Geographic Variation in First Admission Rates to a State Mental Hospital

PHILIP H. PERSON, Jr., M.S.

ONE factor in the relationship between a State mental hospital and the community it serves is the differential rate of admission among various segments of the population. This study is concerned with the effect of patients' places of residence on first admission rates. Specifically, the hypothesis is that first admission rates vary inversely with the distance between patients' places of residence and the hospital.

The well-known Faris and Dunham study concerned a large metropolitan area (*1*). Locke and associates (*2*) analyzed rates of first admission to an entire State mental hospital system by patient's place of residence and a gross measure of distance from the hospital; that is, counties with or without various psychiatric facilities. Hodges and Dörken studied the distance traveled by patients receiving services in three outpatient psychiatric clinics in Minnesota (*3*). These data did not relate the number of patients traveling specified distances to the populations in their residential areas. The evaluation was made only on percentage distributions of patients classified by the distances they traveled to clinics. The present study compares first admission rates per 100,000 population specific for patients' places of residence in terms of distance and direction from the Warren State Hospital, Warren, Pa.

Hospital and its Service Area

The Warren State Hospital, with about 3,000 resident patients, is fairly large in comparison with the 266 public prolonged-care mental hospitals in the United States. In 1958, 20 percent of these hospitals had fewer than 1,000 resident patients, 56 percent had 1,000–2,999, 16 percent had 3,000-4,999, and only 8 percent had 5,000 or more resident patients (*4* and unpublished data from the National Institute of Mental Health). During 1948–52 the Warren State Hospital had an annual average of 735 first admissions (a rate of 90.6 per 100,000 population).

Comparative distributions by mental diagnosis for the hospital for 1948–52 and the total U.S. public mental hospitals for 1950 indicate that the State hospital had somewhat higher proportions of schizophrenic first admissions and resident patients, whereas differences in proportions of patients with diseases of the senium (psychoses with cerebral arteriosclerosis plus senile psychoses) and other selected diagnoses were much smaller (table 1). Comparisons of median ages reveal that patients first admitted to and resident in the Warren State Hospital were older in almost every diagnostic group than the corresponding patients for the total U.S. public mental hospitals.

The Warren State Hospital opened in 1880, and some parts of the original physical plant are still in operation. However, several buildings have been added, the latest being the admission building in 1952.

The hospital is located in northwestern Pennsylvania, about 3 miles outside Warren, a city of about 15,000 population. The hospital serv-

Mr. Person is a statistician with the Hospital Studies Section, Biometrics Branch, National Institute of Mental Health, Public Health Service. *Data and consultation for this study were provided by the staff of the Warren State Hospital, Warren, Pa.*

ice area includes 13 surrounding counties with a total area of 10,208 square miles. The distance is roughly 80–100 miles from the hospital to the more remote parts of this area. The topography of these 13 counties changes from northwest to southeast from the lowland plain along Lake Erie, to the Allegheny plateau region, to the more mountainous area near the Allegheny Front. The Allegheny River cuts through the 13-county area and passes through Warren.

The 1950 U.S. Census of Population characterizes the population of 811,651 in these 13 counties as 50 percent urban, about 35 percent rural nonfarm, and 15 percent rural farm (*5*). Most of the urban population resides in urban places (*5*) under 10,000, with only a scattering of cities in the 10,000–25,000 range. The total U.S. population is more urban (64 percent) and less rural nonfarm (21 percent), but has the same proportion of rural farm population (15 percent). The only city with greater than 25,000 population is Erie with a population of about 130,000 and its additional urbanized area (*5*) of about 21,000 population. The only standard metropolitan areas (*5*) contained in the 13 counties are Erie, with a population of 219,388, and part of Youngstown (Ohio). Therefore, except for these two areas, the general population density is low, varying from 11.8 persons per square mile to 96.8. Erie County (the Erie standard metropolitan statistical area) has a population density of 164.4. By way of contrast, Allegheny County's (Pittsburgh) population density is 2,075.7, and that of Philadelphia County is 16,311.9. Other

Table 1. Percentage distribution and median age of first admissions and resident patients at end of year by selected diagnosis, Warren State Hospital, 1948–52 and 1951, and total United States, 1950

Diagnosis	Percent distribution				Median age			
	First admissions		Resident patients		First admissions		Resident patients	
	Warren State Hospital, 1948–52	United States,[1] 1950	Warren State Hospital, 1951	United States,[2] 1950	Warren State Hospital, 1948–52	United States,[2] 1950	Warren State Hospital, 1951	United States, 1950
Total number of patients	3,677	108,302	2,918	260,839				
Percent	100.0	100.0	100.0	100.0	50.2	46.3	54.0	52.8
General paresis	2.0	2.9	4.4	5.7	49.3	48.9	50.0	51.8
Psychosis with other forms of syphilis of the CNS	.2	.4	.3	.9	([3])	49.3	([3])	52.7
Psychoses due to alcohol	3.1	4.5	2.0	2.2	46.7	44.8	60.0	56.5
Psychoses with cerebral arteriosclerosis	18.7	14.7	5.1	7.1	75.3	70.4	74.0	72.0
Senile psychoses	7.6	11.2	4.5	5.4	77.7	76.0	78.9	77.6
Involutional psychoses	3.9	4.8	1.9	2.7	61.2	53.0	64.0	59.4
Manic depressive psychoses	2.3	5.3	6.0	7.7	53.9	41.8	61.6	57.7
Schizophrenia	28.3	23.3	52.4	45.3	34.5	32.4	47.7	48.0
Paranoia and paranoid conditions	1.3	1.1	4.5	2.5	55.3	49.3	66.4	61.7
Psychoneuroses	5.6	5.0	1.2	1.1	41.0	36.3	51.0	47.3
Mental deficiency with and without psychoses	1.7	3.6	6.5	9.4	34.5	29.5	50.9	44.1
Alcoholism without psychoses	6.3	7.6	.7	1.0	44.0	42.2	([3])	46.5
All other diagnoses	19.0	14.6	10.5	8.7	45.2	39.5	53.3	47.5
Mental disorder undiagnosed	0	.6	0	.3		44.9		48.1
No mental disorder found	0	.4	0	.0		34.5		43.1

[1] Does not include 5,752 first admissions (under-reporting).
[2] Does not include 251,662 resident patients (under-reporting).
[3] Median not shown when total is less than 20.

SOURCE: Patients in Mental Institutions, 1950 and 1951, Public Health Service Pub. No. 356, U.S. Government Printing Office, Washington, D.C., 1954, and unpublished data collected in the annual census of mental patients, National Institute of Mental Health.

population characteristics and comparisons with the total United States are shown in table 2.

These 13 counties represent the Warren State Hospital's service area in the following sense: Persons residing within these specified counties may gain admission to the hospital while those living outside them would not go to the Warren State Hospital but rather to one of the other 16 Pennsylvania State mental hospitals (*6a*). This feature makes the Warren State Hospital and its service area a relatively closed system with respect to admission to a State mental hospital. The only exceptions are emergency admissions of nonresidents or admissions with the intention of subsequent transfer to another facility.

A residentially bounded area makes possible a study of the spatial distribution of hospital admissions to determine whether new admissions come largely from areas close to the hospital or whether admissions are spread uniformly throughout the area in proportion to the population in the area. The following analysis demonstrates that, for the Warren State Hospital, the geographic distribution of first admissions is not random and that the emergent pattern cannot be accounted for entirely in terms of distance from the hospital. However, any evaluation of such an analysis must recognize that no data exist regarding the true geographic distribution of the incidence of mental illness. In the past it has been common practice to use mental hospital first admission rates as estimates of incidence, but these data are subject to an unknown error, namely, the size of the gap between the rate of incidence in the population and the rate of first admission to mental hospitals. This gap, representing nonhospitalized persons with mental illness, has been discussed by Kramer, Pollack, and Redick (*7*).

Development of an Analytical Model

In this study, the comparison statistic is the rate of first admission to the hospital, where the rate is defined as the average annual number of patients first admitted to the Warren State Hospital during the calendar interval 1948–52 divided by the "population exposed to risk during the same interval." Population data for small areal units are available only from the 1950 U.S. Census of Population and these data provide estimates for the denominators. A central rate is used, except that the population is as of April 1, 1950, rather than July 1, 1950.

Three elements were used to define the analytical model: (*a*) distance from the hospital, (*b*) direction from the hospital, and (*c*) type of patient residence (urban or rural). The distance variable in this study is linear distance, that is, straight-line distance as measured on a map. Actually, such distances could be misleading where "straight-line" mileage was far exceeded by "highway" mileage. Suppose topography were such that the "highway" distance between point A and point X was 40 miles

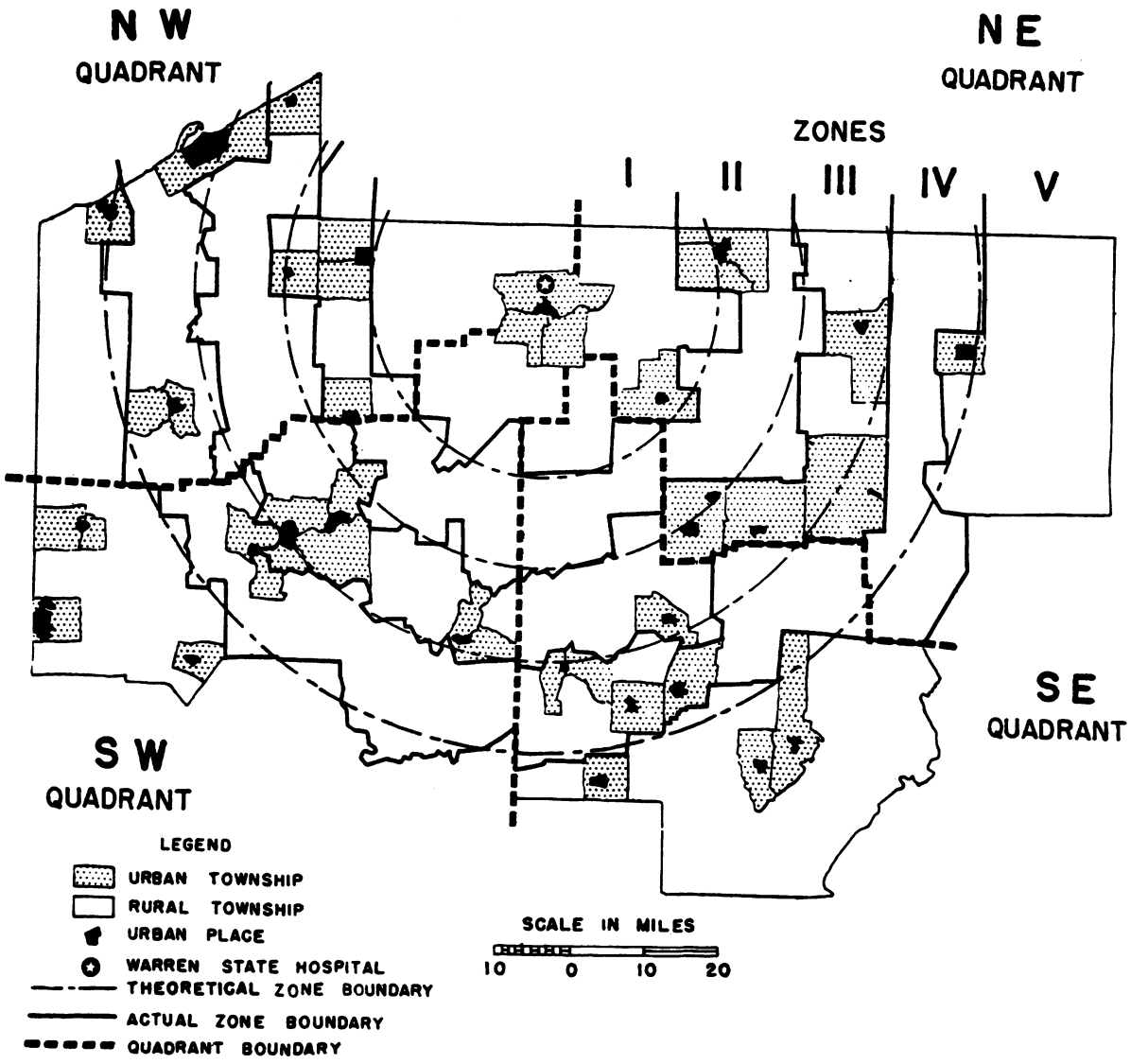
Table 2. Population characteristics of the 13-county hospital service area and of the total United States, 1950

Selected population characteristics	Hospital service area	Total United States
Median family income	$3,003	$3,075
Sex ratio (male : female)	98. 5	98. 6
Median years of school completed:		
Male	9. 2	9. 0
Female	10. 1	9. 6
	Percent	
Proportion married:		
Male	66. 9	67. 6
Female	65. 2	65. 7
Proportion of single females	22. 0	20. 1
Proportion of nonwhite	1. 2	10. 4
Proportion of white foreign born	5. 1	6. 7
Proportion in labor force:		
Male	77. 4	78. 7
Female	24. 9	28. 9
Proportion in selected occupations:		
Males:		
Professionals	6. 0	7. 3
Managers, proprietors, and officials	8. 9	10. 7
Salesmen	4. 8	6. 4
Service workers	4. 3	5. 9
Farm laborers and foremen	1. 7	3. 4
Farmers and farm managers	6. 3	10. 3
Craftsmen and foremen	21. 7	18. 6
Operatives	27. 3	20. 0
Laborers	11. 0	8. 2
Females:		
Clerical	24. 0	27. 3
Private household workers	5. 5	8. 5
Saleswomen	11. 1	8. 5
Operatives	22. 6	19. 2

but the "straight-line" distance was only 20 miles (A and X might be separated by a mountain, lake, or some other topographic feature). Also, suppose that both the "straight-line" and "highway" distances were 20 miles between B and X. Then the linear distance concept places both points A and B equidistant from point X when, by ordinary surface transportation, point A is twice as far from point X as is point B. In cases of this type, a more realistic measure of distance would use some sort of time-mileage-cost function, such as the concept of "ecological distance," developed by Quinn (*8*) and defined by him as a measurement of distance between two points in terms of cost of moving men or materials taking account of such factors as time, money, energy, waste, danger, and discomfort. However, an examination of a roadmap revealed a seemingly sufficient network of highways within the Warren State Hospital area; thus, a more precise measurement of distance probably would not warrant the added complexity. The analytical model, therefore, uses linear distance.

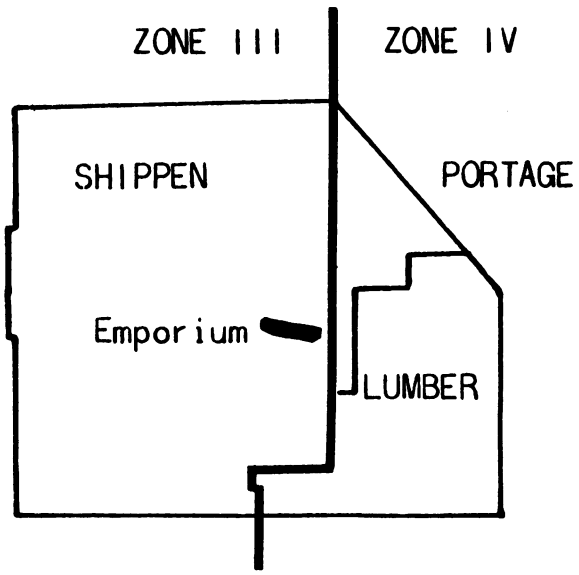
Distance from the hospital was measured roughly by the use of zones in the form of con-

Figure 1. Zones, quadrants, and type of residential area, Warren State Hospital 13-county service area



centric circles with the hospital at the center. This is similar, in appearance at least, to Burgess' original zonal pattern for city development (*9*); but the application in the model is more in line with Shaw's zones for the determination of delinquency rates (*10*). Shaw computed delinquency rates for the total area of each zone where the zonal pattern was imposed on a city with the center of the city as the center of the concentric rings. However, this approach makes the assumption that, with respect to the study variable, there will be differences between zones and no significant variation within any given zone. Since, in the present study, this assumption may not be valid for entire zones, the problem was approached by applying the assumption to smaller areas, that is, superimposing a set of quadrants on the concentric zones with the origin of axes at the center, the hospital. This has the effect of dividing each zone into four sectors on the basis of direction from the hospital. The analytical model used in this paper is further refined to make some distinction between types of area since the 13 counties consist of both urban and rural places. These three dimensions are developed explicitly as follows:

Figure 2. Allocation of seven patients whose residence was "R.D., Emporium"



Township	*Population*	*Percent*	*Patient allocation*
Shippen	1,973	78	5
Portage	191	8	1
Lumber	344	14	1
Total	2,508	100	7

NOTE: Five patients were selected at random and assigned to Shippen Township. The other two patients were assigned at random to the remaining townships.

Distance from the hospital was determined by theoretical zones which were constructed as concentric circles on a map with the Warren State Hospital at the center. The actual zone boundaries are township boundaries, since townships are the smallest areal units for which population data were available. Townships were assigned to the various zones so that the zone boundaries (made up of township boundaries) matched the concentric circles as closely as possible. However, where the circles passed directly through a township, the whole township had to be placed in one zone or the other. Thus, a certain amount of deviation between the actual zone boundaries and the concentric circles was unavoidable; and, as far as was possible, deviations in one direction were balanced with deviations in the opposite direction. Figure 1 shows the concentric circles and the actual zone boundaries obtained in this manner. The possibility exists that different choices of township lines for zone boundaries would affect the analysis; but in the initial phases of the study, the slight boundary variations tried had no appreciable effect on the total zone rates.

Direction from the hospital is classified into four quadrants with the hospital at the origin. Again township lines were used to approximate these boundaries (fig. 1).

Urban and rural areas are defined in a special fashion. An urban area is defined as a city of 2,500 population or over plus the township that contains the city. When a city is located on the edge of a township, the adjacent township is also included, provided that approximately one-fourth or more of the city's perimeter is contiguous with the adjacent township. Rural areas are those townships that do not meet these criteria.

This urban area concept should not be confused with the U.S. census term, "urbanized area," which is defined as a central city of 50,000 inhabitants or more plus the closely set-

tled incorporated and unincorporated areas that comprise its urban fringe (*5*).

However, the urban area definition used in this paper is comparable in theory with that of the standard metropolitan statistical area in that each urban area consists of a township containing one or more cities of 2,500 population or over and contiguous townships are included if they meet the specific and determinable criteria indicated above. Standard metropolitan statistical areas are delineated by a similar procedure except that the city size is 50,000, counties are used instead of townships, and somewhat different criteria are used to determine the inclusion of contiguous counties (*11*).

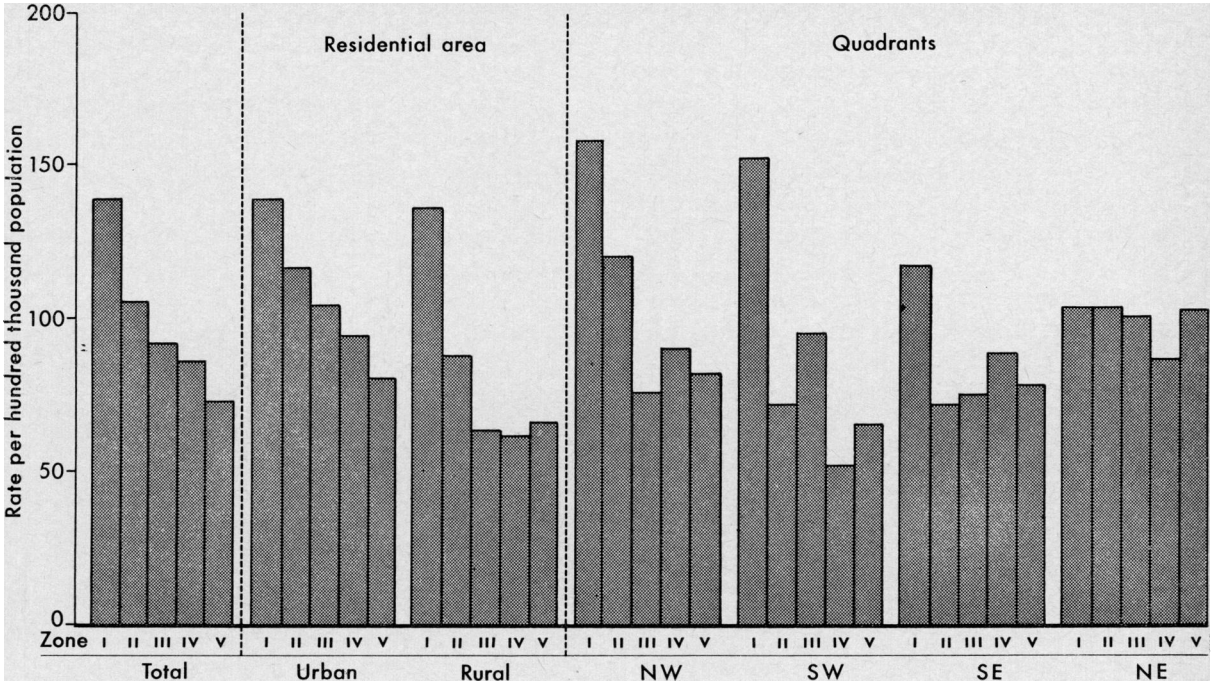
The residence of each patient admitted to the hospital was specified on the abstract sheet in terms of "city or town" and "county." Thus, the township of residence was easily located for those patients who lived in a city, town, or named place, and for whom the county was given. Detailed county maps, from the Pennsylvania Department of Highways, showing all named places and township boundaries, facilitated location procedures. However, the place of residence for patients whose residence was

Table 3. Number of first admissions and first admission rates per 100,000 population specific for zone, quadrant, and type of residential area, Warren State Hospital, 1948–52

Area	Number of patients			Average annual first admission rates per 100,000 population		
	Total	Urban	Rural	Total	Urban	Rural
Total	3,609	2,608	1,001	88.9	98.0	71.6
Zones						
I	370	224	146	138.8	139.9	137.0
II	416	308	108	106.9	115.7	87.8
III	657	519	138	91.6	104.5	62.6
IV	1,317	1,073	244	86.0	94.4	61.9
V	849	484	365	73.5	80.6	65.9
Quadrant by zone						
Central area [1]	178	178	----	145.6	145.6	0
NW quadrant	1,473	1,129	344	94.8	98.0	85.7
I	96	----	96	161.0	0	161.0
II	185	163	22	122.2	123.1	115.9
III	114	35	79	76.4	95.5	70.2
IV	974	906	68	91.5	95.0	61.0
V	104	25	79	80.8	84.0	79.8
SW quadrant	807	569	238	73.2	83.6	56.4
I	20	----	20	153.4	0	153.4
II	21	----	21	72.1	0	72.1
III	307	238	24	96.0	107.0	43.3
IV	104	15	89	52.8	53.8	52.7
V	355	271	84	65.2	69.7	54.0
SE quadrant	606	332	274	82.1	97.1	69.2
I	18	----	18	118.0	0	118.0
II	10	----	10	72.2	0	72.2
III	37	19	18	74.9	85.3	66.3
IV	209	152	57	89.2	98.0	72.0
V	332	161	171	78.1	97.8	65.7
NE quadrant	545	400	145	100.7	110.3	81.1
I	58	46	12	102.7	121.6	64.3
II	200	145	55	102.6	108.3	90.1
III	199	182	17	100.1	105.0	66.6
IV	30	----	30	86.9	0	86.9
V	58	27	31	102.6	153.6	79.6

[1] The city of Warren and adjacent townships constitute an "urban area" which is not included in any of the quadrants.

Figure 3. Average annual first admission rates per 100,000 population specific for zone, quadrant, and type of residential area, Warren State Hospital, 1948–52



not in a city or town was given on the abstract sheet as "R.D., name of Post Office," and determination of township of residence for many was difficult. In most cases the residence could be easily assigned to a specific township; but for 215 patients of 3,609, two or more townships were contiguous or extremely close to the city or town which was given as the post office. Therefore, the actual township of residence was indeterminate, since the patient might have resided in any of the adjacent townships. The 215 patients were distributed among these possible townships by random assignment, largely in proportion to weights based on the relative populations in the townships. In addition, the following factors were taken into account in certain individual instances: the proportion of the city's perimeter bounded by each township, the location of nearby post offices, and probable rural mail delivery routes as inferred from local highway structure and topography. In some cases, the townships in question were divided by a zone or quadrant boundary. Therefore, the assignment of the patients to these townships might have affected the zone-quadrant distribution. However, only 51 of the 215 assigned patients fell into this category; thus the effect was limited to only 1.4 percent of the total 3,609 patients in the study.

An example of the random assignment process is shown in figure 2. The geographic distribution by type of residential area is shown in figure 1.

Thus, each patient was classified by zone (distance from the hospital), quadrant (direction from the hospital), and type of residential area (urban or rural). Frequency distributions were obtained for the 40 possible cells (5 zones × 4 quadrants × urban-rural). Corresponding populations were obtained from the 1950 U.S. Census of Population by adding together the populations in specified townships and cities. Average annual first admission rates per 100,000 population were computed for each cell as:

$$\frac{\text{(Number of patients first admitted 1948–52)} \times 100{,}000}{\text{(Population as of April 1, 1950)} \times (5)}$$

Analysis of Findings

Gross relationships. The pattern of first admission rates by zone is shown in figure 3 and table 3 for type of residential area and quadrants. The total first admission rates by zone

decrease consistently with increasing distance from the hospital. This finding supports the hypothesis that the chances of hospitalization are greatest in areas closest to the hospital. Urban areas have a pattern of rates similar to that for the total, but the rural rate pattern is somewhat different. While the rates in zone 1 are the same for both urban and rural areas, the rural area rates for zones II–V are all lower than the corresponding urban rates. In addition, the rural rates do not decrease consistently as do the urban rates; and indeed, the rural rates for zones III–V are all at the same relatively low level.

None of the quadrants have rates that decrease consistently with increasing distance from the hospital, although the rates for the NW and SW quadrants show markedly decreasing trends from zones I to V. This trend is hardly noticeable in the SE quadrant and not present at all in the NE quadrant.

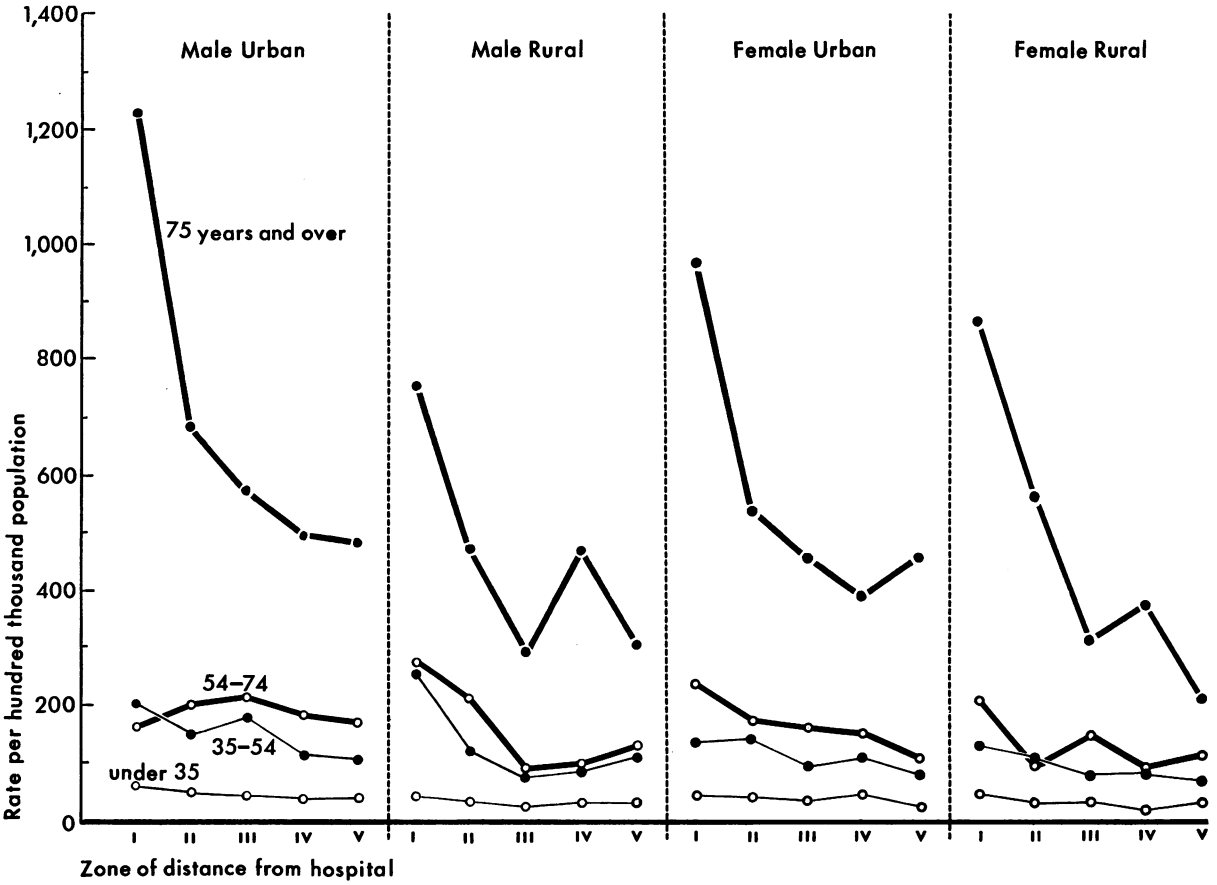
If there were a completely direct but inverse linear relationship between the first admission rates and distance from the hospital, we would expect the rates to decrease along a straight line from zone I to zone V. To determine how well the observed rates fit this expectation, the rates were tested for deviations from linearity. A form of the chi-square test was used which requires fitting a straight line to represent the regression of the rates on an artificial linear variable and the measurement of deviations from this regression line (*12*). This test demonstrated that the trend of first admission rates was significantly linear for all categories in figure 3 except the SE and NE quadrants. However, the total and the urban rate patterns showed the smallest deviations from linearity.

Age, sex, and type of residence. The patients in this study form a heterogeneous group in terms of characteristics such as age, sex, and mental diagnosis. Since population data are not available by age or sex for areas as small as townships, age- or sex-specific rates for townships cannot be computed directly. However, population data were available by age, sex, and type of residence (urban-rural) for counties, and the age, sex, type of residence distributions

Table 4. Estimated average annual first admission rates per 100,000 population specific for sex, age, type of residential area, and zone, Warren State Hospital, 1948–52

Age and zone	Male				Female			
	Total number of patients	Rate per 100,000			Total number of patients	Rate per 100,000		
		Total	Urban	Rural		Total	Urban	Rural
Under 35 years:								
I	42	55.7	64.6	43.8	37	48.2	44.0	54.2
II	56	51.3	59.6	35.2	47	42.0	45.0	35.9
III	78	38.8	46.8	22.7	78	37.9	39.0	35.5
IV	167	39.2	43.5	27.9	172	39.2	46.5	19.0
V	118	35.9	42.4	29.5	100	30.0	28.7	31.3
35–54 years:								
I	73	226.6	206.5	258.8	45	137.2	138.3	135.2
II	68	143.8	154.5	119.1	64	131.9	140.5	109.8
III	130	149.1	178.6	78.2	85	94.9	98.3	85.8
IV	201	107.7	115.0	85.3	212	110.1	115.5	91.4
V	156	112.5	110.1	115.2	112	79.9	83.9	74.8
55–74 years:								
I	42	207.3	164.4	271.6	49	234.4	245.4	214.5
II	62	209.6	207.6	213.9	49	158.2	178.9	104.5
III	95	174.3	214.5	83.5	93	162.7	167.8	149.0
IV	189	162.5	186.4	93.4	170	138.1	150.8	94.2
V	131	149.3	170.9	125.9	100	112.1	109.1	116.1
75 years and over:								
I	40	1,028.3	1,250.0	773.5	42	949.2	992.6	879.8
II	34	612.6	693.6	478.5	36	554.3	552.5	558.4
III	48	470.4	573.2	293.3	50	417.5	461.8	311.6
IV	106	493.6	500.8	477.6	100	390.2	393.4	380.7
V	66	383.3	486.9	297.4	66	346.1	460.6	214.3

Figure 4. Estimated average annual first admission rates per 100,000 population specific for age, sex, type of residential area, and zone, Warren State Hospital, 1948–52



for urban and rural parts of the total 13-county areas were used to estimate the age-sex distribution for the urban and rural parts of each zone. This provided estimated population bases for computing first admission rates specific for age, sex, type of residential area, and zone (table 4 and fig. 4).

Several striking elements may be noted in figure 4. First admission rates for patients 75 years of age and over are by far the highest; and all these rates generally decrease with increasing distance from the hospital, although the decreases are consistent only for the urban males. In this age group urban rates are higher than rural rates and urban males have higher rates than urban females.

The first admission rates for age groups 35–54 years and 55–74 years seem to be very similar except for minor variations. However, the rate pattern for 55- to 74-year-old urban males is unique among the 16 age, sex, and place of residence categories shown in figure 4 in that the highest rate appears in zone III with decreasing rates toward zones I and V. Admission rates for patients under 35 years of age are all low, and the amount of decrease from zones I to V is much less than for the other age groups.

Age and diagnosis. The pattern of decreasing first admission rates with increasing distance from the hospital was examined further by computing estimated rates specific for age, psychiatric diagnosis, and zone (table 5). The rates for all ages combined reveal no significant pattern of decreasing rates in three general categories of mental illness which together account for 42 percent of the patients admitted: schizophrenia, 27.8 percent; other functional psychoses, 7.6 percent; and all other diagnoses, 6.6 percent.

The decreasing pattern actually is attribut-

able mainly to the remaining five categories, or 58 percent of the patients (table 5): diseases of the senium, 26.7 percent (which includes psychoses with cerebral arteriosclerosis plus senile psychoses); patients classified as being "without mental disorder," 12.6 percent (*13a*); psychoneuroses, 5.7 percent; undiagnosed psychoses, 10.1 percent (*13b*); and psychoses due to alcohol, 2.9 percent. The decreasing effect is not necessarily present in each individual age group even though it is well defined for a total diagnostic group. For example, for patients with diseases of the senium, only those 75 years of age and over show a clearly decreasing trend in admission rates, and yet this decreasing trend is quite distinct for all ages combined.

Discussion

The pattern of decreasing first admission rates with increasing distance from the hospital, as observed for several categories of patients, may relate to factors such as (*a*) the probability that potential patients living closer to a mental hospital may be more knowledgeable about the hospital and its functions and consequently may be less reluctant to enter the hospital for treatment, and (*b*) the likelihood that physicians practicing in the vicinity of the hospital will make more referrals than physicians practicing further away.

The pattern may also relate, hypothetically, to the availability of psychiatric facilities other than the Warren State Hospital, some of which

Table 5. Estimated average annual first admission rates per 100,000 population specific for age, psychiatric diagnosis, and zone, Warren State Hospital, 1948–52

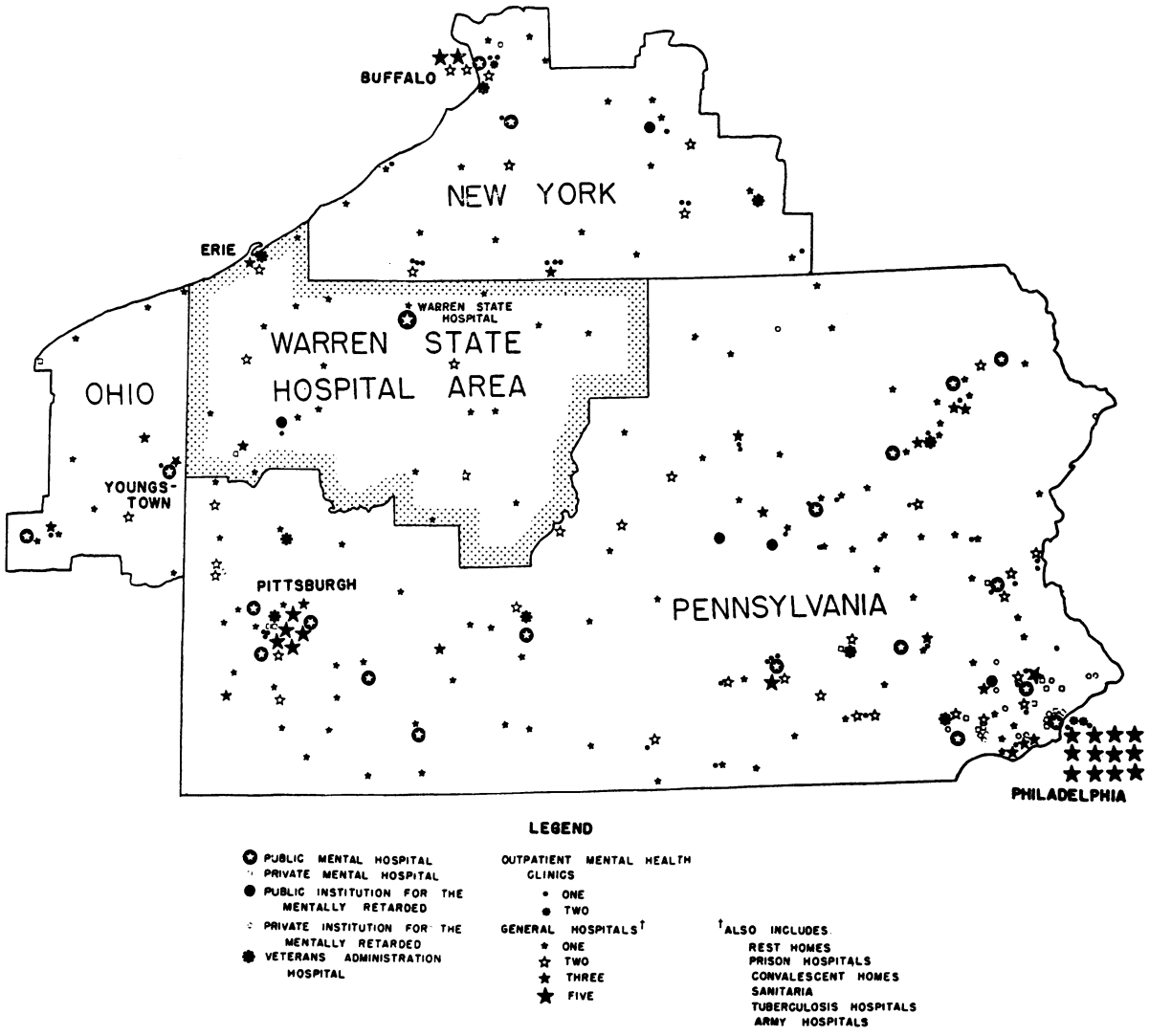
Psychiatric diagnosis, zone, and number of patients	All ages	Age group		
		Under 65	65–74	75 and over
Diseases of the senium				
I: 111	41.6	4.1	148.4	914.0
II: 116	29.8	4.0	154.0	531.3
III: 175	24.4	2.2	160.6	396.8
IV: 344	22.5	3.0	114.2	405.5
V: 217	18.8	1.2	108.6	344.4
		Under 35	35–54	55 and over
Without mental disorder[1]				
I: 62	23.3	13.8	49.2	18.2
II: 57	14.6	11.3	27.1	8.3
III: 83	11.6	6.4	27.7	6.0
IV: 139	9.1	6.0	20.3	3.5
V: 112	9.7	6.2	19.4	8.0
Psychoneuroses				
I: 36	13.5	9.9	26.1	8.1
II: 36	9.2	5.9	16.7	9.6
III: 48	6.7	5.2	9.1	8.2
IV: 51	3.3	1.7	5.5	5.2
V: 35	3.0	1.8	5.4	3.8
Undiagnosed psychoses[2]				
I: 40	15.0	3.3	26.1	36.4
II: 44	11.3	4.1	17.7	24.8
III: 73	10.2	3.2	15.3	24.7
IV: 128	8.4	3.2	14.0	16.4
V: 81	7.0	2.4	10.4	16.9
Psychoses due to alcohol				
I: 8	3.0	.7	9.2	2.0

Psychiatric diagnosis, zone, and number of patients	All ages	Age group		
		Under 35	35–54	55 and over
Psychoses due to alcohol—Continued				
II: 16	4.1	------	12.5	5.5
III: 22	3.1	.7	7.9	3.7
IV: 42	2.7	.6	6.6	4.2
V: 16	1.4	------	4.7	1.4
Schizophrenid				
I: 62	23.3	21.0	40.0	8.1
II: 97	24.9	23.5	38.6	11.0
III: 173	24.1	20.7	41.3	12.0
IV: 417	27.2	24.7	44.0	12.6
V: 255	22.1	20.7	35.9	8.4
		Under 45	45–64	65 and over
Other functional psychoses				
I: 28	10.5	2.1	26.2	39.7
II: 30	7.7	1.1	24.1	21.8
III: 39	5.4	.8	19.2	10.3
IV: 113	7.4	1.3	23.3	18.0
V: 65	5.6	.9	19.6	11.9
		Under 35	35–54	55 and over
All other diagnoses				
I: 23	8.6	2.6	16.9	16.2
II: 20	5.1	.9	11.5	9.6
III: 44	6.1	1.7	13.6	9.7
IV: 83	5.4	2.4	8.7	10.1
V: 68	5.9	1.5	13.3	9.8

[1] "Without mental disorder" includes diagnoses such as epilepsy, alcoholism, drug addiction, mental deficiency, disorders of personality due to epidemic encephalitis, psychopathic personality, and so forth (*13a*).

[2] Undiagnosed psychoses are those for which ". . . a satisfactory diagnosis cannot reasonably be made and in which the psychosis must, therefore, be regarded as an unclassified one. Most frequently this may be due to lack of history, inaccessibility of the patient, or a too short period of observation. On the other hand, the clinical picture may be so obscured and the symptoms so unusual that a reasonably accurate classification cannot be made" (*13b*).

Figure 5. Hospital and mental health facilities in and about Warren State Hospital area, 1951



are shown in figure 5. The figure does not include county institution district homes and other homes for the aged. In 1956 there was one county home each in 12 of the 13 counties; in addition, there were 79 other homes for the aged, handicapped, and infirm in the 13-county area (*14*). The availability of these other community facilities and their possible use as alternatives to the Warren State Hospital may explain, in large part, the pattern of decreasing first admission rates with increasing distance from the hospital.

Another hypothetical factor involves the reaction of individuals, families, and communities to the distance at which the mental hospital is located when other local psychiatric facilities are not available. This leads to the proposition that where the distance to the mental hospital is greater, a family is likely to be more willing to endure certain hardships regarding patient behavior and care than to disrupt family ties by placing the patient in the remote mental hospital where visiting and contact with him would be more difficult to maintain. The distance factor may also be involved in an individual's willingness to recognize and to take action to alleviate his own emotional problems. The following three diagnostic groupings are examined taking these two hypothesized factors into account.

Significantly, the age-specific first admission rates for schizophrenia and other functional disorders show no consistent patterns of rate variation with distance at any age. This suggests that local facilities may not be equipped to provide the long-range psychiatric treatment necessary for patients with these mental disorders. Also, these patients may present behavioral and emotional problems of a nature that cannot be tolerated regardless of the distance to the mental hospital and despite the disruption of family ties brought about by the patient's admission to the mental hospital.

Diseases of the senium (27 percent of the admissions) are found among patients with median admission ages (among these admissions) of 75.9 years for males and 77.1 years for females. Their length of stay in the hospital is relatively short, with death as the most probable outcome. Most of the decreasing pattern of rates is found in the age group 75 and over (table 5). The community problems leading to hospitalization of these patients are usually matters of physical care associated with some psychiatric or behavior difficulties. This would suggest that families more remote from the hospital in areas without other suitable facilities might be more willing to tolerate the patient's behavior and to endure the hardship involving his physical care in an effort to keep the family as intact as possible. This might be the case especially where the patient's life expectancy is presumably short, since the death rates are greatest among patients 75 years of age and over (*6b*). This line of action would lead to first admission rates being negatively associated with distance from the hospital. On the other hand, it may be that local facilities, such as general hospitals, nursing homes, homes for the aged, or county homes, are used more extensively as alternative facilities for care of elderly patients in areas more remote from the hospital. It is not known to what extent these facilities provide care for elderly mental patients comparable with that offered in State mental hospitals. Practices and policies vary from State to State, and appropriate data are not available for the facilities other than State mental hospitals (*15*).

The psychoneurotic patients constitute only 6 percent of the admissions, but it is of interest that a decreasing pattern of rates, however slight, seems to be present in all three age groups. Physical care is not so much of a problem as is behavior and the resultant difficult social situations. Here again, local facilities, such as general hospitals or outpatient psychiatric clinics, may be used instead of the distantly located mental hospital; or, if local psychiatric services are not available, a family might place more value on keeping the patient at home and enduring the consequent difficulties than in placing the patient in the more remote mental hospital.

This analysis and discussion points up the need for further study of the State mental hospital in relation to the broad spectrum of psychiatric facilities available in the community. Also, more intensive research is indicated in the area of community attitudes, values, and knowledge regarding mental illness and the mental hospital itself in order to evaluate the observed differential geographic patterns of first admission rates to a State mental hospital.

REFERENCES

(*1*) Faris, R. E., and Dunham, H. W.: Mental disorders in urban areas: an ecological study of schizophrenia and other psychoses. University of Chicago Press, Chicago, 1939.

(*2*) Locke, B. Z., et al.: Problems in interpretation of patterns of first admissions to Ohio public mental hospitals for patients with schizophrenic reactions. Psychiatric Research Reports 10. American Psychiatric Association, Washington, D.C., December 1958.

(*3*) Hodges, A., and Dörken, H.: Location and outpatient psychiatric care. Pub. Health Rep. 76: 239–241, March 1961.

(*4*) Guide issue. Hospitals 33: 1–518, August 1, 1959, pt. 2.

(*5*) U.S. Bureau of the Census: Census of population: 1950. Vol. II. Characteristics of the population. Pt. 38. Pennsylvania. U.S. Government Printing Office, Washington, D.C., 1952.

(*6*) Kramer, M., et al.: A historical study of the disposition of first admissions to a State mental hospital: Experience of the Warren State Hospital during the period 1916–50. PHS Publication No. 445 (Public Health Monograph No. 32). U.S. Government Printing Office, Washington, D.C., (*a*) p. 6; (*b*) p. 14.

(*7*) Kramer, M., Pollack, E. S., and Redick, R. W.: Studies of incidence and prevalence of hospitalized mental disorders in the United States:

current status and future goals. *In* Comparative epidemiology of the mental disorders, edited by P. H. Hoch and J. Zubin. Grune & Stratton, Inc., New York, 1961, ch. 6.

(*8*) Quinn, J. A.: Human ecology. Prentice-Hall, New York, 1950, pp. 272–273.

(*9*) Burgess, E. W.: The urban community. University of Chicago Press, Chicago, 1926.

(*10*) Shaw, C., et al.: Delinquency areas: a study of the geographic distribution of school truants, juvenile delinquents, and adult offenders in Chicago. University of Chicago Press, Chicago, 1929.

(*11*) U.S. Bureau of the Budget: Standard metropolitan statistical areas. U.S. Government Printing Office, Washington, D.C., 1959.

(*12*) Cochran, W. G.: Some methods for strengthening the common χ^2 tests. Biometrics 10: 417–451 (434–436), December 1954.

(*13*) American Psychiatric Association and National Committee for Mental Hygiene: Statistical manual for the use of hospitals for mental diseases. Ed. 10. New York, N.Y., 1942, (*a*) pp. 20–22; (*b*) p. 42.

(*14*) Pennsylvania Department of Public Welfare, Office of Program Research and Statistics: Number of homes and beds for the aged, handicapped, and infirm—1956, 1957, 1958, 1959, 1960. OA–3. Harrisburg.

(*15*) Pollack, E. S., et al.: Patterns of retention, release, and death of first admissions to State mental hospitals. PHS Publication No. 672 (Public Health Monograph No. 58). U.S. Government Printing Office, Washington, D.C., 1959.

Seek Multidiscipline Approach to Arthropod-Borne Viruses

Extensive evidence indicates that wild birds are involved in the life cycle of many arthropod-borne viruses and that they are the source of infection in arthropods that infect man and domestic animals. The natural history of these viruses and the epidemiology of the diseases they produce are so complex that only a coordinated effort by specialists in all facets of ornithology, ecology, and virology can produce the information needed.

The American Committee on Arthropod-Borne Viruses has been attacking the virological aspects of these problems for several years, but greater participation by ornithologists is required. A meeting of ornithologists, virologists, ecologists, and entomologists was organized in Atlanta, Ga., February 16 and 17, 1962, to discuss the information at hand, current investigations, and the need for more research and communication.

At that meeting a subcommittee was formed to serve as a channel for the exchange of information and as a focus for consultation and to stimulate development of new tools and ideas.

A report on the proceedings of the meeting and a list of references have been prepared, and the subcommittee desires to distribute them as widely as possible. Interested persons may obtain copies of the proceedings and the reference list from the subcommittee chairman, who will place their names on a mailing list to receive future communications—DONALD D. STAMM, *chairman, Subcommittee on the Relation of Birds to Arthropod-Borne Viruses, American Committee on Arthropod-Borne Viruses, Communicable Disease Center, U.S. Public Health Service, Atlanta, Ga.*

CDC Training Program, 1962–63

Training courses offered by the Communicable Disease Center, Public Health Service, from July 1962 through June 1963 are listed below. This list represents the complete schedule for the period. Courses listed under "Organization and Orientation" are especially developed for people from other countries. Additional information and application forms may be obtained from either the Chief, Communicable Disease Center, Atlanta 22, Ga., or the appropriate regional office of the Department of Health, Education, and Welfare. Applications should be submitted at least 6 weeks before the beginning of each course.

Epidemiology

Principles of epidemiology (101). Jan. 14–18; Atlanta.

Applied epidemiology (112). Nov. 5–9; May 6–10; Atlanta.

Epidemiology for nurses (121). Mar. 18–22; Atlanta.

Principles of epidemiology for nurses (122). To be arranged; by arrangement with schools of nursing in universities and colleges.

Applied epidemiology for nurses (123). June 3–7; Atlanta.

Epidemiology for veterinarians (141 (formerly 140)). Feb. 25–Mar. 1; Atlanta.

Vector Control

Epidemiology and control of vector-borne diseases (201). Feb. 11–15; Atlanta.

Insect control (203). Sept. 10–21; Atlanta.

Rodent control (211). Sept. 24–Oct. 5; Atlanta.

Insect and rodent control (221). June 3–14; Atlanta.

Mosquito control (231). Nov. 5–9; Atlanta.

Identification and biology of arthropods (241). Jan. 7–18; Atlanta.

Environmental Control

Epidemiology for professional sanitarians (308). Winter; Regions I & II. Feb.; Region VIII.

Epidemiology and control of foodborne diseases (311). Oct. 29–Nov. 1; Fresno. Winter; Region III.

Applied procedures for control of foodborne diseases (312). Sept. 17–21; Albuquerque. Nov. 12–16; Houston. Spring; Regions III & V.

Communicable disease control in the community—environmental (320). Part III. Mar. 11–15; Atlanta.

Venereal Disease Control

Orientation and training of venereal disease program physicians (412). Dates and locations by arrangement.

Nursing work conferences on the control of venereal disease (421). Dates to be announced; locations to be determined.

Nursing in venereal disease control (422). Monthly, September through June; City of New York Department of Health, Bedford Health District, John F. Mahoney Training Center, Brooklyn.

Venereal disease contact interview and investigation (431). Dates to be determined on basis of need, Atlanta; Detroit; Los Angeles.

Current laboratory methods in the serology of syphilis (454). Sept. 17–Oct. 5; Nov. 26–Dec. 14; Mar. 25–Apr. 12; Chamblee.

Management and control of syphilis serology by the central laboratory (455). Apr. 29–May 10; Chamblee.

The *Treponema pallidum* immobilization (TPI) test (456). By arrangement; Chamblee.

Introduction to fluorescent antibody methods (457). Oct. 22–26; Jan. 7–11; Feb. 25–Mar. 1; Chamblee.

Fluorescent antibody methods in the diagnosis of the venereal diseases (458). Oct. 29–Nov. 9; Jan. 14–25; Mar. 4–15; Chamblee.

Dark-field microscopy for the detection and identification of the *T. pallidum* (459). Sept. 10–12; Sept. 12–14; Oct. 15–17; Oct. 17–19; Feb. 4–6; Feb. 6–8; Feb. 11–13; Feb. 13–15; Feb. 18–20; Apr. 22–24; Apr. 24–26; May 13–15; May 15–17; May 20–22; May 22–24; May 27–29; June 3–5; June 5–7; June 10–12; June 12–14; June 17–19; June 19–21; Chamblee.

Health Mobilization

Medical program of health mobilization (501). By arrangement; State departments of health.

Health mobilization continua (511). By arrangement; State departments of health.

Training Methods and Aids

Training methods (601). Sept. 6–15; Atlanta.

Preparation and use of training aids (611). Sept. 17–21; Atlanta.

Development of teaching presentations (631). Oct. 1–5; Albany, N.Y.

Organization and Orientation

Principles, organization, and practice of communicable disease control (701). June 24–July 19; Atlanta.

Applied epidemiology in communicable disease control (712). June 17–July 12 (tentative); Atlanta.

Nursing aspects of communicable disease control (720). Summer 1963; Atlanta.

Environmental aspects of communicable disease control (730). June 10–July 5; Atlanta.

Laboratory Methods

Laboratory methods in medical parasitology, part I (800). Sept. 10–Oct. 5; Atlanta.

Laboratory methods in medical parasitology, part II (801). Oct. 8–26; Atlanta.

Laboratory methods in the diagnosis of malaria (805). By arrangement; Atlanta.

Laboratory methods in medical mycology (815). Jan. 7–Feb. 1; Atlanta.

Laboratory methods in the study of pulmonary mycoses (817). Feb. 11–22; Atlanta.

Laboratory methods in the diagnosis of viral and rickettsial diseases (820). Oct. 29–Nov. 16; Mar. 11–29; Atlanta.

Special training in virus techniques (821). By arrangement; Atlanta.

Laboratory methods in the diagnosis of rabies (826). Nov. 26–30; Apr. 8–12; Atlanta.

Laboratory methods in medical bacteriology (838). Feb. 25–Mar. 15; Atlanta.

Special problems in medical bacteriology (839). Mar. 18–22; Atlanta.

Typing of *Corynebacterium diphtheriae* (842). By arrangement; Atlanta.

Flourescent antibody techniques in the public health laboratory (845). Oct. 22–Nov. 2; Atlanta.

Laboratory methods in enteric bacteriology (850). Mar. 25–Apr. 5; Atlanta.

Special problems in enteric bacteriology (851). By arrangement; Atlanta.

Phage typing of *Salmonella typhosa* (852). By arrangement; Atlanta.

Laboratory methods in the diagnosis of leptospirosis (853). By arrangement; Atlanta.

Serologic differentiation of streptococci (854). By arrangement; Atlanta.

Laboratory methods in the diagnosis of tuberculosis and related mycobacterial infections (855). Jan. 14–25; Jan. 28–Feb. 8; Atlanta.

Bacteriophage typing of staphylococci (856). Dec. 3–7; Atlanta.

Fluorescent antibody techniques in streptococcus grouping (860). Oct. 1–12; Atlanta.

Laboratory diagnostic methods in veterinary mycology (940). Mar. 4–8; Atlanta.

Serologic methods in microbiology (941). Apr. 1–12; Atlanta.

Special problems in microbiology (942). By arrangement; Atlanta.

Seminars

Seminars for professional organizations (011). Dates and locations by arrangement with professional organizations.

Water and Sewerage Technical School

A school for operators of water and sewerage works was established in January 1960 at Fort Crowder, Neosho, Mo., by the Missouri Water and Sewerage Conference, the Missouri Division of Health, and other agencies.

The unique feature of the school is the laboratory, which contains heavy equipment actually used in water and sewerage works and apparatus for performing bacteriological and chemical tests. The lack of such facilities for demonstration and practical application is the major deficiency of many operator training programs.

The school holds a 40-hour, 1-week session each month, with waterworks and sewerage courses offered at alternate sessions. The curriculum consists of 30 hours of work each in the water and sewerage fields and 10 hours in civil defense and disaster instruction. Enrollment is limited to about 20 persons a session.

The courses are on elementary, intermediate, and advanced levels and are open to all employees of water and sewerage plants, public health personnel, and city management personnel.

Federal Publications

Directory of Homemaker Services, 1961. Homemaker agencies in the United States. *PHS Publication No. 928; by Marjorie Gooch, Grace W. Bell, Gertrude Hoffman, and Lucille M. Smith; 1962; 217 pages; $1.*

Designed to help groups planning community services and persons seeking care for particular families, this directory lists the 208 agencies known to provide homemaker services in the United States. It also includes, for each agency, a brief statement of policies under which the homemaker program functions and data on the number of homemakers employed and families cared for during 1961.

This volume was compiled by the Public Health Service, the Bureau of Family Services, and the Children's Bureau.

Psychology in Dentistry. Selected references and abstracts. *PHS Publication No. 929 (Public Health Bibliography Series No. 35); 1962; 202 pages; $1.*

This indexed bibliography lists 661 articles published before July 1961 concerned with or related to the behavioral sicences in dentistry. Abstracts of all but 50 articles are given, and cross references are provided.

Report on Nursing Care of the Sick at Home in Selected U.S. Cities. *PHS Publication No. 901; 1962; 31 pages.*

An August 1961 study of the distribution of selected cities served by an agency having nursing care in the home as one of its primary objectives is reported.

The data presented are for those 676 incorporated cities having a population of 25,000 or over in the 1960 census. Comparisons are made, where valid, with data obtained in a similar study conducted in 1959 and based on the 1950 census.

The report is divided into three sections: interpretation of the data on home nursing services in selected cities, summary of findings, and an appendix, including tables which show the distribution of cities with and without these resources by Public Health Service regions.

Diabetes Mellitus. A guide for nurses. *PHS Publication No. 861; 1962; 60 pages; 25 cents.*

Information presented deals with the medical aspects of diabetes, its treatment, special services required by patients with diabetes, present-day methods of casefinding and followup, and importance of patient and family education. Emphasis is given to the significance of nursing care in diabetes and the increasing need for the nurse to serve maximally in all aspects of diabetes control within the community. The appendixes include six food exchange lists used in dietary treatment, selected bibliography, glossary, and laboratory procedures for blood and urine sugar determinations.

Fallout Protection for Hospitals. *PHS Publication No. 791; revised 1962; 28 pages; 30 cents.*

A prototype hospital of 150 beds was selected for this study. The report of design features to provide protection for hospitals against radioactive fallout includes a site plan and floor plans for the hospital and for the fallout-protected unit. The plans include shelter space for 750 people. Other subjects discussed are standards for protection against radioactive fallout caused by nuclear explosion, air and water supply, plumbing, sanitation, heating, electric power, food supplies, and sleeping arrangements.

In addition to these plans and criteria for constructing a new hospital with a fallout-protected unit, the report gives suggestions for adding a protected unit to an existing hospital.

PHS Public Advisory Groups: Authority, structure, functions, February 1, 1962. *PHS Publication No. 262; 1962; 92 pages.*

The 168 public advisory groups—councils, committees, boards, panels, and study sections—upon which the Public Health Service relies for advice are described briefly. The authority, structure, and functions are shown. Also included is information on frequency of meetings.

Roster of Members of PHS Public Advisory Groups, November 1, 1961. *PHS Publication No. 262A; 1962; 246 pages.*

Names and affiliations of members of PHS public advisory groups are listed. The groups are indexed alphabetically by key word. Member names are indexed alphabetically and by State in which employed.

Public Health Service Support of Cardiovascular Research, Training, Fellowships, and Community Programs. *PHS Publication No. 912; 1961; 228 pages; $1.25.*

Summary tables are presented for the total extramural program of the National Heart Institute for fiscal year 1961. Contents include research project grants, training grants, fellowship awards, community programs, summary of totals, maps, grantee index, and an NHI grant staff index.

Tables contain the name of grantee, project title, grant number, and amount of money.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D.C.

The Public Health Service does not supply publications other than its own.
