AVAILABILITY AND USE OF MEDICAL FACILITIES: A GEOGRAPHIC CASE STUDY

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ABSTRACT. — Using Golconda, Illinois as the research area, this study determines, from a sample survey of households, (i) the percentage of the population that visited selected health facilities during 1966, and (ii) where the population traveled to these facilities.

The number of medical facilities represents an important component of every region's health program. Brown (1966) noted that the physician-population ratios in underdeveloped countries may range from 1 to 20,000 to 1 to 100,000. In developed countries the ratio is around 1 to 1,000 (Sanders, 1965). Another component is the degree of use of these facilities. It has been found in several studies that availability of health facilities may not correspond to their use. For example:

> "The National Health Service in Great Britain is one of the most comprehensive health services for the population ever devised. Yet, in a study of a representative sample of families in London, 37 percent of the families (as reported by the mothers) had a member suffering pain or discomfort and not being treated. A visit to a physician is free of charge" (Anderson, 1965, p. 363).

Thus, together the availability and use of health facilities in an area form two keys to public health programs. This paper seeks to reveal through a case study, how a geographic analysis may add to an understanding of these two keys.

Specifically, using Golconda, Illinois, in Pope County, as the research area (Figure 1), this exploratory study is concerned with determining:

(i) The availability of medical facilities for the Golconda population. The medical facilities in question are those of the physician, dentist, and hospital.

(ii) The use of these facilities. By use, I mean whether or not a member of a household has visited a physician, dentist, or hospital.

(iii) The patterns of movement to the medical facilities.

The local data on availability and use are compared with national data, taken from the Health--Household Interview Survey conducted by the U.S. National Health Survey during the early 1960's.

METHODS

Selection of the site. — Golconda is located in the Quadri-County area of southern Illinois where the University of Illinois Center For Zoonoses Research is conducting its investigations. (This is a multi-disciplinary investigation of diseases common to man and other animals.) This study is part of

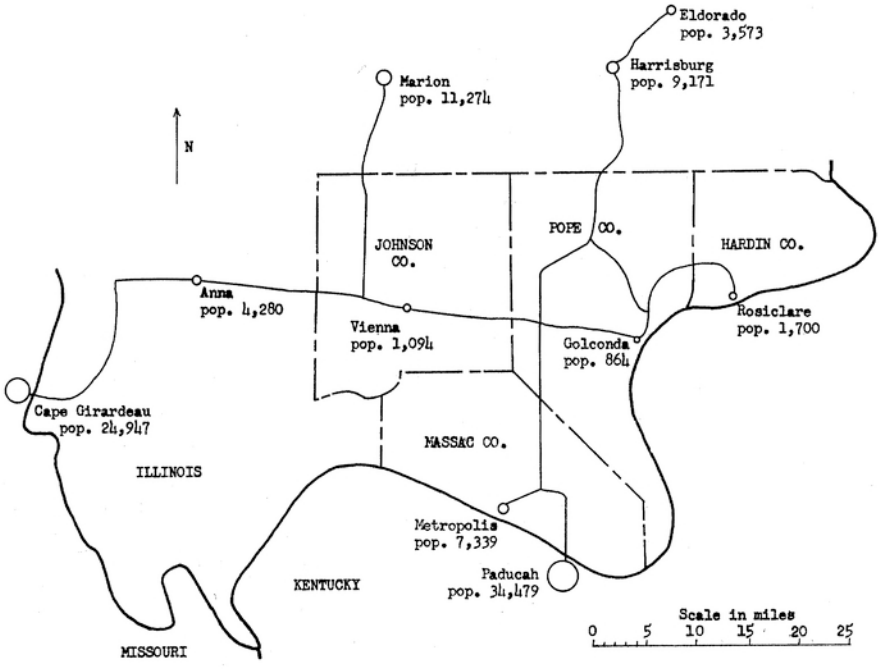

FIGURE 1. — Southern Illinois Study Area.

that work. There are, however, more specific reasons for the selection of Golconda. The size of the town (864 in 1960) was sufficiently large to have (for the area) a representative population in terms of sex and age structures, yet the town was not so large that it could not be studied in the short time available. Also, with the small number of medical facilities in the town (a physician and a dentist), it was assumed that many of the inhabitants would go elsewhere for medical attention. Finally, there was not much difference in distance to four other towns—Metropolis, Rosiclare, Paducah, and Harrisburg — each of which had a greater number of medical facilities than Golconda.

Sample design. — The sample population was drawn from within the legal town boundaries of Golconda. A sampling fraction of one-fifth, or every fifth household, was used. The town was arbitrarily divided into three sampling units of approximately equal area and number of households. Three random numbers, drawn from a random numbers table, were used as the starting points for each unit. For instance, in unit one, "4" was the random number. I started at the fourth household and then interviewed every fifth household thereafter in that sampling unit, always beginning at the northwest corner of each block and working clockwise. The purpose of this procedure was to avoid possible "linear trends" (Stahl, 1966).

The total sample population was 136 inhabitants. This constituted 63 households, of which 58 responded. There were two refusals and three vacancies. Two recalls were made to the vacancies at different times on different days. Then, neighbors were asked to confirm the vacancies. A total of only four people constituted the number of refusals. Adding those four inhabitants to the total expected population from the vacant households (2.3 inhabitants per household times 3 households equals 6.9, or rounded off to 7) it was found that the non-response constitutes 7.9 percent (i.e., 11/147) of the total possible response.

A Chi-square test (2x2 contingency table) was used to test the internal consistency of the sample population data. Two random samples were drawn and found not to be statistically significant (hypothesis accepted $H_o = H_1$) at the 0.05 level of significance.

The value for the number of inhabitants per household, as indicated above, 2.3, was below the average for the county (2.92 for 1960). This is probably due to the fact that there are a large number of elderly persons living alone in the town. This large elderly population in Golconda is evidenced in the age structure of the sample population, which is heavily weighted above 65 years of age (Figure 2).

Data. — A questionnaire was used for each member of the household. Information was sought on: age, sex, visits to the physician, dentist, hospital, and where the person went for these services. The information concerned only the past year, January to December, 1966. It was hoped that memories would still be relatively strong for this time period.

Regarding the comparisons with national findings, statistical analyses, e.g., chi-square, have not been used, since the data from my survey and the national survey were collected at different times, not co-ordinated areally, and were vastly different in size of sample. Therefore, the comparisons should be treated only as tentative indicators.

Results

Availability of medical facilities. —The question posed on availability was: is the ratio of medical facilities to population in the Quadri-County area equal to the state and national ratios? As can be seen in Table I, the answer is no. For all three services, physician, dentist, and hospital, the Pope County and Quadri-County ratios were far below the state and national ratios. The lack of a physician in Johnson County is particularly notable. Focusing on Pope County and Golcon-

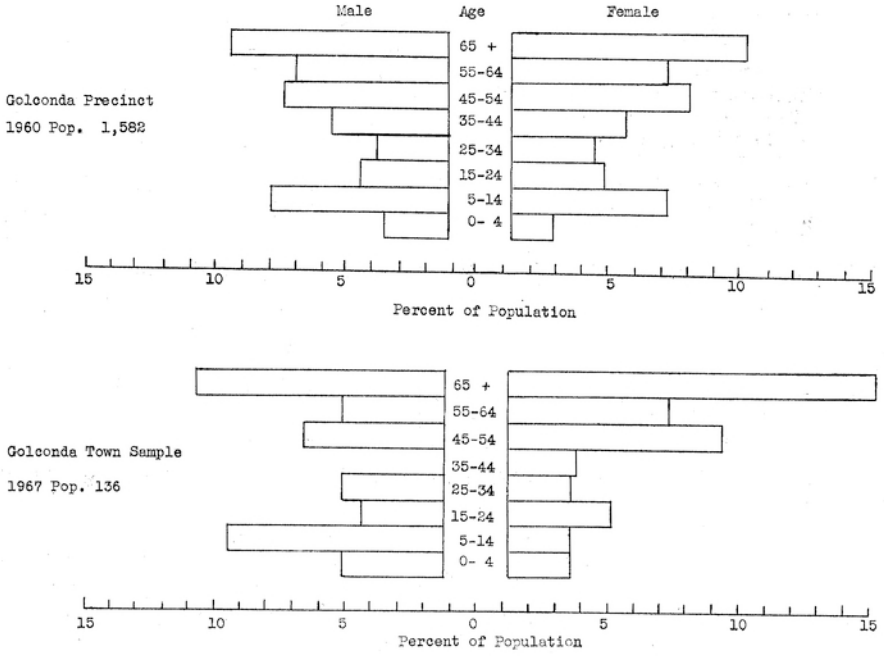

FIGURE 2. — Age-Sex Structures.

TABLE 1.—Availability of Medical Facilities in the Quadri-County Area, the State of Illinois and the United States.

Quadri-County Area[1]

County	Population	Physician (P)	(P) per 100,000 Popu.	Dentist (D)	(D) per 100,000 Popu.	Hospital	Hospital Beds (Hb)	(Hb) per 1,000 Popu.
Hardin	5,879	2	66	2	34	1	27	4.6
Johnson	6,928	.....	.....	2	29	.....	.....	.....
Massac	14,341	6	42	4	28	1	60	4.2
Pope	4,061	1	25	1	25	.....	.....	.....
Total	31,209	9	29	8	26	2	87	2.8

Illinois[2] and United States[3]

Area	Physician per 100,000 Population	Dentist per 100,000 Population	Hospital Beds per 1,000 Population
Illinois	137	60	4.2
United States	143	52	3.8

[1] Field study, January, 1967.
[2] U.S. Department of Health, Education, and Welfare (1965, p. 5-15).
[3] Pennell and Baker (1965, pp. 26-27).

da, several people expressed their concern to me over the need for another physician. And they were also becoming concerned about the future need for a dentist, as the present one is old and declining in health.

Use of medical facilities. — The data on visits to physicians appear to indicate a similarity between the Golconda and national averages (Table II). In both cases about two-thirds of the population visited the physician at least once during a one-year period. Also in each case, a lower percentage of men than women visited the physician.

For dental visits, the Golconda percentage was generally below the national percentage (Table III). Comparisons cannot be made with national differences between sexes, since recent data on a national scale are not available. The Golconda data indicate that females visited the dentist more often than males. This indication is in accord with previous national experience (Anderson, 1956, p. 198).

There was a striking difference between the percentage of hospital visits on the local and national levels (Table IV). While appoximately 20 percent of the Golconda sample pop-

TABLE 2.—Persons with a Physician Visit within a Year by Sex and Age: Golconda, Illinois. (January 1966-December 1966)[1] and United States (July 1963-June 1964)[2]

Age	Both Sexes			Male			Female		
	Gol.[3] No.	Gol. %	U.S. %	Gol. No.	Gol. %	U.S. %	Gol. No.	Gol. %	U.S. %
All ages	91	66.9	66.1	40	61.5	62.7	51	71.8	69.3
Under 5 years	10	83.3	80.4	5	71.4	81.7	5	100.0	79.1
5-14 years	11	61.1	61.2	7	53.8	61.5	4	80.0	60.8
15-24 years	7	53.8	66.1	3	50.0	60.7	4	57.1	71.0
25-34 years	8	66.7	66.2	4	57.1	57.3	4	80.0	74.3
35-44 years	1	16.7	63.4	0	.....	58.2	1	20.0	68.3
45-54 years	16	72.7	63.4	6	66.7	58.7	10	76.9	67.9
55-64 years	12	70.5	63.6	5	71.4	60.2	7	70.0	66.8
65-74 years	10	76.9	67.9	4	100.0	63.3	6	66.7	71.1
75+ years	16	69.5	70.5	6	54.5	67.7	10	83.3	72.6

[1] Field study, January, 1967.
[2] National Center for Health Statistics. "Physician Visits." (1965, p. 29).
[3] Gol. no. refers to the actual number of visits to the physician, from Golconda sample.

TABLE 3.—Persons with a Dentist Visit within a Year by Sex and Age: Golconda, Illinois (January 1966-December 1966)[1] and United States, (July 1963-June 1964).[2]

Age	Both Sexes			Male			Female		
	Gol. No.	Gol. %	U.S. %	Gol. No.	Gol. %	U.S. %	Gol. No.	Gol. %	U.S. %
All ages	45	33.3	42.0	20	30.7	N.A.	25	35.0	N.A.
Under 15 years	11	36.7	39.5	8	40.0	.....	3	30.0	.....
15-24 years	10	76.9	55.2	4	66.7	.....	6	85.7	.....
25-44 years	7	38.9	58.5	4	50.0	.....	3	30.0	.....
45-64 years	13	33.3	38.4	4	25.0	.....	9	39.1	.....
65+ years	4	11.1	20.8	0	.....	.....	4	19.0	.....

N.A.—Data was not available.
[1] Field study, January, 1967.
[2] National Center for Health Statistics. "Current Estimates." (1965, p. 19).

TABLE 4.—Persons with a Hospital Visit within a Year by Sex and Age: Golconda, Illinois, (January, 1966-December 1966)[1] and United States (June 1960-July 1962)[2].

Age	Both Sexes			Male			Female		
	Gol. No.	Gol. %	U.S. %	Gol. No.	Gol. %	U.S. %	Gol. Nol	Gol. %	U.S. %
All ages	27	19.9	9.3	15	23.0	7.0	12	17.0	11.4
Under 15 years	7	23.3	5.0	5	23.8	5.6	2	20.0	4.3
15-24 years	3	23.1	12.5	2	33.3	5.1	1	14.3	19.1
25-44 years	5	27.8	12.2	2	25.0	6.3	3	30.0	17.7
45-64 years	6	15.4	9.5	3	18.8	9.5	3	13.0	9.5
65+ years	6	16.7	11.2	3	20.0	11.8	3	14.3	10.7

[1] Field study, January, 1967.
[2] National Center for Health Statistics, "Persons Hospitalized." (1965, p. 15)

ulation visited a hospital, only about 10 percent of the national sample population did so. Further, in Golconda more males than females visited the hospital, exactly the opposite of the national sample findings.

Location of, and movement to, medical facilities.—Only about one-third (of those visiting) of the sample population visited the Golconda physician (Table V). The percentage of males and females staying in Golconda for medical services was almost exactly the same—one-third. No clear patterns emerged as to age-location distinctions. A combined total of over 50 percent of the patients went to Paducah, Rosiclare, and Metropolis. The high percentage of visits to Paducah is explained, in large part, by the medical specialists found there. The close proximity of Rosiclare to Golconda appears to account, in part, for its percentage of visitors.

The percentage of visitors to the local physician, as contrasted with visitors to the local dentist, is striking: almost ¾ of those visiting the dentist stayed in Golconda, while only about 1/3 visited the local physician. Why is there this difference? Excluding the possibility of a large sampling error, I suggest that psychological factors are responsible. In short, what several people told me was simply, "I don't like him," in referring to the local physician.

Since Golconda has no hospital, the inhabitants must go elsewhere for this medical facility. Rosiclare stands out as the most important center, getting 1/3 of the Golconda hospital visitors. Paducah, which has the largest number of beds and technical equipment in the immediate area, received one-quarter of the visitors. For special services, more distant centers were used: Evansville,

TABLE 5.—Medical Service Visitors from Golconda to Selected Centers.[1]

Center	Physician		Dentist		Hospital	
	Number	%	Number	%	Number	%
Quadri-County Area						
Golconda	38	33.9	32	71.1	0	.....
Metropolis	15	13.3	5	11.1	5	17.2
Rosiclare	20	17.8	1	2.2	10	34.5
Vienna	1	0.8	.....	.....	.....	.....
Illinois: Other						
Anna	0	.....	0	.....	0	.....
Danville	0	.....	1	2.2	2	6.8
Eldorado	2	1.7	0	.....	0	.....
Harrisburg	5	4.4	4	8.8	2	6.8
Marion	1	0.8	0	.....	1	3.4
Indiana						
Evansville	0	.....	0	.....	1	3.4
Kentucky						
Paducah	28	25.0	0	.....	7	24.1
Missouri						
Cape Girardeau	1	0.8	0	.....	0	.....
St. Louis	0	.....	0	.....	1	3.4
Tennessee						
Murfreesboro	1	0.8	1	2.2	0	.....
Total	112	99.3	45	99.8	29	99.6

[1] Field study, January, 1967.

St. Louis, and, for veterans, Marion and Danville, Illinois.

CONCLUSIONS AND SUGGESTIONS

Certain general points emerge from the results of this exploratory study. First, the medical facilities of Golconda in particular, and of the entire Quadri-County area, appear to be inadequate for the given population, as noted in the population-medical facility ratios. Additionally, psychological factors play a large part in reducing the effectiveness of the Golconda physician. Furthermore, one of the Quadri-County dentists works only part time, and will presumably retire within a few years.

Second, the Quadri-County area has long been characterized by both a small and declining population and a low income level. These conditions are not conducive to enticing more medical facilities and personnel into the area.

Third, despite these conditions, in general it appears that the population did visit the physician as often as the national sample population. The percentage of the Golconda hospital visitors was even above the national percentages.

Fourth, (Table V) the Quadri-County medical facilities received well over half of the Golconda visitors. Thus, the facilities of the area are, indeed, important to the inhabitants of Golconda.

Concerning future work in the Quadri-County area I would suggest the following:

Regarding availability of medical facilities, four approaches should be considered. First, Golund's work in Sweden (1961) and Kuhinka's work in Pennsylvania (1965) have revealed that time-distance factors are important in determining areas of inadequate service in relation to hospitals. I suspect that for the most part few places in the Quadri-County area would be beyond Kuhinka's limit of 30 minutes by car from a local hospital; but the point is worth validating. Second, a precise definition of available medical facilities in centers should be established. Cross-checks should be made with physicians to determine their specialties and with hospitals to determine the extent of their facilities. Third, ignoring measures of quality, the numerical sufficiency of facilities could be more vigorously determined through two measures: the total number of visitors to each facility, and the percentage of the total population using the facilities, as determined by a household survey. Fourth, other medical facilities should be considered, particularly the Quadri-County Health Department.

Regarding the use of medical facilities, I would propose an extension of the household sampling approach, since that approach can provide fairly precise answers to the questions of who uses what facilities, how often, where, and why.

In particular, explanations of patterns of movement to medical facilities need to be considered not only in terms of distance, number and type of facilities, and size of centers, but also in terms of the household decision-maker's value structure. In this vein, Koos (1954) found that a calculus of economic, psychological, and sociological factors determine what facility a person will visit.

Finally, I suggest that the household survey would be a valuable means by which to involve specific populations in the continual processes of planning and redevelopment (Shimkin, 1965). Thus, hopefully, a long-term mutual concern could develop on the part of both the medical personnel and the population on the effectiveness of availability and use of medical facilities.

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