An Integrated Medical Record and Data System for Primary Care
Part 5: Implications of Filing Family Folders by Area of Residence

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A discussion of the advantages of filing family folders by geographic location is presented in addition to several methods for determination of socioeconomic status. Advantages of current filing techniques at the University of Rochester-Highland Hospital Family Medicine Program are detailed. Examples are given of the use of such information to estimate health-care utilization as determined by factors of distance from practice, socioeconomic status, natural barriers, and family size.

An earlier communication in this series of papers described a method for filing individual medical charts within a family folder.[1] The advantages of this system to help maintain and assure comprehensive care within a family practice setting were described. The question now becomes, How are family folders to be filed so they will further serve practice needs? Not only should they be easily retrievable but they should offer some means of identifying the practice within the greater community. The latter need is one of particular concern to the family or primary care physician.

Simple alphabetic or numeric filing systems allow rapid chart retrieval but give no indication of the geographic location of the family in question. These filing systems give no information about local community resources, neighborhood problems, or socioeconomic status (SES) of the family. For purposes of outreach into the community to screen children for lead levels, for example, it is necessary to know where the family resides as an indicator of the age of the dwelling with the probability of the presence of lead-based paint.[2] Outbreaks of communicable diseases may be more easily identified and controlled if the area of residence is known. Also, specific medical problems have been shown to correlate in incidence with SES and demographic characteristics,[3] as have levels of prophylactic immunization.[4]

This paper describes some advantages of filing patients' charts by area of residence. Background for development of geographic filing was given in a prior publication.[5] Experience indicates that the measurement of several factors can give insights into the health-care behavior of the practice population. Some of these are (1) geographic boundaries, (2) neighborhood and ethnic factors (particularly in urban areas), (3) distance from practice site, (4) accessibility of other health-care facilities, and (5) socioeconomic factors.

Geographic Considerations

There are numerous ways to file charts by area of residence. In an urban area, census tracts offer feasible boundaries. The Rochester Family Medicine Program uses such boundaries. However, certain geographic or geologic factors require consideration. Figure 1 shows data on patient population as percent of total census tract population for those tracts falling within a one-mile radius of the Rochester Family Medicine Center (FMC). It is apparent that the river offers an impediment to enrollment as a patient at the FMC. Not only is the

river itself a factor but its presence also strengthens neighborhood bonds. There is little intercourse between populations on either side of the river. Public transportation in this city tends to run toward the city center and few crosstown buses are available. Other considerations include SES of the cross-river population and accessibility of other health-care facilities. Of the 14 census tracts within the one-mile radius of this FMC, five are on the other side of the river. These five are populated primarily by families in SES V, the lowest by our means of determination. Public transportation is widely used by this group and direct bus access to another clinic is available.

It is evident that, although census tracts describe the neighborhoods, geographic barriers may limit the predictability of estimations of health service utilization based upon distance from practice. In more rural areas other geographic boundary descriptors may be more useful. In a small town, railroad tracks may be an important determinant of neighborhood boundaries. In some areas, "on the hill," "the other side of the hill," "across the creek," and sometimes school districts may be useful in studying the epidemiology of common diseases. Although census tract boundaries are generally good geographic demarcations, some practices should establish unique systems to describe the geographic boundaries of the practice settings.

Determination of Socioeconomic Status

Although it is possible to establish SES of each family in a practice by any of several methods, it is more efficient to define clusters of SES groups by location of patients' residence. No census tract is completely homogenous in economic, ethnic, and social composition but similar families tend to live in close proximity. The terms "ghetto" and "affluent suburb"

were not derived without reason. Whether ghettos or wealthy suburbs evolve from ethnic or strictly economic factors or a combination of both is of less importance than the fact that there are certain characteristics unique to any one neighborhood.

The socioeconomic status of each census tract in Rochester is determined by a five-part composite index consisting of: median value of owned homes; median rental value; percentage of skilled, semiskilled, and unskilled workers; median years of education (of adults); and percentage of sound dwelling units. A composite score, the mean of five converted individual scores, is established for each census tract. Five SES levels are then established based on percentile distribution. Areas I and V, which have the highest and lowest SES respectively, occupy the upper and lower ten percent limits of distribution. Similarly, census tracts falling within the upper and lower 10 to 30 and 70 to 90 percent limits are assigned to SES II and IV. The remaining middle 40 percent are designated SES III. Although this composite scale has provided an effective means for assessment of SES based upon census tract, certain problems are inherent in its use.

Arbitrary categorization of SES distribution into five levels on the basis of a 10:20:40:20:10 percentile distribution of census tract may be misleading since the division is not reflective of the country population.

When total population of each SES level is tallied for Monroe County, (the location of this FMC), the distribution becomes 14 percent I, 33 percent II, 37 percent III, 10 percent IV, and 5 percent V (Figure 2). Other methods for establishment of SES may more accurately represent the actual distribution of the population. One of the most widely employed methods of SES determination is the Hollingshead Index.[6] This is a two-factor index which uses occupation and education as its scale base. A recent study compared SES determination by census tract with the Hollingshead Index.* A random sample of 228 practice families were selected and the occupation
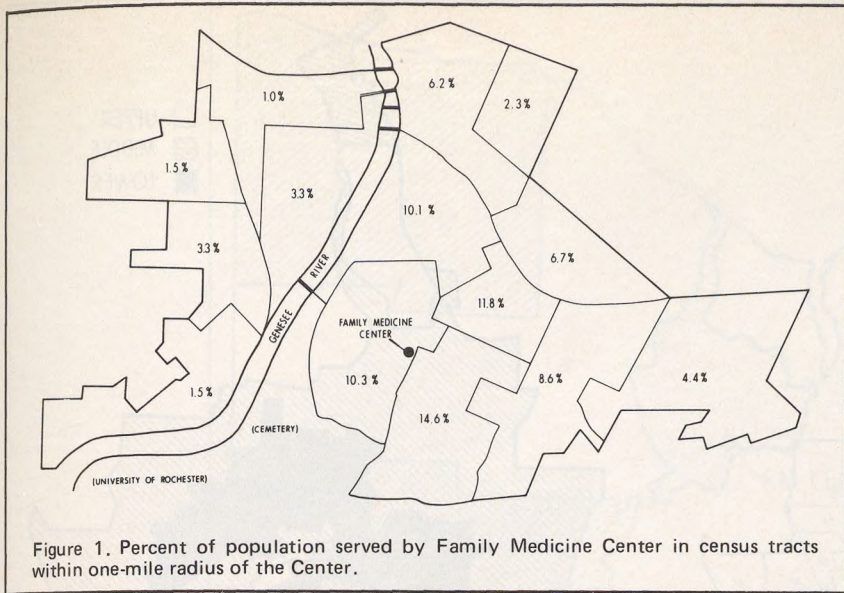
and educational level of the head of household (HOH) was ascertained by direct inquiry. Rank correlation of the two methods of SES determination was established by standard methods,[7] and the resulting coefficient (0.841) indicated a significant correlation ($P < 0.01$).

Most of the observed differences appeared to be related to the inappropriate representation of populations within SES when defined by census tract percentile distribution alone. One of the major problems with the Hollingshead Index, however, is that it has not been revised since 1957. Many of the relative weights of occupational status have been changed in the past 20 years and some occupations have either evolved or become obsolete in that 20-year interim.

The US Bureau of the Census (USBC) developed a method for description of SES in 1963.[8] The USBC index, like that of Hollingshead, is a composite numeric system but is based upon scores for three rather than two variables: education, occupation, and family income. This index has the advantage of simplicity of design; the three items under consideration are routinely obtained during the decennial census and are amenable to objective evaluation and scoring. Scoring is ultimately established on a 0-9.9 base with decile units contained therein, 0-0.9 being the lowest and 9-9.9 the highest SES. Published material for USBC SES distribution, however, gives figures for the United States only by region, not state or city. An additional consideration is that the USBC system gives equal value to all three variables and considers income as the sum of all working members of the household, but education and occupation only as reflected by that of the chief wage earners.

Although a full review of various methods for establishing SES is beyond the scope of this communication, another method devised with health-care behavior in mind merits mention.[9] In a study reported in 1970 of over 1,500 California families containing one or more children under five years of age, three independent variables were used — education, income, and occupation. The major difference between the scoring system developed by the California group and that of the USBC is that the California system is a weighted classification

Figure 1. Percent of population served by Family Medicine Center in census tracts within one-mile radius of the Center.

which not only adjusts for racial difference but considers known ethnic variation in health-care-seeking behavior. A composite index of nine items of health maintenance was the dependent variable.

The authors found a high correlation between SES as determined by their three- (or two-) part weighted index with preventive health-care behavior. A two-part version of their index considers only education and income. An interesting point elaborated in that study is that health maintenance behavior is more highly correlated with educational level of the mother than any other single factor.[10]
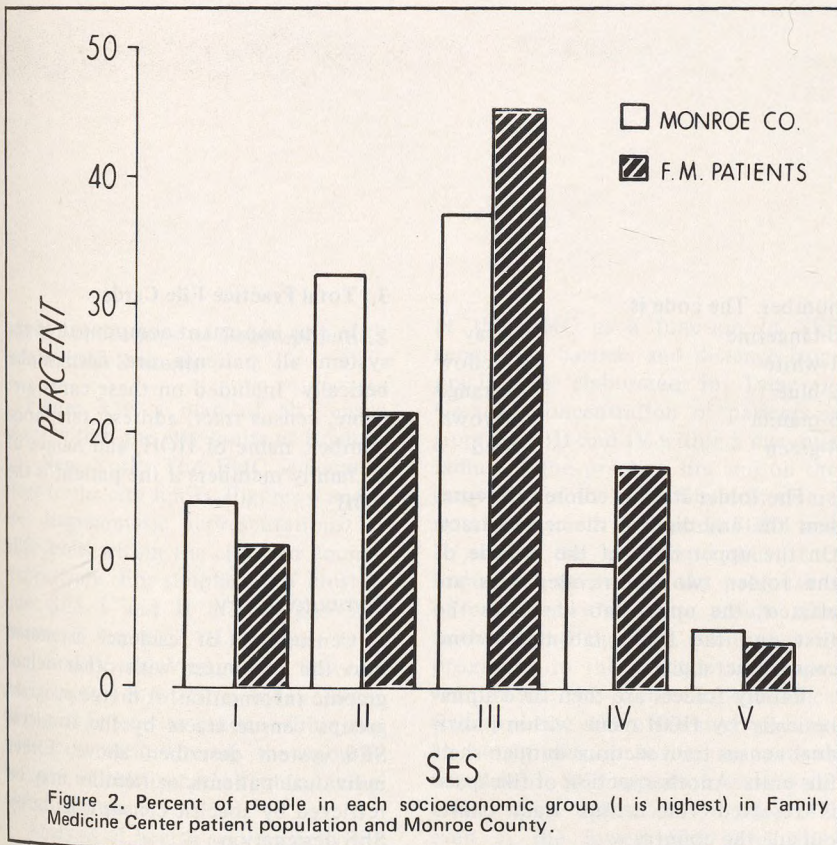
Methods

Once a means for definition of area of residence has been established and an index of SES incorporated into the information base, maintenance of a family chart filing system by area of residence and SES is not difficult. Methods currently in use at the Rochester FMC will be described. Although census tract is the basic geographic unit in this practice, other boundaries could be designated and appropriately numbered.

Demographic data for each census tract are available and include such pertinent information as educational and income level based upon the most recent US Census figures.

Figure 2. Percent of people in each socioeconomic group (I is highest) in Family Medicine Center patient population and Monroe County.

Manuals/Materials

1. Census Tract Directories
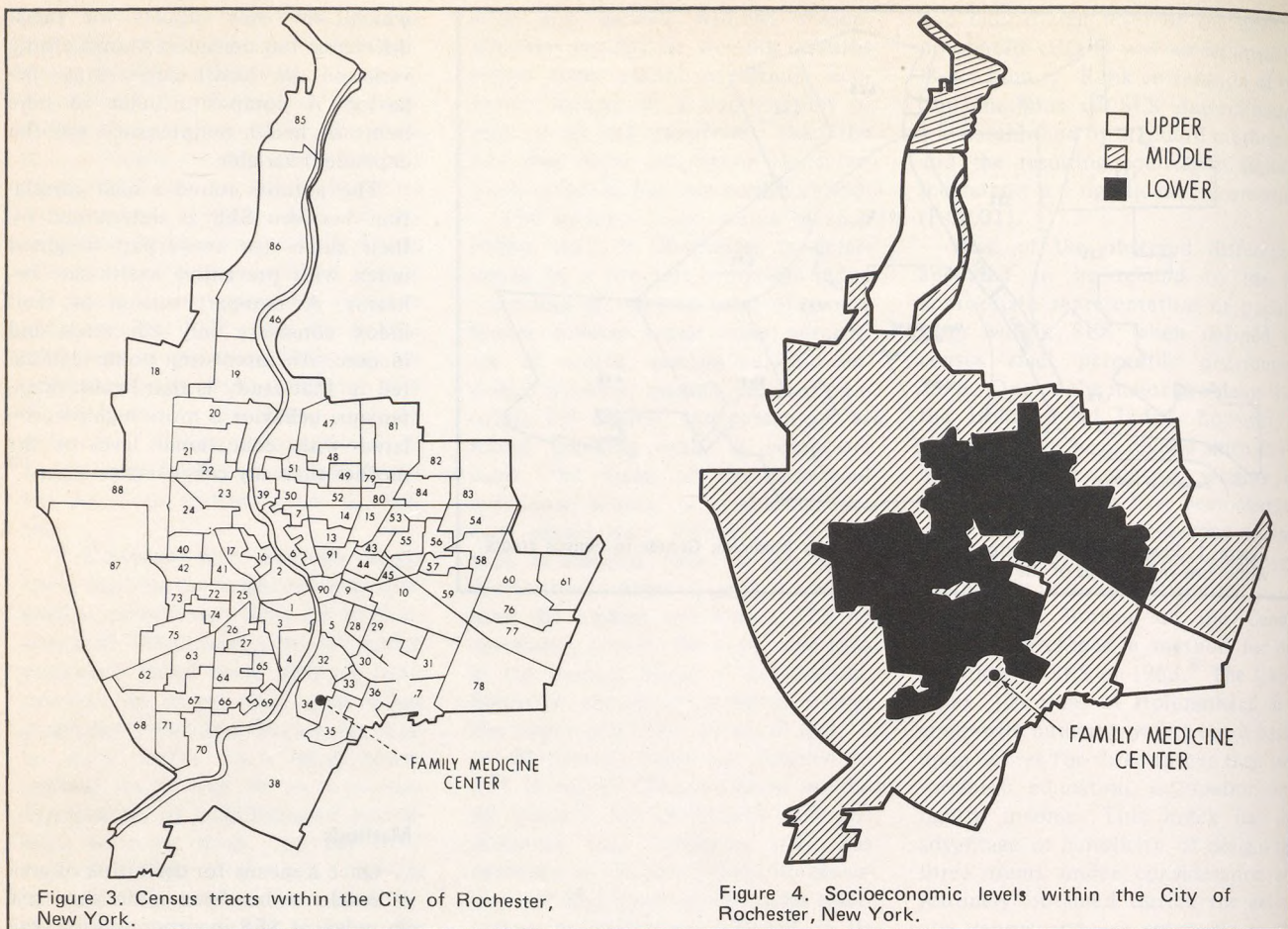
These are usually available from a

Figure 3. Census tracts within the City of Rochester, New York.

Figure 4. Socioeconomic levels within the City of Rochester, New York.

city or county planning commission or, if not, from the Federal Bureau of Census in Washington, DC. Use of these directories permits notation of census tract of residency on the family information sheet at the time of entry into the practice.

2. Color-Coded Family Folders

The Family Medicine Center uses a three-digit code to identify census tract, and the family folder itself is identified by the name of the head of household and census tract of residence. For further identification and to minimize misfiling a ten-color digit code is used to describe census tract

number. The code is:

0-tangerine	5-gray
1-white	6-yellow
2-blue	7-orange
3-manila	8-brown
4-green	9-red

The folder itself is colored to represent the end digit of the census tract. On the upper right of the outside of the folder two color-coded tabs are affixed; the upper tab identifies the first and the lower tab the second census tract digit.

Family folders are then filed alphabetically by HOH name within individual census tract sections in open-shelf file units. Another section of file space is reserved for census tract charts outside the country.

3. Total Practice File Cards

In this important component of the system all patients are filed alphabetically. Included on these cards are: name, census tract, address, telephone number, name of HOH, and names of all family members if the patient is the HOH.

Computer Entry

Census tract of residence is entered into the computer with other demographic information. A merge program groups census tracts by the five-level SES system described above. Either individual patients or families may be retrieved by specific census tract or by SES designation.
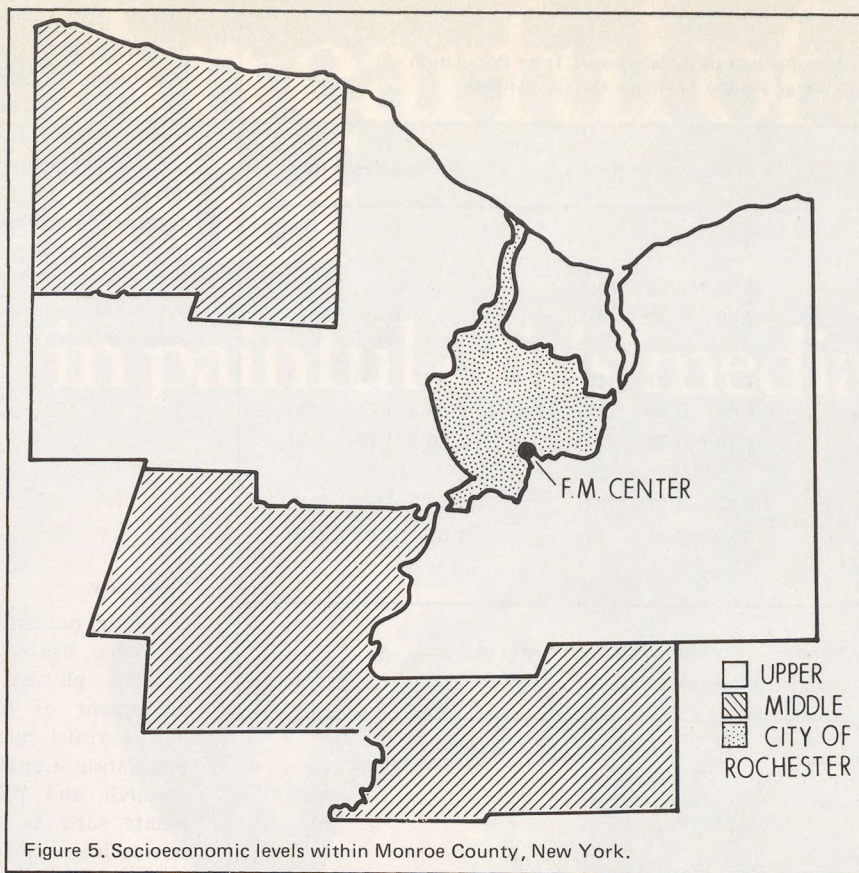
Figure 5. Socioeconomic levels within Monroe County, New York.

Legend:
- □ UPPER
- ▨ MIDDLE
- ▦ CITY OF ROCHESTER

F.M. CENTER

Some Applications of Geographic/SES Information Systems

Figure 3 is a map of all census tracts within the city limits of Rochester, New York. The FMC is located close to the city limits. Figures 4 and 5 are diagrammatic representations of SES levels within the city and county respectively. For simplicity of illustration SES I and II are merged and shown as "upper," III remains "middle," and IV plus V represent "lower." As is true of most cities today, lower SES groups tend to cluster within the inner city area whereas the suburbs (county, in this instance) exhibit more overall affluence.

Analysis of health seeking behavior at this FMC as a function of SES geographic barriers and distance from practice is elaborated in Table 1. Greatest concentration of patients is from SES III and IV within a one-mile radius of the practice site and on the same side of the river. Since there are no census tracts designated SES I and II within the one-mile radius it is impossible to project the proportion of patients within these groups who might attend the FMC were they in proximity to the practice site. However, in the one-to-three-mile distance from practice where the river no longer constitutes a barrier to patient enrollment, SES appears to have little effect upon utilization of the FMC even at the lowest SES level (V), where dependence upon public transportation and distance from the FMC would have been thought to pose a problem.

There is a significant (P<0.05)* increase in size of active FMC patient families with distance from practice (Table 2), but the possibility exists that observed differences may be related to type of housing available. In general, larger single family dwellings are found in areas more removed from the FMC. On the other hand, family size of the patient population was found to be unrelated to SES. It might be argued that a single person or

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*Chi Square Method

Table 1. Mean Percent of Total Census Tract Population Enrolled as Family Medicine Center Patients

Distance from FMC-SES		This Side of River		Other Side of River	
<1 Mile:	Upper	—*		—	
	Middle	8.98 ± 2.10	(5)†	—	
	Lower	7.60 ± 2.38	(4)	2.12 ± 0.46	(5)
1 to 3 Miles:	Upper	1.79 ± 0.31	(4)		
	Middle	1.61 ± 0.19	(14)	1.93 ± 0.23	(11)
	Lower	1.70 ± 0.38	(21)	1.66 ± 0.22	(12)
>3 Miles:	Upper	0.82 ± 0.21	(21)	0.66 ± 0.07	(14)
	Middle	0.89 ± 0.11	(11)	1.01 ± 0.10	(18)
	Lower	—		—	

*A dash indicates that there are no census tracts within that category.

†Mean percent ± SEM (number of census tracts)

couple without children living at some distance from the practice would be less likely to seek care at the FMC than those closer or that housing considerations lead large families to live farther away from the city. Since differences in utilization are small, complete investigation of the factors involved has not been made. However, the effect of family size on health, economic status, and social welfare has recently been extensively reviewed.[11]

Summary

Filing patients' charts by area of residence has several advantages for family physicians. These include assessment of socioeconomic status and a visual picture of the practice population. Capacity for health service research and planning for developments such as satellite offices and outreach are enhanced.

Table 2. Distance From Practice and Family Size

Distribution of active FMC families by family size within distance boundaries from the Family Medical Center

Family Size	<1 Mile	1 to 3 Miles	>3 Miles
1 - 2	69.7%	62.3%	58.6%
3 - 4	21.5%	26.6%	29.1%
≥5	8.8%	11.0%	12.3%
	100.0% (n=1,467)	100.0% (n = 2,130)	100.0% (n = 2,013)

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