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EVALUATION

*Evaluating the Attainment of Process Objectives of Community Mental Health Centers Using MSIS**

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BACKGROUND

In order to plan programs adequately and more effectively utilize manpower and funds in the delivery of community mental health services, information is required on who is served, both in terms of patients and population-at-large, what kinds of services are received, and in what manner they are delivered. This information relates to the *process* of care delivery. Process-related objectives have been explicitly delineated by the National Institute of Mental Health (NIMH) in the federal guidelines for the operation of federally funded com-

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munity mental health centers as typified by the following:

1. The community mental health centers (CMHC) shall be equally accessible to all residents of the populations they serve according to relative need.
2. Equal quantity and quality of service appropriate for the patient's problems shall be given to all center clients regardless of the client's ethnic group or socioeconomic level.
3. Community mental health centers shall insure that care provided residents of the population is continuous regardless of the setting in which the patient is being treated.

Evaluation efforts ideally should go beyond monitoring the numbers of clients and types and amounts of service delivered and seek to analyze the effects that service delivery has had on the status of the population in need. However this is a complicated and difficult task. Although rate indices measuring recidivism, infant mortality, juvenile delinquency, alcoholism, suicide, and mental hospital admissions may be used to delineate populations in need, the direct effect of mental health service interventions is not easily measured. Changes in the mental health status of the population in need may only tangentially or very indirectly be attributed to the provision of such services. Studies and measurement tools must be carefully designed to capture outcome information which can serve as evaluative aids. Such outcome evaluation efforts are being carried on by others, but these efforts fall outside the scope of the present study, which directs itself only to process evaluation.

Although there are limitations in adequately developing evaluative criteria that depict change in mental health status, measures related to the evaluation of process objectives can be developed and superimposed onto already existing ongoing information systems. Such measures are useful descriptive tools for categorizing and defining populations served in terms of variables which have been shown to directly influence mental health status. High-risk groups can be targeted, service utilization and delivery can be examined, and concomitant administrative and clinical decisions can be made on an informed basis.

A report is given here of a study conducted for NIMH whose purpose was to develop methodology and measures of the attainment of process objectives utilizing data collected routinely by community mental health centers using an automated patient-management system. Four community mental health centers participating in the MSIS—such an automated system collecting detailed demographic, clinical and other patient information—collaborated with MSIS in an analysis of their data. Following a description of the methodology, measures, and potential uses of such an approach, the kinds of results obtained for the centers are summarized. The four participating centers with their study

periods indicated are:

- Connecticut Mental Health Center in New Haven, Connecticut, September 1, 1972 to July 31, 1973
- Erich Lindemann Mental Health Center in Boston, Massachusetts, October 1, 1972 to February 28, 1973
- Rockland Community Mental Health Center in Pomona, New York, September 1, 1972 to July 31, 1973
- Area B Community Mental Health Center in Washington, D.C., September 1, 1972 to July 31, 1973

METHODOLOGY

The aims of this study were to provide focused formulations of some of the NIMH "process" objectives and to develop specific procedures for methodology and evaluative measurement based on available MSIS data.

Forming Homogeneous Social Groups within the Catchment

The first step in developing a methodology for an assessment of equity of process within a catchment population was the disaggregation of the catchment population into "homogeneous" subgroups with respect to ethnicity and socioeconomic levels. This was done by aggregating census tracts based on social-area analysis.

The specific social-area analysis model used in the present study followed that of Redick, Goldsmith, and Unger (1) and Goldsmith and Unger (2). Both of these publications are specifically concerned with the application of 1970 United States population census data to the study of mental health center catchment area populations. Redick, Goldsmith, and Unger state that "Social area analysis encompasses the theory that much of residence-related behavior can be understood and accounted for in terms of three types of society-wide population characteristics or dimensions: social rank, life style or urbanization and ethnicity" (1). The definitions of these indices were taken from the work of Greer (3). He suggested that "social rank" includes such social class factors as occupation, age, and stage of family rearing for the population; and "ethnicity" refers to the differentiation of the population by racial background. Goldsmith and Unger (2) indicate specifically those census variables that can be used to define each of these factors.

In this study several specific census variables were chosen to characterize the socioeconomic status of the tract. These variables were:

1. Percent of the population that is nonwhite
2. Median house value
3. Median rent
4. Percent of dwellings rented
5. Percent of persons in overcrowded housing

The variables follow the recommendations given by Goldsmith and Unger (2) for forming social area aggregates in that they capture social rank, lifestyle, and ethnicity. A numerical score obtained from median house value and median rent (using a weighting factor of percent of rented dwellings) was used to describe the social rank of the tract. The variable percent of persons in overcrowded housing was chosen to reflect lifestyle or urbanization and the per cent of nonwhites in the population was the variable chosen to characterize ethnicity.

Following the identification of the characteristics of the tracts of a catchment area, a statistical method for grouping them was developed. Low, medium, and high ranges were determined for the two variables, percent nonwhites in the population and percent of persons in overcrowded housing. The boundaries separating low and medium, and medium and high were determined by using a nearest neighbor clustering computer program. A score of low, medium, or high for each of these variables was then associated with each tract.

Using the same clustering program, median house value and median rent values of the tracts were classified into low, medium, and high ranges. A single social rank score was then derived on the basis of these in combination with the percent of dwellings which are owned and classified into low, medium, and high.

In this manner each tract in the catchment area had associated with it a three-dimensional vector whose entries were high, medium, or low scores representing the clustered range values of the social area variables. Tracts with the same vector scores or close scores were subsequently grouped to form at most five different tract aggregations (Figure 1).

Data Collection Instruments

The data used in this study were obtained from forms utilized routinely by the participating centers. These forms capture descriptive data relevant to the sociodemographic characteristics of the patients served by the centers, as well as the services provided to the patients. These standard data-collection instruments of MSIS are described in Part 2.

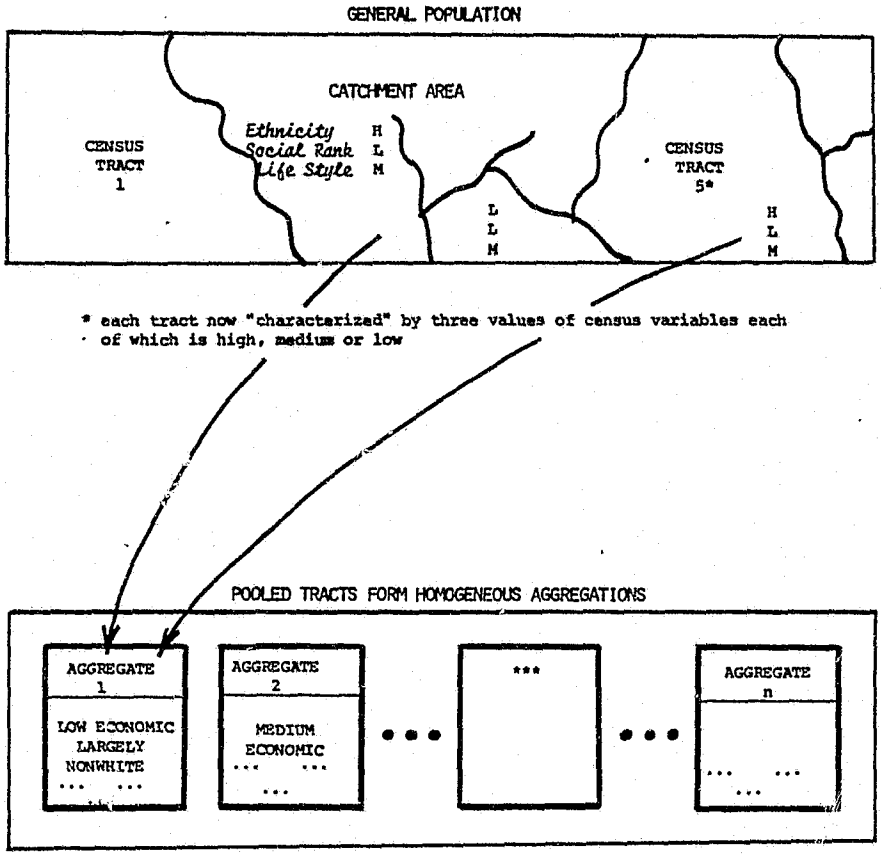


Figure 1 Forming homogeneous general population groups.

The patient populations considered in this analysis consisted of distinct patients who were admitted to the center during the specified study periods and were unduplicated in count. If a patient was readmitted to the center during the study period, the patient was counted only once, although service data were collected for his multiple admissions.

Process Objectives and Evaluative Measures Used

The formulation of the first process objective and the procedure followed was:

1. *Process Objective.* The CMHC should admit all residents of the population which it serves without regard to ethnicity or socioeconomic level, in accordance with the needs of that population.

Specific Procedure. Determine the admission rates of the various socioeconomic and ethnic groups of the catchment area. What are the variations between the percentages of these groups in the general population and the percentages in the client population?

In order to establish the demographic character of the population which each center serves (in terms of whether or not specific population segments were being admitted in differential fashions) sex/ethnic/age specific admission rates per 10,000 were tabulated for each of the aggregations and for the total catchment areas. Along with an analysis of these admission rates, comparisons were made between census population and center population distributions. Further, for each aggregation three summary rates were computed. These are shown below: 028

- Total (sex/ethnic/age) adjusted admission rate (a rate which to some extent eliminates the effect of differences in the sex, ethnic, and age distributions in the aggregation populations by standardization against the total catchment population distributions). 029
- White (sex/age) adjusted admission rate.
- Nonwhite (sex/age) adjusted admission rate (Table 1).

To further characterize the population that a center is serving, MSIS "admission summaries" were created for each aggregation as well as for the total catchment. These summaries are part of the packaged capability of the MSIS and tabulate not only the univariate distribution of admissions of all variables appearing on the MSIS admission form: age, sex, ethnic group, education, source of referral, diagnosis, and so on, but several bivariate distributions as well (Figure 2). 031

The second objective formulated and the procedure followed are as follows:

2. *Process Objective.* The various socioeconomic and ethnic groups should receive treatment according to their needs.

Specific Procedure. Determine the variations among groups of patients in type and quantity of treatment received as evidenced by their (1) modality on admission, and (2) by the number and type of direct patient services rendered.

This objective was much more difficult to specify, for the question of what is appropriate treatment for different patients clearly has no simple answer. Working within the confines of the MSIS data collected, the approach taken was to examine whether there were differential service-delivery patterns for homogeneous patient groups as examined across the census tract aggregations.

ADMISSION SUMMARY FOR CTCHMNT FILE DATE 01/24/74

OF ADMISSIONS- CTOID = 883 TOTAL = 883

**********PATIENT PROFILE SUMMARY**********

EDUCATION

	#	%		#	%
0 YRS	7	1	10 YRS	99	11
UNGRADED	4	0	11 YRS	83	9
1-2 YRS	21	2	12 YRS	239	27
3 YRS	11	1	VOC/BUS	21	2
4 YRS	12	1	1 YR COLL	39	4
5 YRS	8	1	2 YR COLL	36	4
6 YRS	17	2	3 YR COLL	18	2
7 YRS	26	3	4 YR COLL	22	2
8 YRS	66	7	GRAD SCHL	23	3
9 YRS	73	9	MISSING	—	—
			UNKNOWN	58	7

AGE BY SEX

	MALE	FEM	MSNG	TOTAL	%
<12	25	15	—	40	5
12-15	21	17	—	38	4
16-20	67	74	—	141	16
21-64	272	378	—	650	74
>65	6	8	—	14	2
MSSNG	—	—	—	—	—
TOTAL	391	492	—		
%	44	56	—		

VETERAN

	#	%
YES	83	9
NO	800	91
MISSING	—	—

HOUSEHOLD COMPOSITION BY MARITAL STATUS

	NEV-MARR	MARR/REMAR	DIV/SEPR	WID-OWED	OTHER	TOTAL	%
ALONE	40	5	37	10	—	92	10
CHILDREN	24	195	85	11	—	315	36
SPOUSE	3	268	2	—	—	273	31
SIBLINGS	63	1	4	—	1	69	8
INSTITUTION	4	1	1	—	—	6	1
PARENTS	212	10	32	—	—	254	29
RELATIVES	21	7	11	4	1	44	5
WITH OTHERS	69	4	22	2	—	97	11
UNKNOWN	8	3	9	—	—	20	2
MISSING	—	—	—	—	—	—	—
TOTAL	371	302	183	26	1		
%	42	34	21	3	0		

ETHNIC GROUP

	#	%
WHITE	628	71
NEGRO	200	23
AMER IND	—	—
P RICAN	46	5
ORIENTAL	—	—
SEE INST	—	—
MISSING	—	—
UNKNOWN	4	0
OTHER	5	1

RELIGION

	#	%
PROTESTNT	215	24
ROM CATHL	454	51
JEWISH	25	3
NONE	54	6
UNKNOWN	40	5
OTHER	95	11
MISSING	—	—

WEEKLY INCOME BY NUMBER ON INCOME

	1	2	3	>3	UNKN	MSNG	TOTAL	%
WELFARE	57	22	44	57	11	—	191	22
<$50	36	8	5	5	1	—	55	6
50-99	44	17	16	19	1	—	97	11
100-149	21	14	36	45	2	—	118	13
150-199	7	14	8	33	—	—	62	7
200-299	3	2	3	25	—	—	33	4
>$299	—	—	—	1	—	—	1	0
UNKNOWN	68	32	24	64	136	—	324	37
MISSING	—	—	1	1	—	—	2	0
TOTAL	236	109	137	250	151	—		
%	27	12	16	28	17	—		

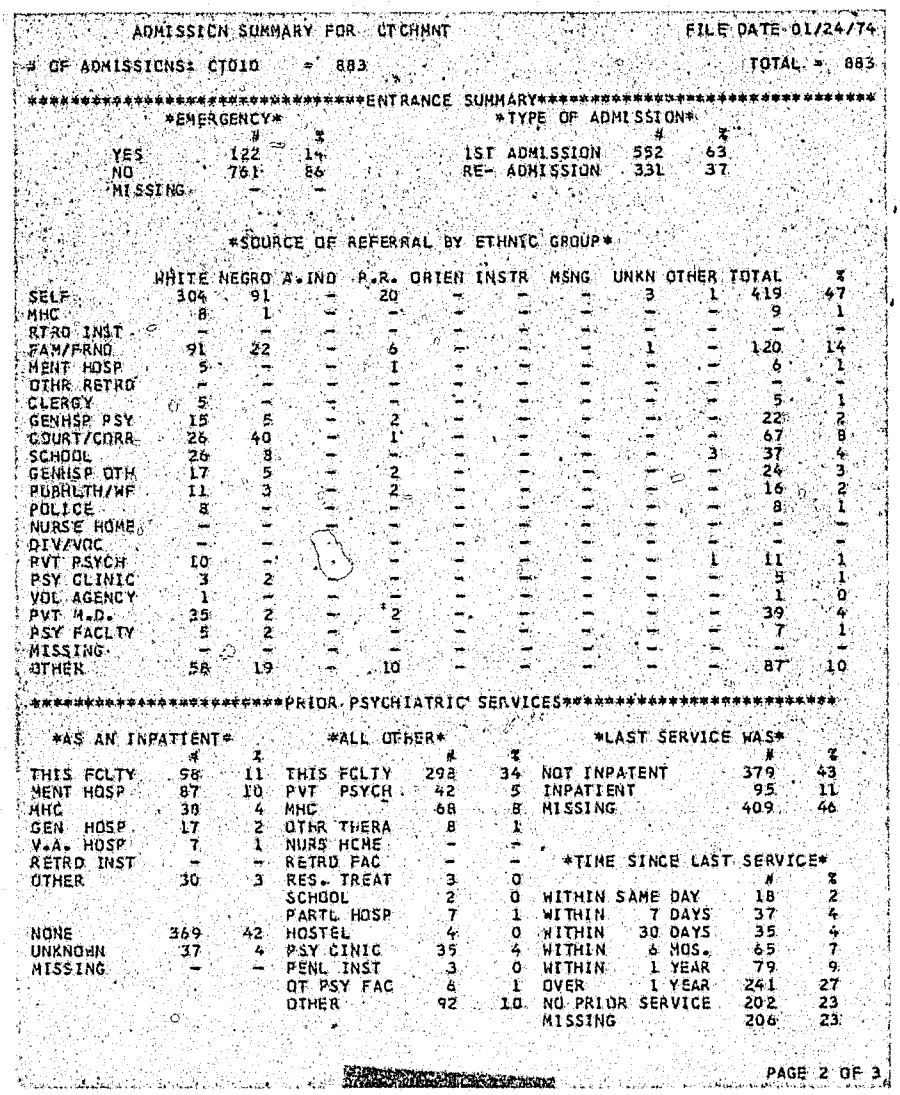
ENVIRONMENT

	#	%
FARM	—	—
CITY VILL	882	100
RURAL	—	—
UNKNOWN	—	—
MISSING	1	0

PAGE 1 OF 3

Figure 2 Admission Summary for Catchment.

But what is a homogeneous patient group? One may argue that patients are so unique in their problems and background that no two patients may be grouped. On the other hand, if patients are grouped in some manner and if gross differential patterns are unearthed by an analysis of these groups, administrators can use their own judgments as to the extent to which these represent legitimate variations in individual care as opposed to service inequities.



ADMISSION SUMMARY FOR CTCHMNT FILE DATE 01/24/74

OF ADMISSIONS: CT010 = 883 TOTAL = 883

**********ENTRANCE SUMMARY**********

EMERGENCY	#	%
YES	122	14
NO	761	86
MISSING	–	–

TYPE OF ADMISSION	#	%
1ST ADMISSION	552	63
RE- ADMISSION	331	37

SOURCE OF REFERRAL BY ETHNIC GROUP

	WHITE	NEGRO	A.IND	P.R.	ORIEN	INSTR	MSNG	UNKN	OTHER	TOTAL	%
SELF	304	91	–	20	–	–	–	3	1	419	47
MHC	8	1	–	–	–	–	–	–	–	9	1
RTRD INST	–	–	–	–	–	–	–	–	–	–	–
FAM/FRND	91	22	–	6	–	–	–	1	–	120	14
MENT HOSP	5	–	–	1	–	–	–	–	–	6	1
OTHR RETRD	–	–	–	–	–	–	–	–	–	–	–
CLERGY	5	–	–	–	–	–	–	–	–	5	1
GENHSP PSY	15	5	–	2	–	–	–	–	–	22	2
COURT/CORR	26	40	–	1	–	–	–	–	–	67	8
SCHOOL	26	8	–	–	–	–	–	–	3	37	4
GENHSP OTH	17	5	–	2	–	–	–	–	–	24	3
PUBHLTH/WF	11	3	–	2	–	–	–	–	–	16	2
POLICE	8	–	–	–	–	–	–	–	–	8	1
NURSE HOME	–	–	–	–	–	–	–	–	–	–	–
DIV/VOC	–	–	–	–	–	–	–	–	–	–	–
PVT PSYCH	10	–	–	–	–	–	–	–	1	11	1
PSY CLINIC	3	2	–	–	–	–	–	–	–	5	1
VOL AGENCY	1	–	–	–	–	–	–	–	–	1	0
PVT M.D.	35	2	–	2	–	–	–	–	–	39	4
PSY FACLTY	5	2	–	–	–	–	–	–	–	7	1
MISSING	–	–	–	–	–	–	–	–	–	–	–
OTHER	58	19	–	10	–	–	–	–	–	87	10

**********PRIOR PSYCHIATRIC SERVICES**********

AS AN INPATIENT	#	%
THIS FCLTY	98	11
MENT HOSP	87	10
MHC	38	4
GEN HOSP	17	2
V.A. HOSP	7	1
RETRD INST	–	–
OTHER	30	3
NONE	369	42
UNKNOWN	37	4
MISSING	–	–

ALL OTHER	#	%
THIS FCLTY	298	34
PVT PSYCH	42	5
MHC	68	8
OTHR THERA	8	1
NURS HOME	–	–
RETRD FAC	–	–
RES. TREAT	3	0
SCHOOL	2	0
PARTL HOSP	7	1
HOSTEL	4	0
PSY CLINIC	35	4
PENL INST	3	0
OT PSY FAC	8	1
OTHER	92	10

LAST SERVICE WAS	#	%
NOT INPATENT	379	43
INPATIENT	95	11
MISSING	409	46

TIME SINCE LAST SERVICE	#	%
WITHIN SAME DAY	18	2
WITHIN 7 DAYS	37	4
WITHIN 30 DAYS	35	4
WITHIN 6 MOS.	65	7
WITHIN 1 YEAR	79	9
OVER 1 YEAR	241	27
NO PRIOR SERVICE	202	23
MISSING	206	23

PAGE 2 OF 3

Figure 2 (Continued)

The approach taken was to group patients based on their diagnosis on admission for specific sex/ethnic/age categories. The total client population from the catchment area was examined and the diagnosis accounting for the most patients in a sex/ethnic/age group was used to delineate a homogeneous grouping; thus all patients of a particular sex/ethnic/age category with the same "most prevalent diagnosis" (MPD) were grouped for purposes of further

ADMISSION SUMMARY FOR CTCHMNT FILE DATE 01/24/74

OF ADMISSIONS: CTOLO = 883 TOTAL = 883

**********SUMMARY OF PSYCHIATRIC IMPRESSIONS**********

DIAGNOSTIC IMPRESSION	#	%
MENTAL RETARD	3	0
ORGNC BRAIN SYND	9	1
NONPHYS PSYCHOS	58	7
NEUROSES	146	17
PERSONY DISORDER	132	15
PSYCH/PHYSIO DIS	2	0
SPECIAL SYMPTOM	1	0
TRANSIENT SITUAT	88	10
BEHAVIOR	-	-
SOCIAL MALADJUST	41	5
NON-SPECIFIC	2	0
NO MENT DISORDER	51	6
NOT DIAGNOSED	109	12
MISSING	241	27

PROBLEM APPRAISAL	#	%
PHYSICAL		
SLEEPING	251	28
EATING	158	18
ENURESES	7	1
SEIZURES	9	1
SPEECH	7	1
OTHER PHYSICAL	90	10
INTELLECTUAL DEVELOPMENT		
INADEQUATE	38	4
SOCIAL RELATIONS		
WITH CHILDREN	127	14
WITH SPOUSE	271	31
WITH FAMILY	200	23
WITH OTHERS	164	19
SOCIAL PERFORMANCE		
SCHOOL	81	9
JOB	120	14
HOUSEKEEPING	69	8

OTHER SYMPTOMS	#	%
SUICIDL THOUGHT	102	12
SUICIDAL ACTS	38	4
ANXIETY, FEAR	214	24
OBSESSIONS	35	4
DEPRESSION	370	42
SOMATIC CONCERN	59	7
SOCIAL WITHDRAW	145	16
DEPENDENCY	106	12
GRANDIOSITY	14	2
SUSPICION	67	8
DELUSIONS	25	3
HALLUCINATIONS	37	4
ANGER,BELLIGERN	113	13
ASSAULTIVE ACTS	35	4
ALCOHOL ABUSE	102	12
NARCOTIC, DRUGS	169	19
ANTISOCIAL ACTS	39	4
SEXUAL PROBLEMS	74	8
AGITATION	45	5
DISORIENTATION	29	3
SPEECH DISORDER	11	1
LACK OF EMOTION	61	7
INAPPROP AFFECT	49	6
IMPAIR ROUTINE	113	13
MISSING	67	8

OVERALL SEVERITY BY PROBLEM DURATION

	WEEK	MONTH	1-YR	2-YR	>2-YR	MSNG	TOTL	%
SLIGHT	2	15	28	16	26	-	87	10
MILD	3	30	55	29	57	2	176	20
MODERATE	5	25	67	53	127	1	278	31
SEVERE	1	4	16	23	77	-	121	14
MISSING	-	2	9	17	34	76	138	16
NOT ILL	9	17	19	7	19	12	83	9
TOTAL	20	93	194	145	340	91		
%	2	11	22	16	39	10		

NOTE: SUMS OF INDIVIDUAL ITEMS MAY NOT EQUAL TOTALS DUE TO INVALID VALUES OR MULTIPLE ENTRIES. PERCENTAGES ARE BASED ON TOTAL ADMISSIONS. PERCENTS ARE ROUNDED TO THE NEAREST INTEGER. A PERCENT OF 0 INDICATES AN UNROUNDED PERCENT > 0.0 BUT < 0.5.

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Figure 2 (Continued)

analysis. Comparisons of type and quantity of treatment across aggregations were made first for sex/ethnic/age groups (or sex/age groups if ethnicity did not play a role) and second, in order to homogenize the client population, for sex/ethnic/age MPD groups (or sex/age MPD groups) (Figure 3).

To examine whether ethnicity played a role with respect to service delivery within an aggregate, first sex/age groups of whites were compared with non-

Table 1 Population Distribution, Admission Distribution, and Admission Rates by Sex/Ethnicity/Age[a]

AGGREGATE II	Total Population = 14148 Total Admission = 148			Adjusted Admission Rates per 10,000 Total 141 White 100 Nonwhite 373					
	Total			0–14			15–24		
	Pop. (%)	Adm. (%)	Adm./ 10,000	Pop. (%)	Adm. (%)	Adm./ 10,000	Pop. (%)	Adm. (%)	Adm./ 10,000
Total	100.00	100.00	105	23.12	7.43	34	15.68	35.14	234
White male	44.26	31.76	75	10.91	2.70	26	6.91	11.49	174
White female	51.54	52.02	106	10.40	2.70	27	7.82	18.92	253
White total	95.80	83.78	91	21.31	5.40	27	14.73	30.41	216
Nonwhite male	2.05	6.76	344	0.89	1.35	159	0.38	1.35	370
Nonwhite female	2.51	9.47	395	0.92	0.68	77	0.57	3.38	625
Nonwhite total	4.56	16.23	372	1.81	2.03	117	0.95	4.73	522
Male total	46.31	38.52	87	11.80	4.05	36	7.29	12.84	184
Female total	54.05	61.49	119	11.32	3.38	51	8.39	22.30	278

	25–44			45–64			Over 64		
	Pop. (%)	Adm. (%)	Adm./ 10,000	Pop. (%)	Adm. (%)	Adm./ 10,000	Pop. (%)	Adm. (%)	Adm./ 10,000
Total	21.17	41.90	207	25.20	13.51	56	15.19	2.03	9
White male	9.87	12.84	136	10.78	4.05	39	5.99	0.68	12
White female	10.08	20.27	210	13.99	8.78	66	9.25	1.35	15
White total	19.95	33.11	174	24.77	12.83	54	15.04	2.03	14
Nonwhite male	0.56	3.38	633	0.18	0.68	385	0.04	0	0
Nonwhite female	0.66	5.41	860	0.25	0	0	0.11	0	0
Nonwhite total	1.22	8.79	756	0.43	0.68	164	0.15	0	0
Male total	10.43	16.22	163	10.96	4.73	45	5.83	0.68	12
Female total	10.74	25.68	250	14.24	8.78	65	9.36	1.35	15

[a] All calculations were performed to six decimal places, but only four are exhibited. Thus recalculations based on figures reported in this table (i.e., using only four decimal places) would produce incorrect results due to round off.

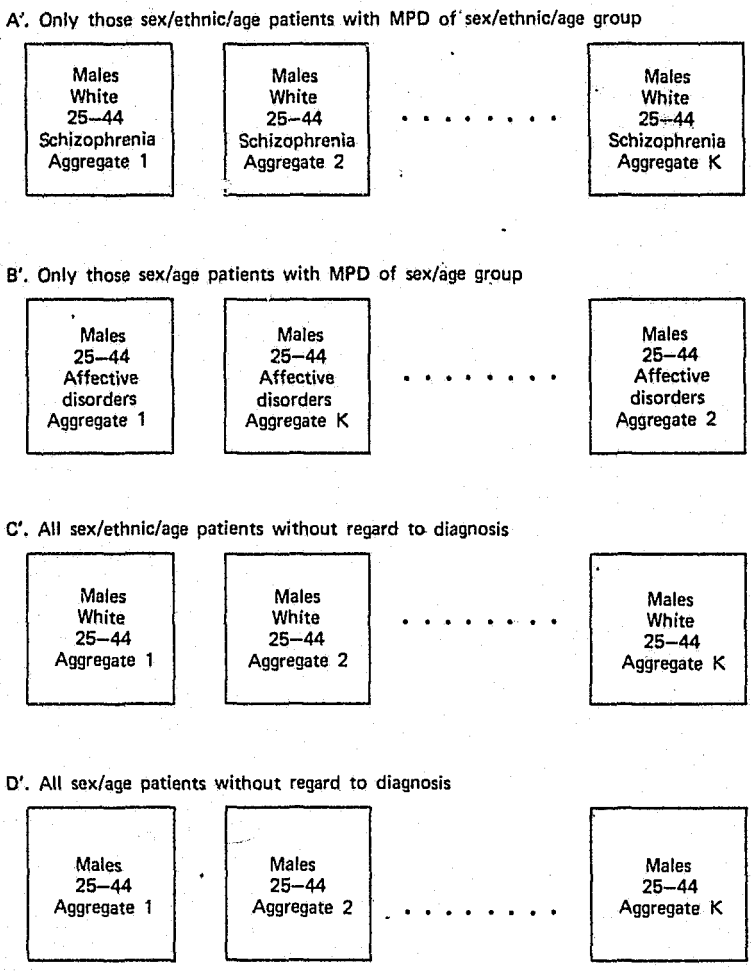

Figure 3 Equity comparisons among aggregates (across social areas). S/E/A, sex/ethnic/age; S/A, sex/age.

whites, and then sex/age/MPD groups were compared for whites versus nonwhites using (*a*) the MPD of whites and (*b*) the MPD of nonwhites (Figure 4).

(1) Modality of Admission. Data pertaining to modality on admission were analyzed. If certain subgroups were showing excessive entry to the center by one specific entry unit (i.e., inpatient or emergency), an assessment could be made whether such a pattern was in accord with center policy, and programs planned either to modify admission patterns or to allocate staff more knowledgeably in line with the existing admission trends.

Unit on Admission on the Admission Form (MS 5) was classified into the center's modality structure. Comparisons of patient subgroups as outlined above were made with standard Chi square analysis used to test for dependency of either social area aggregation or ethnicity on modality on admission.

(2) Number and Type of Direct Patient Services Rendered. The number of service units of a given type rendered to a client was examined. One of the data collection instruments of the MSIS system is the Direct Patient Service (DPS) Form which captures service data. Part of the information collected on this form is the occurrence of a patient contact with a clinician characterized in terms of the type of service. These data were examined for all services combined and for the individual service types for "homogeneous" groups of patients exposed to treat-

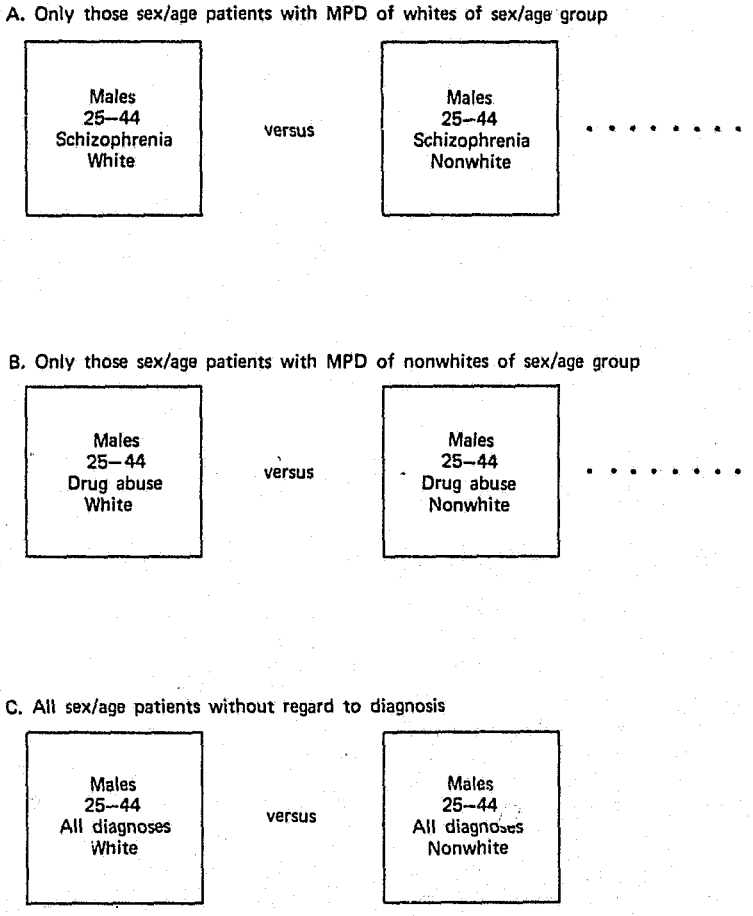

Figure 4 Equity comparisons within aggregates (whites and nonwhites). S/A, sex/age.

ment for the same length of time; those who received service for at least 30 days, and those who received service for at least 90 days. The total group which included any patient receiving service within the study period also was analyzed. For the "at least 30 day" group, service received only within the first 30 days after admission was examined, while for the "at least 90 day" group, service only within the first 90 days after admission was examined. For the total group, services rendered at any time in the period were included in the analyses.

There are many possible types of services that a center may provide. Each center was asked to characterize its service codes in terms of individual therapy, group therapy, medication, rehabilitation–restoration–habilitation services, client-related activities, residential-care services, and hospitalization–partial hospitalization. Only these seven broad categories of service were considered.

To describe these data, several measures and analyses were developed and outputs were produced:

The "client service rate" for sex/ethnic/age groups (total contacts/total patients) was defined as the average number of contacts received by each patient within the group (some of whom may not have received any service). A "client service rate" was also defined for the particular types of service (e.g., group therapy) as total group therapy contacts/total patients. For the total period for each sex/ethnic/age group a "population service delivery rate" (total contacts/total population) was calculated. Further, an "adjusted population service delivery rate" was obtained for the total population of each aggregate, enabling comparisons to be made of this rate among the aggregates.

The client service rate describes the process by which care is allocated or utilized by patient subgroups already seeking care at the center. The population service rate describes the rate at which care is delivered to the overall population, regardless of who within the population seeks or receives care.

Variations in population service rates may be more dependent on factors related to characteristics of the population itself, such as perception of need for care, tolerance of deviant social behavior, extent of high risk, and numbers of high-need persons within the area. Variations in client service rates may be more dependent upon factors that are directly related to the manner in which care is delivered within the center, such as clinical determinations of severity of illness and administrative/clinical decisions as to types and amounts of care to be rendered to the client population.

A statistical analysis of client service rates was developed to test the hypothesis that the service-specific client service rates are the same for subgroups of the patient population. Table 2 illustrates the type of tables analyzed to test for differential service patterns across aggregates and within aggregates.

For a given "homogeneous" group of clients, the client service rate can be viewed as a summary measure. Although the measure conveys a great deal of

Table 2 Client Service Rate for Overall Patient Population and for Major Therapy Classifications by Ethnicity and Aggregate

Population Patient Subgroup	Number of Patients		Number of Services		Overall Client Service Rate	Direct Service						Tests for Differences		
						IND		GRP		MED				
	N	%	N	%		N	Rate	N	Rate	N	Rate	$-2 \log \lambda$	Degrees of Freedom	Level of Significance
White	101	80	653	84	6.47	391	3.87	190	1.88	57	0.56	55.58	4	0.01
Nonwhite	25	20	129	16	5.16	106	4.24	5	0.20	12	0.48			
Total	126	100	782	100	6.21	497	3.94	195	1.55	69	0.55			
												5.76	1	0.05
												49.82	3	0.01
Aggregate														
1	40	32	242	31	6.05	174	4.35	41	1.02	18	0.45	124.98	12	0.01
2	22	17	177	23	8.05	124	5.64	37	1.68	16	0.73			
3	34	27	144	18	4.24	109	3.21	21	0.62	8	0.24			
4	30	24	219	28	7.30	90	3.00	96	3.20	27	0.90			
Total	126	100	782	100	6.21	497	3.94	195	1.55	69	0.55			
												40.56	3	0.01
												84.42	9	0.01

information, it does not describe possible disparities in receipt of the number of contacts among the clients in the group. Thus in one group each of 10 patients may receive 10 services and in another group each of 9 patients may receive 1 service while a tenth patient receives 91. Both groups received a total of 100 services for a client service rate of 10 and therefore none of the measures described above would distinguish between them. However the distribution of the number of contacts, that is, the number of distinct patients receiving no contacts, the number receiving one contact, the number receiving two contacts, and so on can be used to describe these disparities. In lieu of the distribution of contacts, a graphical representation, referred to as a Lorenz curve, of the distribution of service was presented, as demonstrated by Siegel, Meisner, and Laska (4). From these curves, disparities in the receipt of number of contacts among clients becomes more visually apparent.

To form Lorenz curves, first clients are "ordered" (listed) according to increasing number of contacts. The graph displays for each point on the X axis the percent of total contacts accounted for by the xth percentile of the clients. Using this curve the reader may ascertain such relationships as "90% of the clients received 9% of the contacts." A typical Lorenz curve is shown in Figure 5. (The proportion of patients receiving no contacts is marked on the X axis of each graph by the symbol *.)

If each xth percentile of clients would receive x% of the service, the curve that would represent this situation is the 45-degree line. For a given Lorenz curve, the area between the Lorenz curve and the 45-degree line (multiplied by 2) is referred to as the Gini coefficient. The value of the Gini coefficient varies between a lower bound, depending on the data, which is greater than 0 to a maximal value of 1. A large Gini coefficient corresponds to large disparities among numbers of contacts received by members of the group.

The third objective and the procedures addressed to this directive were as follows:

3. *Process Objective.* The client should receive continuous care that is nondisruptive as long as it is therapeutically necessary.

Specific Procedure.

a. What proportion of clients scheduled for appointments are "no shows" (that is, at least one appointment was neither kept nor canceled)? Determine the variations of these proportions among groups of patients. Compare service delivery to "no shows" with that of "never no shows."
b. Among terminated patients, determine the proportions lost to the program in terms of those who withdrew from treatment without notifying the center and those who are unresponsive to referral or for whom further care is indicated but unavailable.

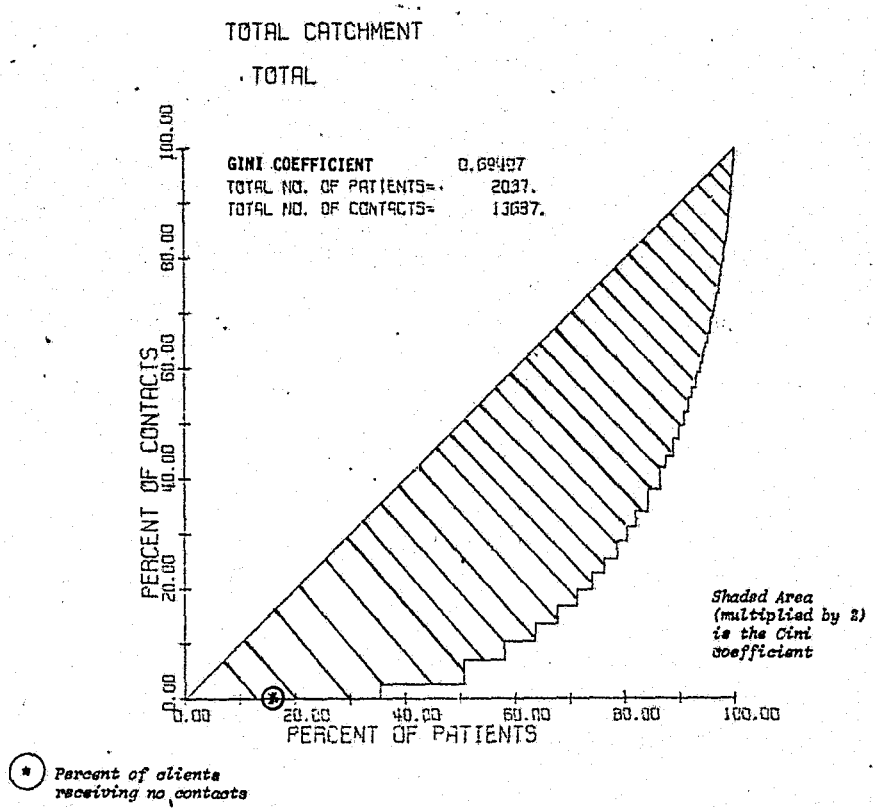

Figure 5 Lorenz curve. Total S/E/A, total population, total service.

Evaluating the degree to which an individual who requires treatment continues to receive care without disruption within the community mental health center's jurisdiction involves a multitude of issues. The issues considered in this analysis were of three types: (1) disruption of care while the individual is a client of the center in active treatment, (2) loss of contact with individuals requiring further service from the center, for example, clients who prematurely and inappropriately drop out of treatment, and (3) ensuring adequate and appropriate care for individuals terminated from the center who require further service.

Centers utilizing the Direct Patient Services system fill out the form if a scheduled appointment is not kept, indicating whether the patient or clinician canceled, or if the appointment was neither kept nor canceled (no show).

The first measure of the disruption of care to be considered in the analysis was the proportion of the total number of patients scheduled for service in some period who were no shows for one or more appointments. The proportion was

taken in terms of the number of patients who, at one time or another, were no shows rather than in terms of the number of appointments which were no show.

It is to be expected that this proportion changes from month to month as the client participates in the program of the center and as his attitudes change. Therefore the measure was calculated on a monthly basis. For example, only those patients who were scheduled for appointments in the third month after their admission, regardless of which calendar month they were admitted, were included. For each center, a graph displaying the proportion of no shows for each aggregation by month since admission was plotted together with a plot of the number of contacts scheduled in each month (Figure 6).

Several tables and statistical tests were developed to examine whether or not there were differences in the measure between whites and nonwhites as well as among social area aggregations. A Chi square statistic was utilized to test the hypothesis of independence between ethnicity and the no show measure within an aggregation as well as for the total catchment area. Similarly, the procedure was repeated to determine whether there were differences among aggregations.

To further evaluate center efforts to the no show group, the *client service rate* for kept appointments (or not kept but canceled) for the no show population was calculated and compared to that of the never no show group for the total catchment and all aggregates.

Disruption of care was further examined by considering the disposition of patients terminated within the study period. The centers either utilized the Termination Form (MS 5A) or the Change in Status Form (MS 6) to record terminations. Only the most recent termination data of clients terminated during the study period were examined, as it was felt that if there were a disruption of care, it would be most evident in the data of the client's last termination in the period.

To measure loss of contact with individuals requiring further service, a *Notification Index* was created, which is defined as the proportion of the total number of patients withdrawing from treatment who withdraw without notifying the center.

To measure whether clients receive adequate and appropriate care in other mental health facilities outside the center is obviously beyond the scope of the MSIS data base unless the other agencies are utilizing the system. However the referral status for patients terminated from the center requiring further care can be examined. This could indicate the degree to which centers are successful in pointing patients in the direction of agencies that could provide adequate and appropriate care and in getting the patient to respond to such referrals.

A *Referral Index* was defined as the proportion of the total number of patients terminated by the facility (excluding self-terminations) who were terminated without referral for either one of two reasons: (1) further care indi-

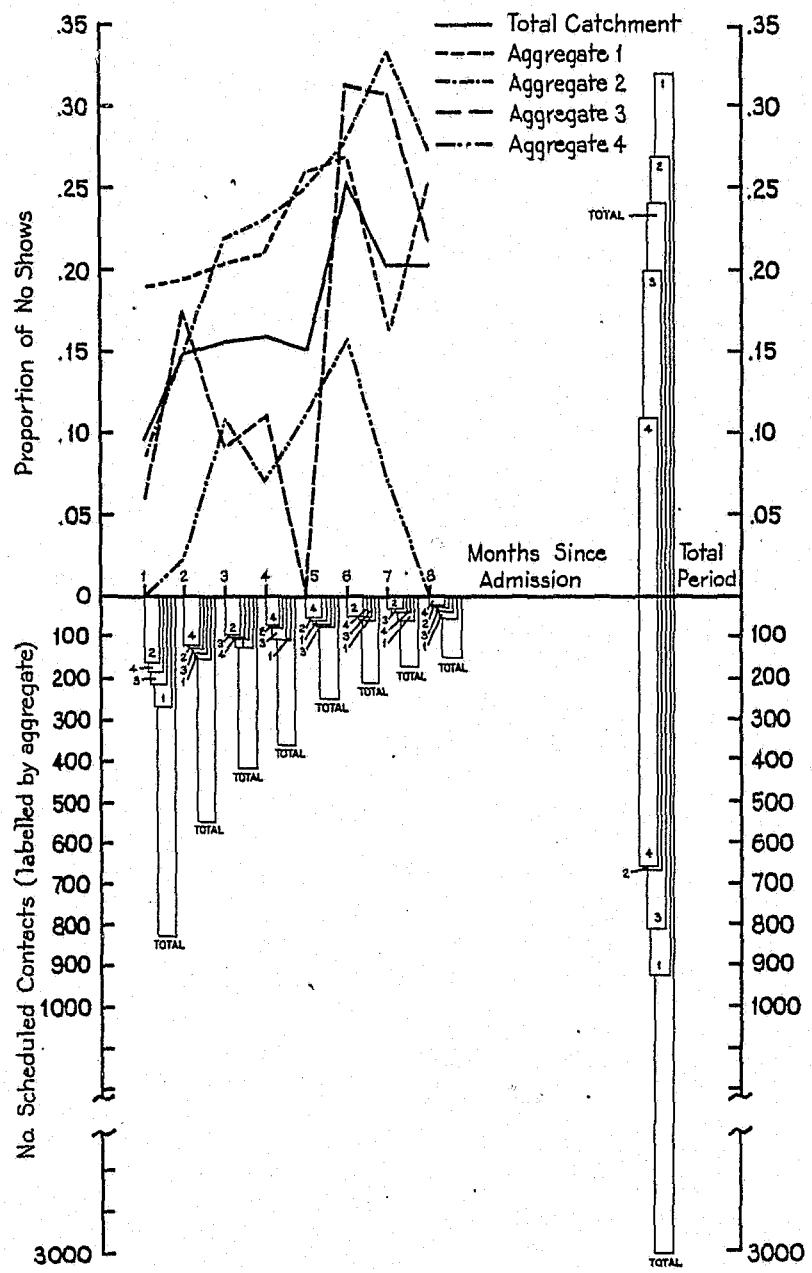

Figure 6 Monthly proportion of no shows and number of scheduled contacts by aggregate.

cated but unavailable and (2) unresponsive to referral. A bar graph was drawn (Figure 7) charting the variation of these two indices over aggregations.

The disruption of care measures introduced can be used longitudinally to assess the effects of changes in programming and staffing as well as to compare patterns of care over the social area aggregates.

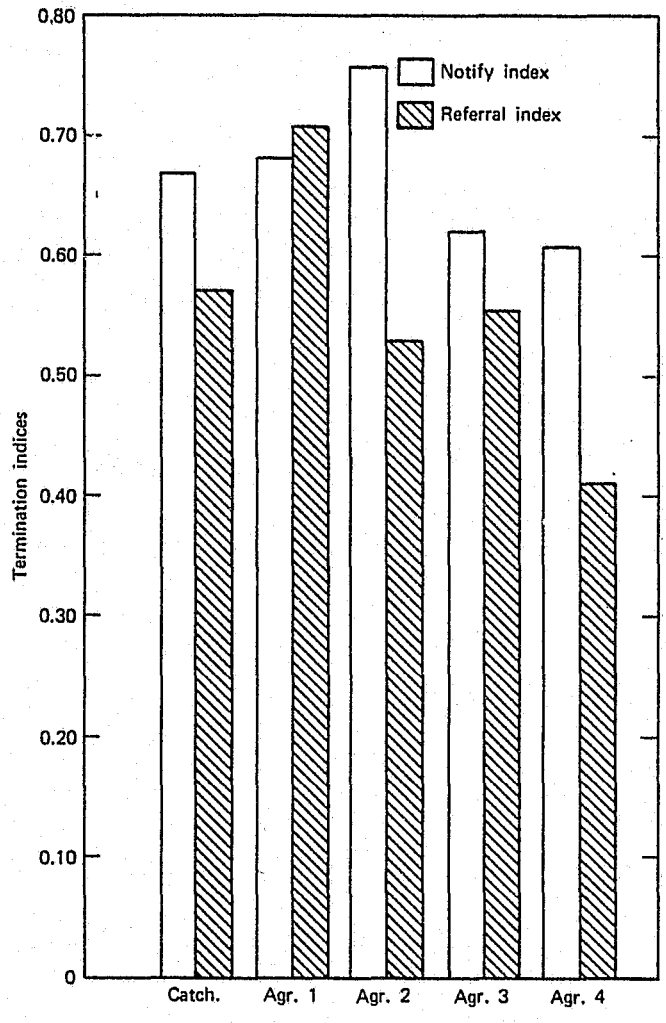

Figure 7 Termination indices.

DESCRIPTION OF THE CATCHMENT AREAS AND THE CENTERS

The four mental health centers participating in this study exhibit extensive differences in terms of the catchment areas they serve, their client populations, the types of services they provide, the length of time they have been in existence, and the size and scope of their therapeutic facilities as well as the way in which MSIS is employed in each center. Because of these intrinsic and fundamental differences, it was felt that comparisons of the centers in terms of the various study measures were not appropriate and accordingly were not made. Differential admission distributions and dissimilar patterns of service utilization are unquestionably due in large part to these differences, as well as to differences among the centers in terms of administrative and clinical philosophies and goals. Therefore each center's data were separately considered. However the methodology and data analysis employed in the evaluative paradigm were found useful as a general approach across all four participating centers.

The qualitative differences among the four centers are summarized below in terms of the catchment areas.

The populations vary tremendously in terms of both size and ethnicity (Figure 8). Area B CMHC services a very large, predominantly nonwhite population (85% nonwhite). Rockland also services a very large population but differs from Area B in that its catchment population is predominantly white

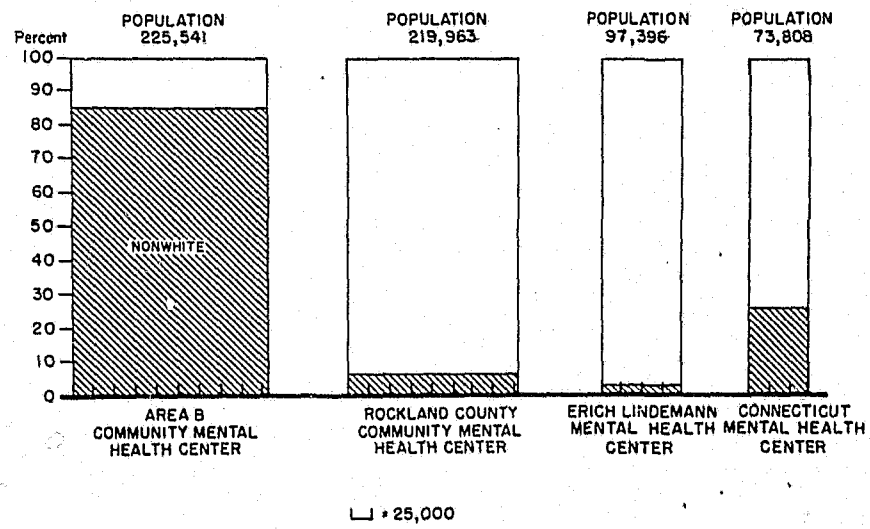

Figure 8 Comparison of catchment areas by population size, excluding group quarters, and ethnicity of four participating community mental health centers.

(6% nonwhite). Lindemann services a population which is less than half the size of Rockland's or Area B's and Connecticut about one-third the size. Lindemann is almost totally white (2% nonwhite) and Connecticut is about 16% nonwhite.

The four catchment areas vary in social rank as measured by median house value/median rent figures (Figure 9). Rockland has the highest median house value/median rent indices, composed as it is for the most part of substantial homes with a few small areas of poverty in an otherwise generally well-to-do community. The Connecticut Mental Health Center has the second largest median house value/median rent indices. These values are much lower than those of Rockland County due to the presence of poverty-stricken urban areas,

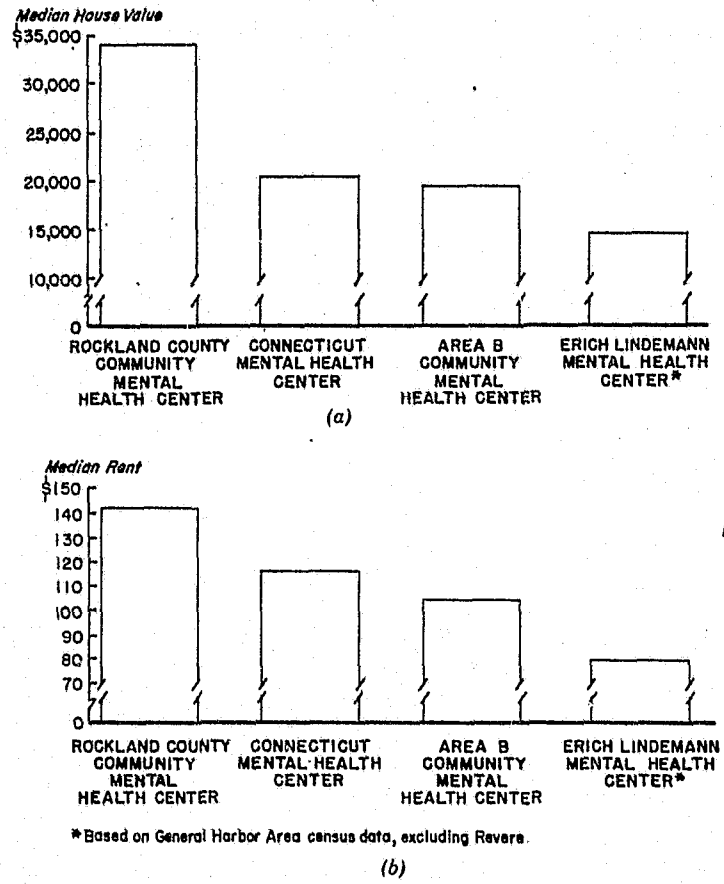

Figure 9 Comparison of median (a) house and (b) rent values of catchment areas of four participating community mental health centers.

particularly in the Hill district, balanced somewhat by more affluent suburban areas in West Haven. Area B Community Mental Health Center, while evidencing house values comparable to Connecticut, shows a lower ranking due to a lower median rent value. Since a majority of dwellings within the city are rented, this lower median rent figure more appropriately characterizes the social level of the inhabitants. Erich Lindemann Mental Health Center has the lowest values of the four participating centers. However it must be noted that median house value/median rent statistics were unavailable for the collection of tracts, including the Revere area, actually used in this study. Catchment area statistics were only available for the general Harbor area, including North End, Chelsea, and Beacon Hill but excluding Revere. If Revere statistics had been available, the Lindemann indices would have been higher, since Revere is a predominantly middle class, outlying area, in some respects comparable to West Haven.

The four catchment areas also differ in terms of degree of urbanization. An urbanicity index was constructed by equally weighting the three urbanicity indicators, percent occupied housing rented, percent multiple-unit housing structures, and percent persons in overcrowded housing (Figure 10). Lindemann is the most highly urbanized catchment area (urbanicity score 52), closely followed by Area B (urbanicity score 46). Connecticut MHC with a

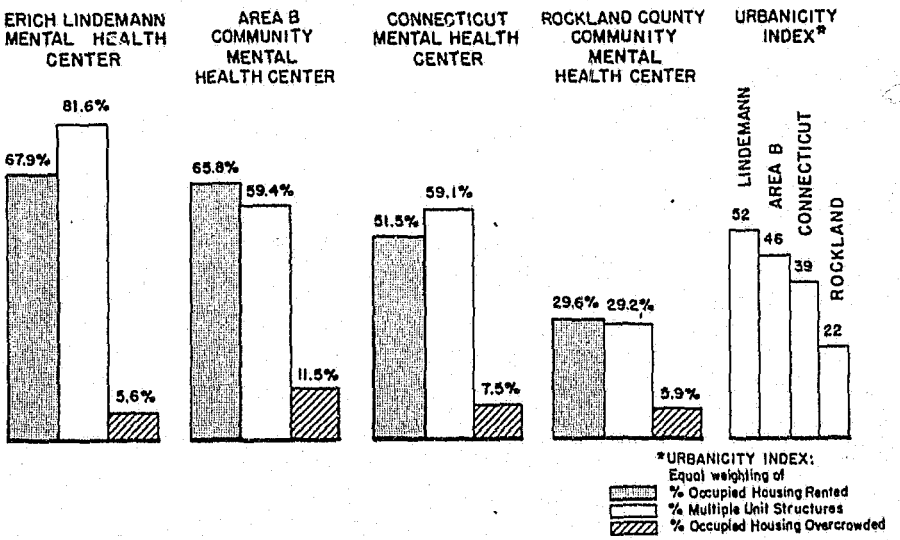

Figure 10 Lifestyle/urbanicity index of catchment area of four participating community mental health centers.

catchment area composed of a combination of central city and suburban area is less urbanized (urbanicity score 39). Finally, Rockland County CMHC has the lowest urbanicity index, as a result of its predominance of owner-occupied, single-unit, uncrowded housing (urbanicity score 22).

Fourteen percent of Connecticut MHC admissions were emergency admissions, while at least twice as many admissions to the other centers were emergency admissions (29 to 38%). It should be noted that Lindemann MHC with the highest proportion of emergency admissions uses its emergency service as a walk-in clinic as well as an emergency service.

Further differences were found in terms of center admissions. These differences strongly reflect the entirely different populations comprising the catchments these centers serve. An overview of the clients served by each of the community mental health centers has been obtained from an analysis of data on the admission record of each client grouped into Admission Summaries for the catchments. The MSIS Admission Form is used by the centers to report various socioeconomic and demographic characteristics as well as relevant data regarding source of referral to the center, prior psychiatric experience, type of admission (whether emergency or not), and some summary material on psychiatric impressions. Admission Summaries of the demographic characteristic of the admitted patients for each catchment area revealed interesting differences in the types of patients seen and the manner in which they came to the centers.

Although the ethnic composition of the catchment area is reflected in the ethnic composition of the admissions, in the three predominantly white areas, the percent nonwhite admission was somewhat higher than the percent nonwhite in the population. For Area B CMHC, which alone of the four centers is predominantly nonwhite, the nonwhite proportion of admissions was slightly less than the nonwhite proportion of the population (Figure 11).

The three predominantly white catchment areas of the Lindemann, Rockland, and Connecticut centers reflect national sex distributions. Admission sex ratios for these three centers tend to be lower than are found nationally (ratios of 79 to 87 for catchment admissions against a ratio of 91, nationally). The predominantly nonwhite catchment area (Area B) had a 2 to 3% lower proportion of males than the other three areas, which may be due to the fact that black males tend to be underreported in censile counts. Thus the highly significant overrepresentation of males in the Center's admissions (sex ratio of 183, which is twice as high as the national figure) was all the more noteworthy.

The four catchment areas varied significantly with respect to the age distributions of their populations, with Rockland County having a greater proportion of children under the age of 15 and Lindemann having higher proportions of persons beyond the child-rearing stage and over 65. The centers themselves differ significantly with respect to the age of patients served, with Rockland CMHC serving twice as many children 14 and under as the other centers.

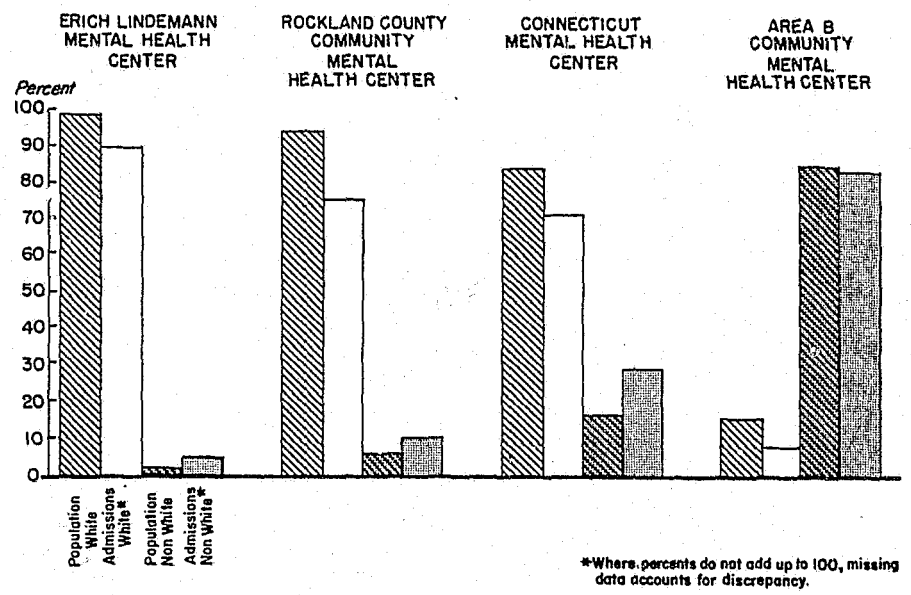

Figure 11 Comparison of ethnic composition of center admissions with catchment area populations (group quarters excluded) of four participating community mental health centers.

Service facilities in Rockland reflect this interest. Area B, on the other hand, serves significantly greater proportions of adults than the other centers, with a strong emphasis on the care of alcoholics. None of the centers spends a significant proportion of its efforts serving the elderly 65 and over.

There were highly significant differences in the educational level of admissions to the four centers, with Area B CMHC and Connecticut CMHC having significantly greater proportions of admissions with less than 12 years of schooling than Rockland County CMHC and Erich Lindemann CMHC. Factors other than age distribution of the catchment population, such as ethnicity and socioeconomic determinants appear to be responsible for the disproportionate representation of admissions not having completed high school in the Area B and Connecticut CMHC admission loads.

The centers differ significantly with respect to the distribution of referral sources of admissions. Connecticut MHC which has been in operation for the longest time had the highest percent of self/family/friend referrals. Area B and Lindemann MHCs, both relatively new to the catchment areas they serve, had proportionately less self-referrals. Area B CMHC received twice as many referrals from police and court agencies as did the other centers. Lindemann MHC received a significantly greater proportion of its referrals from mental hospitals and other hospitals.

RESULTS

The study was viewed basically as methodological. The applications of the measures to the centers' data were carried out to assess the feasibility of the developed approach rather than to carry out an evaluation of the centers. The principal findings for the four centers are summarized to indicate the kind of information obtainable from the evaluative paradigm.

Admission Patterns (Process Objective 1)

While the centers participating in this evaluation suspected that nonwhites were underapplying for available services, admission data indicated that in all four centers nonwhites in general showed adjusted admission rates that were more than twice the rate of whites.

In the three catchment areas that are predominantly white, nonwhite adjusted admission rates increased as the percent of nonwhites within the aggregate decreased. The nonwhite adjusted admission rates were not as high where nonwhites comprised more than 12% of the population of an area. (However it must be noted that this finding is based on relatively small numbers.) This finding is similar to that reported in a previous study indicating rates were "highest for the group which constituted a small minority (10% or less) of the population in a census tract, whether the group was white or nonwhite" (5). It is felt that this finding, which is replicated across the three predominantly white catchment areas, merits further investigation to examine determinants of the greater needs for service of the very small minority nonwhite groupings within the larger white areas. Lack of cohesive social support or structure leading to feelings of "anomie" and increased social stress may serve to create greater needs for mental health services.

In the two catchment areas with relatively long-established service networks, the poorest aggregation in each catchment area showed the highest adjusted admission rates. In the most recently established center, highest admission rates were from the most affluent aggregation. The community mental health center, itself, was on the periphery of this aggregation and seemed to be servicing those in geographical contiguity to the center. However, although this highly serviced aggregation showed the highest socioeconomic level within the catchment area, it exhibited the highest indices of those demographic characteristics commonly associated with high risk of encountering mental illness, such as the highest proportions within the catchment of persons not living in families, the lowest proportions of children in normal families, and a markedly lower youth dependency ratio than the rest of the catchment. These indicators suggest that in spite of the higher socioeconomic level of the aggregate, there was an increased need for service.

The extremes of the age range were underrepresented in the admission populations of all four of the centers. However, in those centers where special programs were targeted toward either children, age 14 and under, or the elderly, age 65 and over, the extent of unequal representation appeared to be smaller. Where no programs existed, the catchment population proportions were from three to five times as great as the corresponding admission proportions. Where special age-targeted programs existed, the population proportion for the age group was only twice as great as the corresponding client proportion. However these age groups may be served by other facilities within the catchment area (such as schools or social service organizations) that are not directly affiliated with the centers.

The three predominantly white centers exhibited peak admission rates for the 15- to 24-year age group, with females utilizing the centers at greater rates than males for all age groups except 0 to 14, where males showed higher utilization rates. The predominantly nonwhite catchment area exhibited a different utilization pattern, in which peak admission rates were found in the 25- to 44-year age group. A most striking finding for the center serving a nonwhite catchment area was the fact that male admission rates were more than double female rates, although males constituted only 46% of the catchment population.

Variations in Type and Quantity of Treatment Received (Process Objective 2)

Modality on Admission. There were significant differences in the way clients presented to the centers related to population characteristics of the various social areas within the catchment. Although each of the centers manifested different usage of various differing admission modalities, the usage pattern could be interpreted in terms of the population characteristics of the different aggregations involved.

Direct Patient Service. Once having been admitted to the center, patients exhibited differential care patterns linked to their social area and ethnicity. Those aggregates across the four catchments that were identified as utilizing significantly different modes of entry to the center were further highlighted as receiving differential treatment patterns once treatment was begun within the center. For each catchment area, the aggregate with a modality on admission pattern which differed from the remaining aggregates within the center received significantly different amounts and types of treatments than did the other aggregates.

In all but Lindemann, the population service rate was highest for the poorest, most highly nonwhite aggregate of the catchment area. However client service rates for the 90-day period in both Connecticut MHC and Rockland

County CMHC showed a different pattern. For these two centers the lower middle class, predominantly white aggregates had the highest overall client service rates. In Connecticut whites received service at higher rates than nonwhites for the 90-day period, while in Rockland this ethnic differential varied for males and females—male nonwhites receiving service at higher rates than male whites, and the reverse for females.

For the 30-day period in Rockland, Aggregates I and III had the highest client service rates. The high rate of service for Aggregate I was accounted for by service to whites and nonwhite females. Nonwhite males in Aggregate I had the lowest service rate. However nonwhites received service at higher rates than whites in the catchment area as a whole.

In Connecticut for the 30-day period Aggregate II had the highest overall client service rate, with nonwhites receiving service at higher rates than whites.

In Area B, the predominantly nonwhite center, the most highly urbanized aggregates had the highest client service rates for both the short-term and long-term periods. For these periods, nonwhite females received service at higher rates than white females.

In Lindemann, the predominantly white center, the highest socially ranked aggregate had highest client service rates for both periods. This finding appeared to be linked to the particular composition of the population of this aggregate (singles, students, one-family households).

For all centers, it was seen from the Lorenz curve data that 10% of clients received more than 50% of the total service. This 10% of patients will be scrutinized carefully in the near future to determine what population characteristics are represented by this high-utilization group.

Disruption of Care (Process Objective 3)

An analysis of ongoing service patterns to determine the extent and amount of disrupted care of clients while in treatment suggests that sociodemographic characteristics of the patients significantly influenced the extent of disrupted care encountered. For two of the four centers the poorer, more crowded aggregates showed in each month higher proportions of clients who neither kept nor canceled (no show) an appointment at least once. The proportion in each of the aggregates generally increased with time since admission. Proportionately greater amounts of service were offered by the centers to the no-show clients than to those who always kept appointments, suggesting that clinicians expended effort to insure that services were made available to the more difficult-to-treat clients who tended toward a disruptive care pattern.

The termination data indicators created to measure disruption of care in terms of loss of contact with clients and the assurance of care for terminated clients requiring further service were highest in the predominantly white catchments for the more urbanized, ethnically diverse aggregates. As length of time

between last contact and termination increased, the values of the indices of disruption of care increased. Only a small proportion of patients in any of the catchment areas had their disposition marked "care indicated but unavailable." The single predominantly nonwhite catchment exhibited different termination patterns of disrupted care. Disruption indicators on termination were similar for the five aggregations of this catchment area. There was a high proportion of terminated clients having the disposition status of "withdrawing and not notifying the facility" across the five aggregates.

CONCLUSION

In the light of competitive requirements for federal funds and legislative requirements of evaluation and accountability, the need to assess the degree to which an agency is fulfilling its goals and objectives has assumed major significance. To measure the extent to which the process objectives of a CMHC are being met is a difficult and ambiguous task. Simply stated but loosely constructed general aims must be translated into more precisely formulated objectives which are amendable to the application of statistical methods. A comprehensive, readily accessible repository of psychiatric data is an important prerequisite.

This study has defined a methodology for evaluating objectives applicable to CMHC data and applied the methodology to the data of four CMHCs. Since all were users of the MSIS, relatively detailed data were already available on computer files, permitting a timely and detailed analysis for this assessment. This study represents a paradigm and thus, theoretically, any CMHC may utilize both the methodology and specifics of this approach.

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