.

c. Contributing to the impairment of the otherwise desirable marginal locations were two particular circumstances associated with periods of critical deficiency of the housing supply: first, the policy which permits subdivision development without requiring the installation of public water and sewers, illustrated by the fact that the principal sectors lacking water and sewer lines are in six of the fringe census tracts with above average incidence of substandard conditions; and second, a relaxation of building code requirements to permit substandard construction, until in 1938 over one-seventh of all dwelling units were of the so-called garage type, located on the rear of the lots in anticipation of constructing a conventional type home at some future date.

d. Speculative overdevelopment has not been limited to the city proper, as

indicated by an estimated 20,000 vacant subdivided lots in a mile-wide belt surrounding the city in 1938. The rate of home construction in the four townships surrounding the city has been greater than inside the city since 1930. Of the total number of dwelling units existing in the respective areas in 1940, 47 per cent were built in the townships since 1930, as compared with 10.5 per cent of the city total.

e. Some indication of suburban housing quality may be observed in these 1940 census figures for tracts bordering the city: From 0.1 to 25.7 per cent needing major repairs; 10.0 to 17.1 per cent with no running water; 13.5 to 30.7 per cent with no inside flush toilet.

County health department records reveal the construction of 446 septic tanks in the 4 suburban townships in 1946.

Overcrowding in 1940 existed in the unincorporated fringe in a ratio three times that of the city, a substandard condition not attributable to the lack of public water supply and sewers.

The ratio of home ownership in the unincorporated section is significantly higher than in the city, but the rate of turnover is much higher outside the city—a factor which may explain the want of concerted effort to secure community improvements.

Miscellaneous—

The scope of this study did not permit the examination of such environmental facilities as parks, swimming places, play areas, schools, drainage works, dumps, and various others. However, it was pointed out that the suburban sectors were deficient in the provision of public recreational facilities and depended largely on city and state services.

SERVICES RELATED TO ENVIRONMENTAL HEALTH

Garbage and Rubbish—

a. Collection practices in the city were evidently adequate, but costs were

obviously affected by the extensive outlying developments with houses widely scattered.

b. No public collection service was available for the suburban metropolitan area. Independent collectors were subject to no control. Vacant lots and roadside ditches have become unsupervised refuse dumps, as might be expected.

Food and Milk Control—

The city program has been an outstanding success, noted particularly for its pioneering efforts in educational techniques. But adjacent unincorporated areas, although similarly urban in character were governed by state statutes and regulations enforced by the State Department of Agriculture. Fortunately, amicable relations established with the agriculture department permitted supplementary inspection by the county health department, but legal requirements for the contiguous communities contained many disparities, such as the lack of any meat inspection requirement for unincorporated communities.

Miscellaneous Health Department Services—

a. Among the other services rendered more difficult by the decentralization movements have been the control of nuisances, house trailers, unkempt vacant lots, various types of business establishments, and the like. Former city residents, accustomed to expect high standards of service, fail to comprehend the limitations they encounter when they move outside the city into a newer and apparently more desirable subdivision.

SERVICES AFFECTING ENVIRONMENTAL HEALTH BUT ADMINISTERED BY AGENCIES OTHER THAN THE HEALTH DEPARTMENT

a. Planning, zoning, subdivision controls, and related services bear forcibly upon the community environment.

Many of the existing ills of this metropolitan community previously recounted can be ascribed to the rapid growth and accompanying decentralization that transpired prior to the establishment of the planning and zoning commissions. At the time this study was made (1946-1947), the city did not have a master plan, the zoning plan and regulations were obsolete, and subdivision regulations enacted in 1944 failed to provide for health department approval of plans. A recent instance illustrates the need for coordination of interests in the drafting and administration of such controls. A subdivision of 100 homes was well under construction, having been approved by the Planning Commission (without consultation with the health department), on the basis of individual or community private wells as the source of water supply and individual septic tanks for sewage disposal. Fortunately, an existing ordinance requiring health department permits for the construction of such facilities brought the developer to the health department, where he was informed that shallow wells could not be depended upon for safe water, and septic tanks could not function satisfactorily at the location in question. The builder was forced to arrange financing to provide city water and sanitary sewers, necessitating a sewage lift station, through no fault of his own. It is entirely possible that earlier knowledge of this exigency, to which he should have been entitled, might have prompted the choice of a site better located and already served by utilities, rather than the isolated, inconvenient location approved by the Planning Commission.

The construction of 322 septic tanks in the city during the preceding 5 years, while thousands of lots improved with public sewers remain vacant, attests again to the environmental health implications of planning and related services.

b. The townships encircling the city were without any planning, zoning, or subdivision controls. State enabling legislation authorizing local adoption of such programs had been enacted in 1943, and civic groups have been debating the possibility of local application. These townships have been experiencing the mistakes resulting from rapid unplanned growth that have afflicted the city in former years. Trailer camps, industries, and undesirable commercial establishments may be noted adjacent to otherwise desirable residential sections in the fringe area. This situation handicaps the efforts of the health department to obtain the badly needed environmental improvements, for it contributes to the despoiling of neighborhoods as permanent homesites, resulting in occupancy by a mobile population lacking in civic consciousness.

c. Housing, building, and plumbing codes are vital services in urban areas, of recognized import in the maintenance of a healthful community environment.² Communities which permit the construction of substandard dwellings, lacking essential sanitary provisions, are burdening the health department with a difficult and often hopeless task, for in congested areas these conditions become problems affecting the entire neighborhood, demanding corrective measures.

The high proportion of garage-type houses, basement houses, shacks, converted house trailers and similar dwellings, both within and outside the city in this metropolitan community testify to the failure of governmental services that might have precluded or modified this problem.

ADMINISTRATIVE PROBLEMS

a. Separate city and county health departments serving one metropolitan community always produce jurisdictional difficulties, but when large numbers of the populace of the central city

spill over or migrate to the suburbs the administrative difficulties of both are substantially augmented. In this instance further complications existed because of the numerous independent units of government in the county, and in addition, several environmental health activities were the legal responsibility of various state agencies.

The environmental health sections of both health departments were directed by competent, well trained sanitarians, who have developed superior programs in some fields and have endeavored to coordinate policies and programs. But the lack of qualified public health engineering personnel on the staffs was manifest by the impotence of the approach to some of the major problems of engineering character, such as sanitary utilities and subdivision controls.

b. There was no regional or county planning authority or other agency to coordinate attempts to solve environmental problems affecting both the city and county. The city housing, planning, and zoning programs had not progressed to the stage of positive, overall action necessary to correct past ills and prevent future mistakes. Much of the enforcement activity was limited to complaint investigation. The townships adjoining the city had just begun to consider the need for planning, subdivision controls, building codes, and related services.

c. The pronounced lack of coordination of the many programs and policies bearing upon the community's environmental health status is an administrative obstacle common to the larger cities. Communities suffering with a decided decentralization movement face the added task of harmonizing the efforts of various governmental units outside the central city. Such was the situation in the metropolitan community subjected to this study. The city had made little progress in the integration of policies and activities relating

to common problems, and was greatly handicapped with respect to suburban areas by the almost total lack of comparable services maintained in the county.

Neither the official city planner nor the city health department has been consulted in regard to the extensive improvement program contemplated for the water supply. Sewerage problems similarly were resolved by the public works department, with little participation by the health department except where lateral extensions were sought by the health department to correct insanitary conditions. Review of subdivision plans for water supply and sewerage was the exclusive responsibility of the public works agency. Garbage collection and disposal was another function of the public works department, conducted without the counsel of other units. Contrasting with such marked independence of action and policy, the building, plumbing, zoning, and housing inspection services performed by the department of public works demonstrated the possibility of coordinating programs of mutual concern to several official agencies. The widespread conditions of impending blight in this comparatively young metropolitan community require aggressive measures, with the collaboration of all agencies that can contribute to the rehabilitation of such conditions.

d. The city planning, zoning, and housing commissions, responsible for the administration of programs demanding the utmost degree of collaboration and integration with all units of government, were found to be functioning in an almost sequestered fashion. This practice was particularly noticeable with respect to health department relations. The planning commission membership did include the public works director, but provided for no functional committees with representative members from the numerous agencies concerned with the diverse facets of planning.

Consideration of environmental health cannot logically ignore the many health problems associated with blight, poor housing, overcrowding, atmospheric pollution, and similar conditions which planning and zoning purport to control and improve. Numerous studies have shown how blighted and slum areas become an economic liability, producing reductions in tax revenue and requiring increased municipal services, including public health.³ It is difficult to reconcile these known facts with the reported limited interest in the initiation of vigorous preventive and corrective measures to combat the decentralization movement. The tendency for specialization in governmental administration has frequently been overemphasized, and the ensuing confusion or misunderstanding is responsible for charges of inefficiency, extravagance, partiality, and prejudice.

An outstanding but not unusual illustration of the environmental health implications of zoning has been mentioned previously. The seven census tracts adjoining or including industrial establishments had a higher incidence of environmental health deficiencies than the city average, whereas other tracts similar in such characteristics as density and average age of structures had a lower-than-average incidence of such defects. This picture, demonstrating the influence of proximity to commercial and industrial zones, shows the need for re-zoning that would afford reciprocal protection to both industrial and residential interests.

The obvious need for expanded water and sewer systems in this community raises the zoning question when the design stage is reached. Adequate zoning will prove valuable in defining the anticipated maximum demand for specific areas.

Building, subdivision, and housing controls might be designated as prophylactic measures, subordinate to and integrated with planning and zoning. It has been aptly stated⁴ that, "No sub-

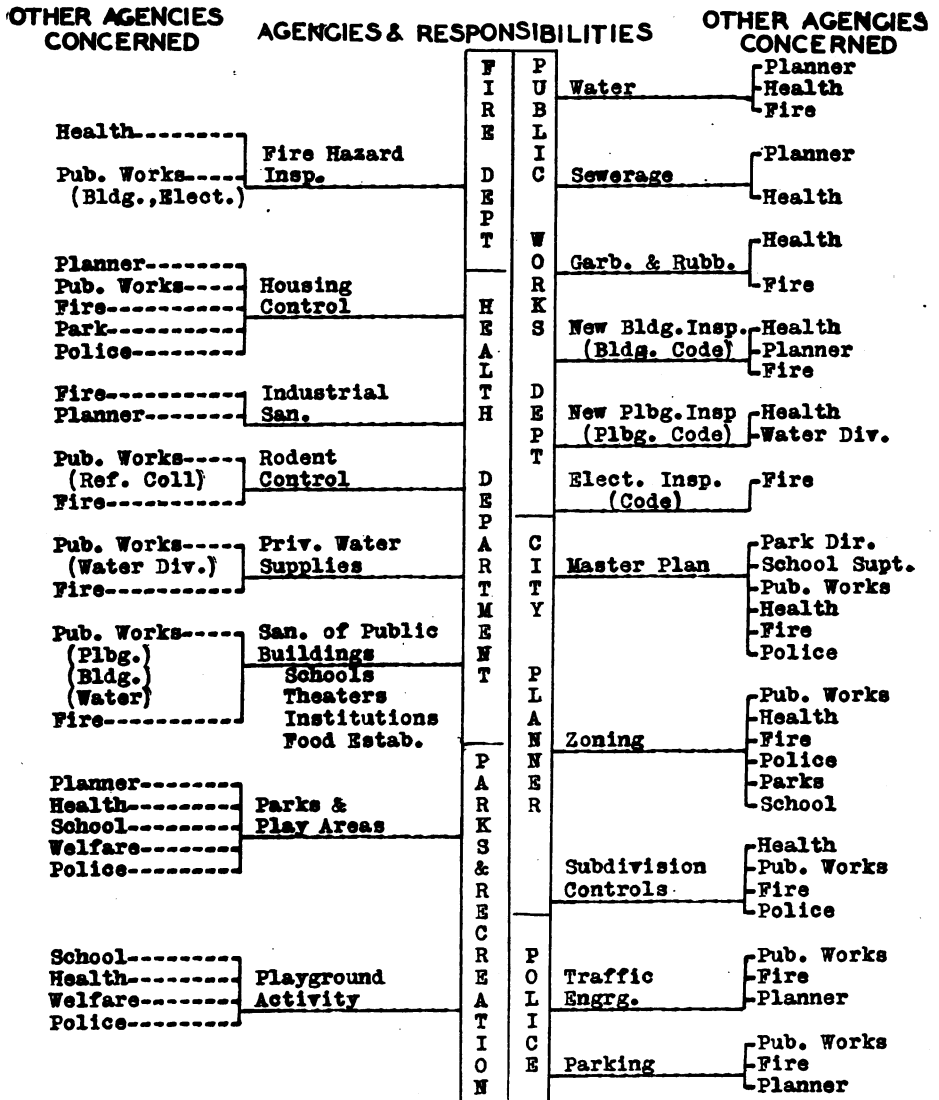
division can be sound, economically, unless it has all the improvements necessary to make home building a desirable investment. . . . Too often the innocent purchaser of a home finds himself faced with unforeseen heavy assessments for sewers and paving, which he is not financially prepared to meet. Furthermore, the cost of improvements in a neighborhood that is already built up will inevitably be higher than if the improvements had been provided at the outset." The critical substandard housing conditions in this community previously cited, lack of flush toilets, bath, running water, etc., constitute problems whose correction is a health department responsibility; but such conditions could have been *prevented* by good building, subdivision, and housing controls based on due consideration of environmental health.

The unincorporated fringe area, with its urban density of population, but without any pretense to urban facilities and controls, has already developed environmental conditions much worse than those in the city, with the health department efforts largely limited to the hopeless task of attempting to enforce general nuisance regulations designed for rural conditions.

CONCLUSIONS AND RECOMMENDATIONS

a. The conception of a metropolitan community as a single community, irrespective of political subdivisions, is essential to view its environmental health problems with an overall perspective. The health department as a service agency, typifies the possibilities of such treatment. As in this case, where separate departments serve the central city and its environs, it often has been extremely difficult to coordinate effectively even such well established and highly developed programs as milk and food sanitation. It is very doubtful that the much broader planning program, necessarily including

FIGURE 3—Interrelated Interests of Some Municipal Departments



many agencies within its scope, could be adequately developed in its environmental health phases when separate health jurisdictions are involved, and no metropolitan planning group exists.

An A.P.H.A. review of the public health program in this city and county in 1940 included a recommendation that the two health departments be combined. The solution of the environ-

mental health problems discussed in this report could be expedited in no small measure by such a step.

The employment of competent public health engineering personnel in responsible capacity should make possible increased emphasis on those environmental health problems of primarily engineering character.

b. Recognition of the hypothesis that

when extensive substandard environmental health conditions prevail in any section of a metropolitan community, they constitute a potential hazard to the entire community, will explain the necessity for coordinated planning and combined effort by the various agencies of all political subdivisions within the area.

The authors have attempted to show how pronounced decentralization trends within a typical metropolitan community have magnified the environmental health problems; how such problems relate to the responsibilities and activities of many governmental agencies; and the need for emphasis and initiative by the health department if other agencies are to give due consideration to the environmental health aspects of their programs. Observations reported here supply evidence of the importance of *preventive* measures in dealing with those causes of outward migration that involve environmental health conditions.

Figure 3 depicts the interrelated and overlapping interests of several municipal departments and suggests the possibility of an official committee as a means of effecting joint policies, eliminating duplication, and providing improved services. The expansion of such a committee to include comparable representation from the suburban areas would assure a broader perspective of mutual problems.

c. The similarity of environmental problems confronting the city and the populous suburban community presents an opportunity for health department participation in their solution, that could go far toward averting a repetition of past mistakes and omissions largely responsible for the present pernicious effects of the decentralization trend. Among such problems are the following:

1. The need for an additional source of water supply to serve the city, and for the extension of the water distribution system to serve adjoining areas.

2. The necessary expansion of the city sewage treatment plant, and the lack of sanitary sewers in the unincorporated fringe. Elimination of pollution of city streams.

3. Control of water supply cross-connections and abandoned wells.

4. The lack of any master plan in the community. Every effort should be made to approach this task as a metropolitan area problem. Public administration groups urge the use of a health committee in development of the master plan necessary for a wholesome environment.⁵ Specific public health interests in planning should include land uses, population density, types and location of industry, housing, water supply, sewerage, recreational facilities, zoning, subdivision control, community services, etc.

5. The need for re-zoning in the city and the lack of any zoning in the adjoining townships. The advantages of metropolitan zoning committees whose membership would include health authorities has been emphasized by Young.⁶ The health department can assist in the preparation of zoning plans and regulations, and, furthermore, can reinforce their application by review of applications for industrial and commercial establishments, investigation of appeal cases, and similar measures.

6. The city's subdivision regulations should be revised, and comparable regulations are needed in the adjacent townships. The need for adequate building, zoning, and subdivision regulations has been stressed by the private home building interests within the community.⁷ The health department is concerned not only with water supply and sewerage for new subdivisions, but to a large extent with surface drainage, grossly polluted open watercourses, atmospheric pollution, mosquito breeding places, rodent infestation, and other possible blighting influences.

7. The city building and plumbing codes need revision, and similar controls are sorely needed for the suburban area. Enabling legislation is provided, and uniform codes are advocated by state authorities.

8. The need for a comprehensive housing program is urgent, for the entire metropolitan community. The diverse phases of the housing problem have contributed materially to the urban development outside corporate city boundaries. A thorough study of housing conditions could be valuable in the planning of the needed program. It is claimed that for the most part the residential communities in the unincorporated areas are a tax liability to the county, penalizing the farm population and precluding the provision of essential facilities and services.⁸

REFERENCES

1. Bureau of the Census, U. S. Department of Commerce. *Sixteenth Decennial Census, Population and Housing Series*. Washington, D. C., 1942.
2. Committee on the Hygiene of Housing, A.P.H.A. The Improvement of Local Housing Regulation Under the Law. *A.J.P.H.*, 32:816-821 (Aug.), 1942.
3. United Auto Workers, CIO. *Memorandum on Post-War Urban Housing*, 1944.
4. American Society of Civil Engineers. Land Subdivision—*Manual of Engineering Practice, No. 16*, Jan. 17, 1939.
5. Public Administration Service. *Action for Cities*. Chicago, Ill., 1944.
6. Young, Hugh E. Practical Methods of Re-Zoning Urban Areas. *Proc. Am. Soc. Civil Engineers*, 458-508, Mar., 1938.
7. Urban Land Institute. *Opinion Survey on Urban Development and Re-Development*. Washington, D. C., Aug. 31, 1945.
8. Firey, Walter. Social Aspects to Land-Use Planning in the County-City Fringe. *Mich. State Coll. Spec. Bull. No. 339*, June 2, 1946.

Best Sellers in the Book Service for June

Alcohol, Science and Society. Haggard, 1948.....	\$5.00
An Appraisal Method for Measuring the Quality of Housing:	
Part I. Nature and Uses of the Methods, 1945.....	1.00
Part II. Appraisal of Dwelling Conditions. 3 vols., 1947.....	5.00
An Introduction to Public Health. Mustard, 2nd ed., 1944.....	3.50
Communicable Disease Control. Anderson, 2nd ed., 1948.....	5.00
The Control of Communicable Diseases, 6th ed., 1945.....	.35
Diagnostic Procedures and Reagents, 2nd ed., 1945.....	4.00
Diagnostic Procedures in Virus and Rickettsial Diseases. Francis, 1948.....	4.00
Milk and Food Sanitation Practice. Adams, 1947.....	3.25
Standard Methods for the Examination of Water and Sewage, 9th ed., 1946.....	4.00
35 Year Index of American Journal of Public Health, 1911-1945, 1948.....	7.00

Order from the Book Service

AMERICAN PUBLIC HEALTH ASSOCIATION

1790 Broadway

New York 19, N. Y.