Emphasizing the importance of knowing the "anatomy" of our communities, a health officer illustrates with two examples how epidemiological data and techniques can be used in program planning and suggests where more information is needed.

Epidemiological Techniques and Data in Planning Public Health Programs

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IT WOULD seem unnecessary to stress the reasons for the importance of program planning in public health. We have heard a great deal about program planning during the past few years, and we have learned that it, as well as program analysis, is a responsibility of a health department director that he must not shirk.

In order to plan new programs, we need an occasional glimpse of the health problems that lie ahead and of the techniques now being developed that may be applied to control them. We also need estimates of the current effectiveness of existing programs, for often new programs can be added only if obsolete activities are discarded. In both instances the data and techniques of epidemiology can be used to good advantage.

As long ago as 1927, that dean of American epidemiologists, Wade Hampton Frost, who was talking about the relating of disease frequency to population characteristics, said that we needed many "facts collected especially because of their epidemiological significance. These, which are, perhaps, the most distinctive data of epidemiology, include systematic collective observations on the incidence of different diseases in relation to such details of local environment, personal habits, past history, and individual traits as may be supposed to have a probable relation to the occurrence of the disease." This goes far beyond the usual morbidity and mortality rates according to age, sex, and race. In view of the developments during the past quarter of a century, we might translate for local environment: level of housing sanitation or fluorine content of the municipal drinking water; for personal habits: the number of packs of cigarettes smoked each week; for past history: frequency of prior accidents; and for individual traits: the state of the individual's nutrition in terms of percentage overweight or underweight. Then we have striking reminders of the acuity of Dr. Frost's statement.

Such data are the natural domain of public health. They form a basis for the determination of a particular community's peculiar anatomy. Here I should like to digress for a mo-

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ment to stress the importance of the concept of community anatomy.

Both the practicing clinician in medicine and his patients accept the ill individual as the clinician's proper field of operations. His knowledge of normal histology and anatomy and his training and experience in the pathogenesis and etiology of disease form the foundations of his value to the individual in curing or ameliorating illness. Also, it should now be firmly established that the public health physician has the additional responsibility of knowing the characteristics of the groups of individuals which make up his community and the disease patterns of the community as a whole and of its various population groups.

There is a parallelism here that cannot be ignored: Just as the private physician examines the various parts of the human body in order to understand what is going on in his individual patient, so must the public health physician examine a group of communitywide factors in order to understand disease patterns as they affect masses of people. But there is also a strict dichotomy: The kinds of information necessary to analyze and correlate community factors with disease prevalence are such that they are not readily available to the individual clinician, based as they must be on reports of disease, deaths, and births and involving, as they do, not characteristics of the individual but group patterns of these characteristics. Thus, only a community agency, such as the health department, is in a position to perform this function.

What are the factors involved in determining community anatomy? The following list, though by no means all inclusive, gives examples of the principal kinds of factors, a knowledge of which will add considerably to the understanding of community disease patterns.

Internal factors:

1. Age.
2. Sex.
3. Race.
4. Inherited tendencies.

External factors not controlled by public health programs:

5. Type of work and working environment.
6. Economic status, as reflected by housing and nutrition.
7. Climate and seasons.
8. Chronologic location on the long-term disease incidence cycle.

External factors controllable by public health programs:

9. Sanitation.
10. Physiological resistance to disease.
11. Isolation, quarantine, and hospitalization.
12. Health education.

Now let us turn to some illustrations of the use of epidemiological data and techniques in program planning and analysis.

Diabetes Case Finding

During the past 5 years in Erie County, N. Y., the health department has been cooperating with the medical society and the public health laboratory in a program of diabetes case finding, using mass survey techniques. Because the collection of capillary blood samples was found to be much more acceptable to large groups of people than the collection of urine samples, fairly extensive use has been made of the Wilkerson-Heftmann blood glucose test. At first, voluntary laboratory technicians carried out the examinations, but during the past year, the clinitron has been used.

In this program, we have tried to tie in the operation of detection centers with public education on diabetes, particularly stressing the population groups that we believe most likely to have undiscovered clinical diabetes. It was decided early to direct our message toward people who are over 40 years old and overweight and who have a family history of diabetes. Also, it was decided to emphasize the danger among women in these categories.

During the first 4 years, detection centers were operated for less than 1 week each year in a few of the large department stores in downtown Buffalo and for exactly 1 week in the health building at the county fair. Since the county fair is traditionally in August, the city survey was conducted in the wintertime. During the past year, two major changes were made in the distribution of case-finding services: First, detection centers were set up in four different locations in the city at 2-month intervals. Second, the Wilkerson-Heftmann clinitron test was made a part of the health department chest clinic routine.

Let us now consider questions which should be asked about this kind of operation, some of which can be answered by application of epidemiological data and techniques. Does the nature of our appeal to the public and the location of the centers give us the kind of test groups we think we should be reaching? And, of course, does the yield of positive tests confirm or disprove the validity of our basic assumptions as to which groups should be reached?

Clinical verification of positive tests has not been considered in evaluating the program. It is assumed that persons with blood glucose values above the screening levels used deserved further medical consultation and that the clinical diabetes yield in these groups would be greater than in otherwise similar groups with lower blood glucose levels. Few, if any, persons with known diabetes are included in the test groups. Each person reporting for a test was asked twice whether or not he had diabetes, first by the volunteer worker who filled out the history sheet and again by a public health nurse just before the test was made. If the answer was yes, the person was either not tested or his record was excluded from the subsequent tabulations.

Characteristics of 1950 and 1951 Test Groups

As shown in table 1, between 27 and 33 percent of the population in Erie County in 1950 was 45 years of age or over, but more than 50 percent of the 1950 and 1951 diabetes test groups were in this age group. Thus, we succeeded in testing considerably more people past the age of 45 years than were normally distributed within the community. We also tested considerably more women than men. In the age groups 15 to 44 years and over 45 years there were 3 women to every man. It might be noted that there was no significant difference in age distribution in the population between males and females.

There are certain other internal factors about which we have information for the test groups but none for the population as a whole. For instance, the data concerning history of diabetes in the family showed that 27 percent of the 1950 group and 25 percent of the 1951 group had such a history. Incidentally, over 70 percent of the known prior cases were among lineal relatives rather than collateral relatives. It would seem unlikely that 1 out of 4 people in the general population has diabetes in the family, but at present there are simply no adequate data for comparison.

Furthermore, we were interested in testing people who were overweight and particularly women who were overweight. Forty-four percent of all women in the 1950 and 1951 test groups admitted to weights of over 150 pounds, and 37 percent of those under 5 feet and 4 inches in height still admitted to weights of over 150 pounds. Here again, there are no good communitywide data for comparison, but it would seem that the test groups were really weighted in the direction in which we had hoped they would be.

Table 1. Age distribution of population in Buffalo and Erie County, N. Y., in 1950 and of the 1950 and 1951 diabetes test groups

Age (in years)	Buffalo		Erie County, exclusive of Buffalo		Diabetes test groups			
					Males		Females	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All ages	583, 132	100. 0	319, 106	100. 0	1, 960	100. 0	5, 802	100. 0
Under 15	129, 299	22. 2	88, 901	27. 9	106	5. 4	133	2. 3
15–44	265, 203	45. 5	142, 467	44. 6	858	43. 8	2, 496	43. 0
45 and over	188, 630	32. 3	87, 738	27. 5	985	50. 2	3, 155	54. 4
Unknown					11	. 6	18	. 3

Table 2. Yield of positive tests in 1950 [1] and 1951,[2] according to age

Age (in years)	Number tested		Number positive		Percent positive	
	1950	1951	1950	1951	1950	1951
All ages	3, 959	3, 803	618	54	15. 6	1. 4
Under 15	152	87	9	0	5. 9	0
15–44	1, 612	1, 742	170	13	10. 5	. 7
45 and over	2, 168	1, 972	436	41	20. 1	2. 1
Unknown	27	2	3	0	11. 1	0

[1] Screening level of 130 mg. percent after eating.
[2] Screening level of 180 mg. percent after eating.

Yield of Positive Tests in 1950 and 1951

As shown in table 2, there was indeed a tremendous difference in percentage of positive tests between the younger age groups and the age group 45 years and over. Even among the young adults, those aged 15 to 44 years, the yield of positive tests was only about half the yield among the oldest group. This was true for the 1951 group, for whom the blood-sugar screening level of 180 mg. percent was used, as well as for the 1950 group, for whom the very low screening level of 130 mg. percent was used.

From table 3, we see that there was, as expected, a considerably higher yield of positive tests among overweight people, if we accept two broad weight groups—over 150 pounds and under 150 pounds. The yield in the group over 150 pounds was from 30 to 55 percent greater than the yield in the group under 150 pounds.

With respect to the yields according to sex and history of diabetes in the family, however, the data did not confirm our original hypotheses. For 1950, when the lower screening level was used, 15.4 percent of the males and 15.7 percent of the females had positive tests—not a significant difference. For 1951, when the higher screening level was used, there was still no real difference in yields according to sex—1.5 percent positives among males and 1.4 percent positives among females.

Table 3. Yield of positive tests in 1950 [1] and 1951,[2] according to weight

Weight (in pounds)	Number tested		Number positive		Percent positive	
	1950	1951	1950	1951	1950	1951
All persons	3, 959	3, 803	618	54	15. 6	1. 4
Under 150	1, 894	1, 797	257	20	13. 6	1. 1
150 and over	2, 034	1, 985	355	34	17. 5	1. 7
Unknown	31	21	6	0	19. 4	0

[1] Screening level of 130 mg. percent after eating.
[2] Screening level of 180 mg. percent after eating.

As shown in table 4, neither in 1950 nor in 1951 did we observe any excessive yields associated with prior diabetes among relatives. This finding cannot be fully explained, but it may be that cases in which heredity is a factor are discovered early in life and would therefore not be reflected in these test groups, which are made up largely of older adults.

Table 4. Yield of positive tests in 1950 [1] and 1951,[2] according to history of familial diabetes

History	Number tested		Number positive		Percent positive	
	1950	1951	1950	1951	1950	1951
All persons	3, 959	3, 803	618	54	15. 6	1. 4
Without history of familial diabetes	2, 884	2, 844	452	39	15. 7	1. 4
With history of familial diabetes	1, 051	952	163	15	15. 5	1. 6
Unknown	24	7	3	0	12. 5	0

[1] Screening level of 130 mg. percent after eating.
[2] Screening level of 180 mg. percent after eating.

A Group Tested in 1954

Finally, let us consider a group tested for diabetes during the first quarter of 1954 as part of the routine of the health department chest clinic. Table 5 shows some of the characteristics of this group. The numbers of males and females were practically equal. It is still predominantly a group of older persons, but only 52 percent were over 40 years of age whereas this percentage were over 45 years in the 1950 and 1951 groups. Again, we did not find an excess of positive tests among females; in fact, we found the percentage higher among males.

Table 5. Yield of positive tests among chest clinic patients, according to age, first quarter of 1954 [1]

Age (in years)	Number tested		Number positive		Percent positive	
	Males	Females	Males	Females	Males	Females
All ages	1, 503	1, 423	46	21	3. 1	1. 5
Under 40	695	713	10	1	1. 4	. 1
40 and over	808	710	36	20	4. 45	2. 8

[1] Screening level of 160 mg. percent after eating.

Because the screening level was again changed, this time to 160 mg. percent of glucose, direct comparisons between this group and the earlier ones is impossible, but it is interesting to note the continuing preponderance of yield in the older age group.

To recapitulate, we see how such factors as age, sex, body weight, and heredity can be considered in both the planning of a diabetes case-finding program and later in an analysis of the extent to which those plans have been carried out. The ultimate evaluation of the program must, of course, take into account clinical confirmation of cases referred on the basis of positive blood tests as well as the prevention of disability and death resulting from the early discovery of cases.

Housing and Health

One hundred and four years ago, Lemuel Shattuck, in his Report of the Sanitary Commission of Massachusetts, said, "The condition of dwelling houses has a most intimate and important relation to the health of the inmates." Since that time there has been general acceptance of this dictum, and many statements have been made sympathetic to the theory that better housing might produce better health. But the quantitative relating of housing to health is difficult and has been attempted infrequently. Obviously, the problem is a complicated one, with the whole picture of depressed economic status, rather than just the condition of housing, having an important bearing on health.

In approaching this problem, we must first try to find out whether the life expectancy for people living in areas of crowding, poor sanitation, and lack of recreational facilities actually differs from that for people living in more fortunate circumstances and, if it does, just what the difference amounts to in a specific situation. Then, as one step in attempting to sort out the impact of crowding and improper sanitation in contrast to inadequate provision of medical care, we might try to determine the causes of excess mortality and see whether there is a preponderance among those diseases characterized as infective and parasitic. We might expect such a preponderance if crowding and improper sanitation are major factors in decreased life expectancy, since upper respiratory infections or hand-to-mouth and vector-transmitted infections are most likely to occur under these conditions. We might also get a rough check on some of the related factors by making nutrition surveys on a sampling basis in areas with varying economic status. Such surveys might indicate whether or not nutritional inadequacies are contributing to the morbidity and mortality pattern.

During the past year, we have attempted to do various of these things in the city of Buffalo. First, all the census tracts were grouped into three economic categories: above average, average, and below average. United States Bureau of the Census data on housing for 1950 were used, and three characteristics were considered—density of population, adequacy of water supply, and presence or absence of toilet facilities. Then, life tables were prepared for the population in each of those three groups of

Table 6. Life expectancy at birth, according to socioeconomic areas, Buffalo, 1950

Socioeconomic areas [1]	Life expectancy (in years)		
	All persons	Males	Females
Above average	68. 5	67. 0	69. 9
Average	66. 9	64. 8	68. 9
Below average	61. 8	59. 9	64. 5

[1] Census tracts grouped according to density of population, adequacy of water supply, and toilet facilities, from United States Bureau of the Census data on housing.

Table 7. Average death rates [1] for deaths from infective and parasitic diseases and for all other deaths (except deaths from accidents) by socioeconomic area, according to age, Buffalo, 1949–52

Age (in years)	Socioeconomic areas					
	Below average		Average		Above average	
	Infective and parasitic diseases [2]	All other causes, except accidents	Infective and parasitic diseases [2]	All other causes, except accidents	Infective and parasitic diseases [2]	All other causes, except accidents
All ages	89. 9	1, 094. 3	31. 5	1, 035. 2	13. 7	933. 3
Under 1 year	72. 5	3, 425. 0	31. 2	2, 757. 8	(3)	2, 424. 4
1–4	27. 6	80. 5	9. 9	77. 0	8. 8	69. 3
5–9	4. 5	47. 4	5. 9	26. 6	(3)	19. 7
10–14	2. 6	26. 4	3. 6	19. 4	(3)	52. 5
15–19	25. 2	78. 5	5. 5	36. 9	4. 7	4. 7
20–29	51. 4	93. 0	16. 9	56. 8	8. 5	63. 9
30–39	59. 6	249. 9	25. 8	140. 5	6. 4	136. 2
40–49	115. 6	727. 0	33. 8	495. 5	14. 3	360. 9
50–59	206. 0	1, 829. 4	52. 1	1, 298. 4	27. 2	1, 018. 8
60–69	252. 2	4, 133. 7	86. 7	2, 997. 0	17. 8	2, 752. 5
70 and over	252. 9	9, 500. 9	67. 9	8, 589. 9	62. 6	8, 547. 4

[1] Per 100,000 population.
[2] International List Nos. 001–138.
[3] Too few deaths to calculate reliable rates.

census tracts, and the life expectancies determined. As shown in table 6, there is a difference in expected life span for females of 5.4 years and for males of 7.1 years between the upper and lower economic groups. The difference persists for all age groups, but it is relatively greater in the older ages and reaches its peak at ages 50 to 59. In terms of absolute differences, the maximum difference in life expectancy exists at birth and decreases with increasing age—from 10.0 years at birth to 1.1 years for persons aged 75 years old or older.

If these differences are really due to increased morbidity of the type that one might expect to result from crowding, unsafe water supply, and insanitary sewage disposal, then we should expect a much greater difference in death rates for infective and parasitic diseases than in death rates for other causes. To determine whether or not this situation existed, we tabulated the average resident death rates for the infective and parasitic diseases and for all other causes, except accidents, by economic area according to age group, as shown in table 7. In these data, we see a consistent pattern of increasing mortality from the infective and parasitic diseases at every age level in inverse relation to economic status. The differences in mortality rates for all other causes among the economic areas are much less. Moreover, as shown by the data in table 8, the differences in the mortality rates for four of the most frequent causes of death—heart disease, cancer, stroke, and diabetes—between the high and low economic areas are still less. The factors of crowding, water supply, and sewage disposal are not known to have much, if any, pathogenic effect on these diseases.

These few figures, incomplete though they are, indicate some of the quantitative data

Table 8. Average resident death rates [1] for deaths from four causes, by socioeconomic areas, Buffalo, 1949–1952

Cause of death	Socioeconomic areas	
	Below average	Above average
Diseases of the heart	493. 9	443. 3
Malignant neoplasms	185. 6	169. 2
Vascular lesions affecting central nervous system	94. 6	100. 7
Diabetes	26. 9	21. 2

[1] Per 100,000 population.

which are helpful in both program planning and program analysis insofar as external factors affecting health are concerned. They were used in persuading the Buffalo Common Council to enact, as they did, a minimum standards housing ordinance based on that recommended by the American Public Health Association's Committee on Housing. Similar analyses in the future should enable us to determine whether or not enforcement of the ordinance has any effect on the health of the people.

Other External Factors

Of the many examples of external factors in community anatomy, in addition to housing, that could be given, I shall mention only a few:

The percentage of sputum positive tuberculosis patients hospitalized would be one of the indexes of the control of one communicable disease.

The number of contacts named per case of early syphilis reported and the percentages of these contacts examined, found infected, and treated would be indexes of the control of another.

The fluorine level of the drinking water supply and the percentage of children immunized against diphtheria, tetanus, and pertussis would be indexes of physiological resistance of the community to specific ills.

As indexes of the level of sanitation, the percentage of pasteurized milk sold in a community, the percentage of municipal water supplies being adequately treated, and the percentage of public and private sewage being disposed of in an approved fashion could be determined.

All these factors are measurable indicators of a community's barriers against disease.

Thoughts for the Future

Most of the epidemiological data discussed so far are fairly traditional, many of them based on the recording of population characteristics, morbidity, and mortality. A few of the data, such as those on body weight and family history in the diabetes case-finding program, have been used less frequently than others. But if we are to know the anatomy of our communities, we must go beyond these starting points. There are at least three areas in which we certainly can secure additional information.

One area of valuable information is, of course, the data recorded by the vital statistics units. We should make full use of the currently available data, and we should expand the sources of such data at least to include local sample population groups, to be kept under continued observation for morbidity, and national sample population groups, to be used for special studies.

A second area might well be a series of physiological determinations of resistance to disease. It is true, Schick test surveys have been done to determine the relationship of natural and artificial immunization against diphtheria to the community's level of protection; and tuberculin test surveys have served from time to time to give us a measure of the infection rate in different parts of a community, as well as some indication of the ratio between unsensitized and sensitized persons. But we need much more information. We should be able, for example, to start very soon to map some of the virus disease patterns as they relate to antibody levels in different population groups. With more laboratory facilities, this could be done right now for poliomyelitis.

A third area in which data can be secured has as yet scarcely been tapped. That is the area of attitudinal surveys. The framing of opinions, their genesis and their background, may be exceedingly difficult to assess, but some day we should have measures of at least the end results.

Chronic alcoholism is a good example of a public health problem that has bogged down because of negative reactions. Yet, even the people working most intimately with this problem have no ready measure of the effectiveness of their efforts to change the community's attitude toward it.

Another example of a problem which involves attitudes is that of accident prevention. Here we are pulled and pushed between the people who say, "We must define accident problems to the community so that every individual will be aware of the hazards he faces," and those who say, "By emphasizing the way in which accidents happen you frighten people so that actually they become more accident prone." Yet, even with this basic dichotomy of opinion, we have no generally acceptable index of change in people's attitudes that would enable us to measure the effectiveness of different techniques.

In conclusion, may I urge that we accept and utilize the concept of community anatomy. To do this effectively, we must develop adequate epidemiological data, in the broadest sense of the term, to describe our communities, their people, their health problems, and their health protective resources. In this way, we can help our community improve the health and happiness of its people.

Poliomyelitis Vaccine Advisory Committees

Appointments were made in May 1955 to three key advisory groups to aid the Department of Health, Education, and Welfare and the Public Health Service in the formulation of policies concerning safeguards for the production, continued research, and the distribution of Salk poliomyelitis vaccine.

Named to the permanent advisory group, called the Technical Committee on Poliomyelitis Vaccine, are the following: David Bodian, poliomyelitis laboratory, Johns Hopkins University School of Hygiene and Public Health; Thomas F. Francis, Jr., School of Public Health, University of Michigan; Jonas E. Salk, virus research laboratory, University of Pittsburgh; Richard E. Shope, Rockefeller Institute for Medical Research; Joseph E. Smadel, department of virus and rickettsial diseases of the Army Medical Services Graduate School; John F. Enders, department of bacteriology and immunology, Harvard University Medical School; William McD. Hammon, department of epidemiology and microbiology, University of Pittsburgh Graduate School of Public Health;

Arthur C. Hollister, Jr., bureau of acute communicable diseases, California State Department of Public Health; Robert F. Korns, poliomyelitis vaccine evaluation center, University of Michigan, and bureau of epidemiology and communicable disease control, New York State Department of Health; Edward H. Lennette, viral and rickettsial disease laboratory, California State Department of Public Health;

G. Foard McGinnes, National Foundation for Infantile Paralysis; John R. Paul, Yale University Medical School; Albert B. Sabin, Children's Hospital Research Foundation, University of Cincinnati College of Medicine; Howard J. Shaughnessy, Illinois Department of Public Health; and Herdis von Magnus, State Serum Institute, Denmark.

Surgeon General Leonard A. Scheele named Bodian, Francis, Salk, Shope, and Smadel to a Standing Expert Committee. James A. Shannon, associate director of the National Institutes of Health, Public Health Service, was named chairman of this group.

Health, Education, and Welfare Secretary Oveta Culp Hobby named the following to serve on the National Advisory Committee on Poliomyelitis Vaccine:

Chester S. Keefer, committee chairman, and special assistant (for health and medical affairs) to the Secretary of Health, Education, and Welfare; Philip S. Barba, American Academy of Pediatrics; Daniel Bergsma, New Jersey State commissioner of health; Robert Fischelis, American Pharmaceutical Association; Malcolm Phelps, American Academy of General Practice; Julian P. Price, American Medical Association; George M. Uhl, Los Angeles city health officer;

Basil O'Connor, National Foundation for Infantile Paralysis; Mrs. Newton P. Leonard, National Congress of Parents and Teachers; Mrs. Charles L. Williams, National Congress of Colored Parents and Teachers; and Frank W. Moudry, National Association of Retail Druggists.