

The Neighborhood Dynamics of Hospitals as Large Land Owners¹

Raphael W. Bostic, LaVonna B. Lewis, and David C. Sloane

Paper prepared for the
Lincoln Institute for Land Policy Conference
on
Large Landowners and Their Impact on Land Values
October 4-5, 2006

¹ The authors acknowledge financial support from the USC Lusk Center for Real Estate and the Lincoln Institute for Land Policy. They would like to thank John Karevoll and Dataquick for providing the data, Xiaoxin Zhang for producing the maps, and Hina Gupta for research assistance. A special thanks is extended to Megan Cummings, Pria Hidisyan, Leza Mikhail, Katie Peterson, Lauren Siniawer, and Joshua Williams for their work as census surveyors.

The Neighborhood Dynamics of Hospitals as Large Land Owners

The health care economy is enormous, consuming over 14 percent of the US GDP. The industry ranges from pharmaceutical and biotechnological companies on the cutting edge of research to family physicians in offices scattered throughout our communities. Such industries are crucial to metropolitan economies, as demonstrated by a new study from the Milken Institute. DeVol and Koepp (2003) demonstrate that Boston, New York, Philadelphia, Chicago, and Los Angeles are metropolitan leaders in the health care economy because of the range and depth of their activities.

The hospital plays a central and multifaceted role in the health care economy. First, hospitals are large employers. For instance, Cedars-Sinai Medical Center in Los Angeles “is the anchor [for] office[s] and [medical] clinics [that have] 8,600 on staff” (DeVol and Koepp, 2003). This employment is only the tip of the larger iceberg, as a medical center such as Cedars is surrounded by other businesses related to the hospital’s mission. Hospitals thus can be important for a community’s economic performance, development, and stability.

Modern urban hospitals do not occupy as much land as they did in the late nineteenth century, when concerns about cross-infection mandated pavilion-styled hospitals that could spread over dozens of acres. Hospitals have instead become centers for a wide range of medical services, including ambulatory care, imaging and diagnosis, as well as the traditional in-patient services. The result has been that they often spread out, appropriating land around them both for current uses and future expansion. Some hospitals, such as Dartmouth-Hitchcock Medical Center sited on a 225-acre location in Lebanon, New Hampshire, have created large land holdings for future development. Urban hospitals rarely have such a luxury, but are constantly

incrementally expanding into surrounding neighborhoods (see Figure 1: Cedars-Sinai Campus Map).

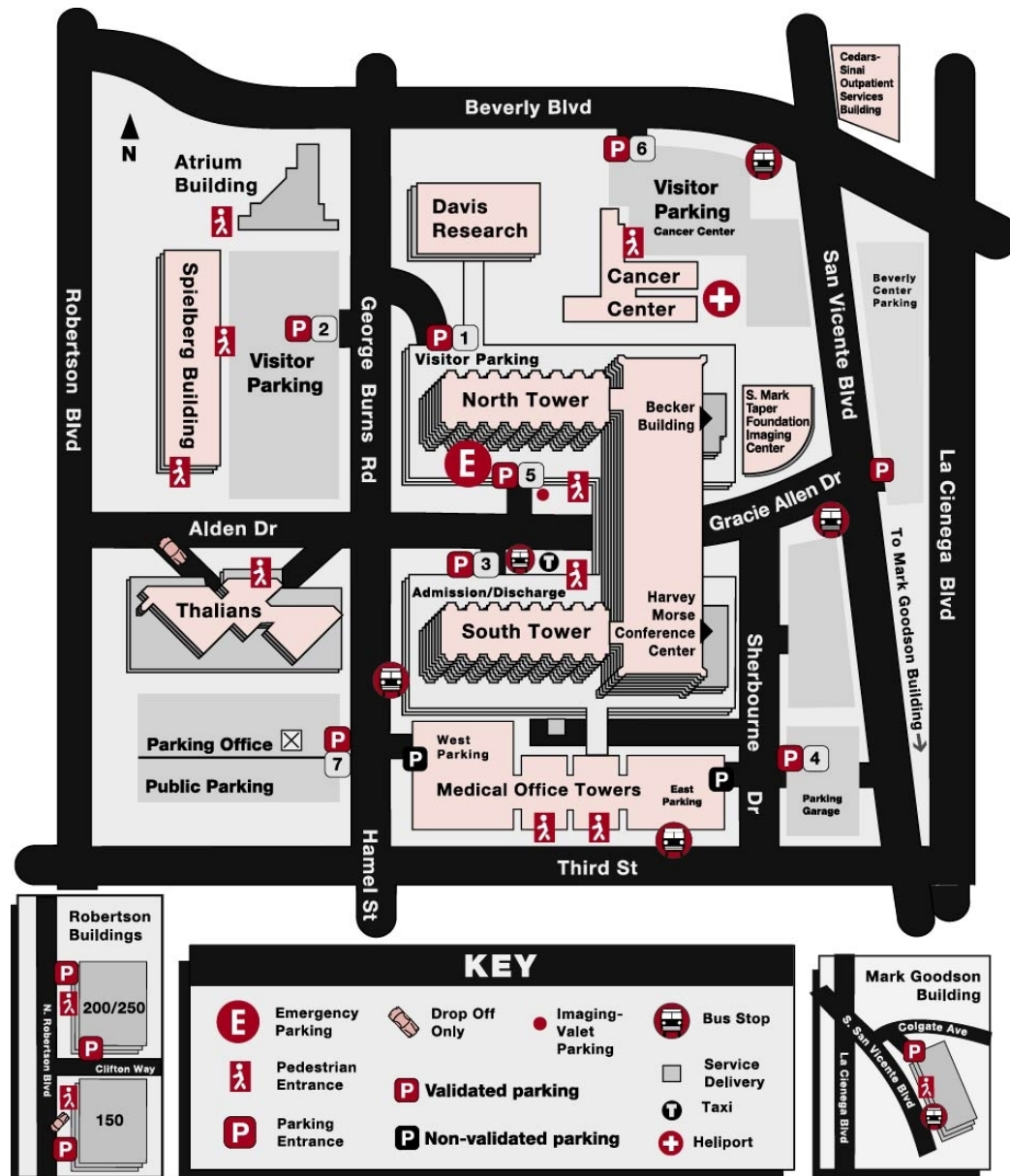


Figure 1: Cedars-Sinai Campus Map (www.csmc.edu)

Second, hospitals serve as a focal point for ancillary health care businesses, including physicians and other practitioners, medical specialists and supportive services

such as physical therapy, testing labs and medical supply companies (Freeman, Sidhu and Montoya, 2006). These complementary activities are essential if a hospital is to have maximal effectiveness and proximity can further enhance this efficacy. Thus, the demands of these ancillary businesses for space and buildings can potentially impact local land markets in important ways. Driving around virtually any urban hospital, one will find a constellation of other health care services (see Figure 2: Palmdale Dialysis Medical Center). Some will be in commercial rental space, others will locate in buildings that the hospital constructs to improve the efficiency of care for its patients, and to provide complementary space for its affiliated health care providers.



Figure 2: Example of Surrounding Medical Uses, Westwood Surgery Center

Third, because of their role as an important provider of health care services, hospitals are a neighborhood amenity. As with all amenities, the additional benefits of

hospitals will be capitalized into the value of land near the hospital. Hospitals therefore will shape land values in the neighborhoods in which they are located and can differentiate some neighborhoods and communities from others.

Despite their obvious importance, hospitals have been understudied from a geographic and land use perspective. For example, DeVol and Koepp (2003) note that “remarkably little quantification of the economic geography of health in the United States” has been reported in the scholarly literature. Health care scholars have traditionally focused on individual economies of health, particularly related to insurance, and the internal distribution of health care expenditures among the various activities of the industry. Notably, the rise of prescription drug prices and the expansion of their use have led to a deep literature on the latter topic. Geography and space have been minor issues in this literature. Similarly, urban and real estate economists, who have a more natural disposition to consider space, have tended to focus on sectors, such as residential and retail, rather than on industries, such as health, whose land use cuts across those sectors.

Recently, that gap in the literature has slowly begun to fill as a growing body of work looks at the economic impacts of hospitals in California, with particular attention paid to Los Angeles County. The primary reason is that hospitals in California are under stress. The stress comes about from a variety of reasons: limited (often negative) net operating margins, low reimbursement rates for government programs, unfunded mandates such as seismic retrofitting and nurse staffing ratios, uninsured and underinsured patients, and the continuing demand for services. Elected officials, health foundations, and representatives of the hospital industry have all been interested in examining how hospitals have handled these various stressors and the consequences when hospitals are unable to handle them.

A brief look at the research shows that these studies varied in their focus. One area of study has been the impact of hospital closures (Scheffler, Kagan, Maiuro, Schmittiel, and Yu, 2001). In this study, the authors note that from 1995-2000 urban, southern California hospitals, located in close proximity to other hospitals, were the ones that most frequently closed. The authors also reported an acceleration in closures with more than twice as many taking place in the second half of the period studied as in the first. Finally, the authors note that hospitals with fewer than 100 licensed beds closed more often than any other type. A second study provided evidence that the closure of hospitals in Los Angeles County has reduced access and increased mortality for individuals residing in surrounding zip codes (Buchmeuller, Jacobson, and Wold, 2004).

A second area of study was the impact of emergency department closures and diversions on other area hospitals and communities (Melnick, Nawathe, Bamezai, and Green, 2004). Here, the focus was more on how the closures and diversions impacted the organizational capacity and finances of the hospitals. While the conclusions were that the hospital emergency departments in California have maintained capacity and patient access, and are contributing to hospitals' profits, several critiques of the research have been presented in the literature.

A third area of study seeks to quantify the role of hospitals as centers of economic activity—hubs of employment, payers of wages, purchasers of goods and services, and generators of tax revenue. Freeman, Sidhu, and Montoya (2006) note that Los Angeles County area hospitals were directly or indirectly responsible for generating over \$47 billion in revenue in 2004. This included direct revenue attributed to hospitals and the hospital-related portion of revenues from doctors' offices and medical labs; and indirect revenue, generated when hospitals, doctors' offices, labs, etc., and their employees buy goods and services in the local area.

While the focus of the studies varied, their conclusions are the same—hospitals are major economic drivers of their respective communities. Two key elements are lacking from the previous research. First, the studies lacked a more detailed examination of a hospital's community. In particular, when we explore hospitals via a statewide, regional, or county lens, we miss the impact of the hospital on its' surrounding community. Second, the research treated all hospitals equally, not systematically taking into account the size of the particular facilities. As a result, the economic impacts of small, medium, and large hospitals were collapsed together. The hospitals selected for this paper respond to both of these issues.

We are particularly interested in the interaction between neighborhood characteristics (race/ethnicity, income) and the presence of a hospital. Does agglomeration of health care businesses occur equally over all places, or is it affected by neighborhood characteristics? Put another way, we seek evidence on whether hospitals are an engine for economic development in consistent ways or if a hospital's effect is influenced by social, demographic and political factors apart from pure economics. Through these questions we hope to uncover the role of the hospital as a large landowner within the local real estate market.

Methods

Our research approach involves conducting a visual census of land uses for parcels located close to the hospital. The objective is to establish the full range of activities taking place around hospitals, with an objective of inferring the links between hospitals and their environs. A second objective is to establish the extent to which hospitals anchor agglomerations of health-related activities. Thus, beyond classifying parcels according to broad land use, the census also identifies the type of health-related activity taking place on parcels with health-related activities. This information can

provide an indication of the nature of clustering of activities, an important feature of agglomeration economies. A third goal is to establish whether these relationships differ across hospitals located in different types of neighborhoods. Such a question highlights important distributional issues regarding the benefits hospitals confer upon the neighborhoods and populations with which they interact locally.

While quite labor-intensive, the visual parcel-level census approach is appropriate for this research for several reasons. First, almost no datasets provide reliable information on land uses at the parcel level. This is because collecting such information is expensive and because, even if data are collected, parcels can change land use and go unnoticed by those that collect such information for some time. Second, individual parcels might feature multiple land uses. For example, parcels may feature housing with retail or gas stations and convenience stores. A visual census permits the accurate identification these mixed-uses. Third, the census allows for the identification of business activities that might not be recorded in the phone book or other potential source of information. A dentist, accountant, or massage therapist might have small operations run out of a home or other non-traditional business location. While not eliminating these issues altogether, the parcel-level census approach increases coverage and accuracy and reduces the likelihood that important land uses are overlooked.

A key issue is how to define a hospital's "neighborhood." We use a 1-mile radius around a hospital as the boundary of its neighborhood. This represents a compromise, as in some cases this will be too large and in others it will not be large enough. However, given the lack of a consensus view in the literature, the choice of a 1-mile radius served to ensure project tractability.

The study focuses on Los Angeles County, which lies at the core of a large, dynamic, and demographically diverse metropolitan area. The second largest city in the

United States and a gateway city that draws population from origins worldwide, Los Angeles is highly varied and thus offers a natural laboratory for evaluating the relationship between hospitals and their surrounding neighborhoods and whether these relationships vary with the neighborhood in which the hospital is located.

In terms of health economies, Los Angeles represents an important market. DeVol and Koepp (2003) rank Los Angeles as the fifth largest health care metropolitan economy in the nation and note that health care employment in Los Angeles has dramatically outpaced overall employment between 1980 and 2001, suggesting that while health care has consistently been an important part of the economy, it is steadily growing even more important. The authors, however, provide little sense of the impact of the health economy on local or regional growth or real estate markets. Thus, this study provides an opportunity to advance our understanding of the region's economy, its potential for growth, and neighborhood and land market dynamics.

We started by stratifying the 124 hospitals in Los Angeles County, using neighborhood characteristics such as income, poverty and racial and ethnic makeup, and scope of services provided, ranging from full-service hospitals with large-scale surgical, orthopedic, and other in-patient services to smaller community hospitals, with limited services.

Of the 24 hospitals that were randomly selected via the first screen, seven were selected for the more detailed parcel-level land use census based on their distribution along the three selection dimensions. Spatially, they are distributed widely across Los Angeles County and serve diverse communities from racial and income perspectives (Table 1).

Table 1. Distribution Of The Census Hospitals Across The Selection Criteria

	<u>SPA</u>	<u>Income</u>	<u>Race</u>
City of Angels – Ingleside	Southeast	Lower	High Asian
Elastar	Southeast	Lower	High black and Hispanic
Glendale	Northeast	Lower	High black and Hispanic
Kaiser Sunset	West	Lower	No dominant race
Lakewood South	Southeast	High	High black and Hispanic
Lancaster	Northeast	Lower	No dominant race
Hollywood Community of Van Nuys	Northeast	Moderate	No dominant race

Brief profiles of the hospitals in the census sample, grouped by their size, follow.

Small Hospitals—Less than 100 Beds

- City of Angeles Medical Center-Ingleside Campus

City of Angels Medical Center – Ingleside Campus is one of the oldest licensed psychiatric hospitals in California. Founded in 1918, Ingleside is a 70-bed acute psychiatric hospital and full service mental health center. The campus sits on five acres near the San Gabriel Mountains in the city of Rosemead.

- Hollywood Community Hospital of Van Nuys

The Hollywood Community Hospital of Van Nuys in the San Fernando Valley is nestled under the umbrella of Hollywood Community Hospital. The Van Nuys facility is a 59-bed acute psychiatric hospital.

Medium Hospitals—100 to 300 Beds

- Elastar Community Hospital

Roughly 80-years old, Elastar in East Los Angeles was a financially troubled 110 bed general acute hospital serving as the principal care destination for Hispanic immigrants when it was ordered to close its doors in August, 2004.

The hospital was more than \$10 million in debt and it couldn't afford to pay its roughly 400 workers.

- Lancaster Community Hospital

Located in Antelope Valley north of central Los Angeles, Lancaster Community Hospital is a 117 bed general acute hospital that is owned and operated by a subsidiary of Universal Health Services, Inc., one of the largest hospital management companies. In 2004, the hospital reported just under 6000 admissions and roughly 33,000 outpatient visits.

- Lakewood Regional Medical Center

Lakewood Regional Medical Center was built in 1972 and is a 161-bed hospital with 143 general acute beds and 18 psychiatric beds. The facility is a part of Tenet California. In 2004, the facility reported over 10,000 admissions and almost 67,000 outpatient visits.

Large Hospitals—More Than 300 Beds

- Glendale Memorial Hospital

Glendale Memorial Hospital opened in 1926 as Physicians and Surgeons Hospital. Originally forty-seven beds, the hospital is now a 334-bed facility (255 general acute care beds, 49 psychiatric beds, and 30 long term care beds), expanding over three city blocks. The hospital is part of the Catholic Healthcare West system.

- Kaiser Hospital Sunset

Kaiser Foundation Hospital on Sunset Boulevard is a 439-bed facility. The facility is part of the Kaiser Permanente Health Plan that was initially founded in 1945. In 2004, the hospital reported roughly 22,000 admissions and over

79,000 outpatient visits making it one of the most used facilities in the Kaiser, Southern California group of hospitals.

Coding the Land Uses

In conducting the visual parcel-level census of the land uses in the 1-mile radius surrounding each of the hospitals, we coded the land use of each parcel, using the following coding:

- Food: Restaurants and grocery stores
- Med: Medical
- RT: Retail
- MFG: Manufacturing or general industrial
- RES: Residential (single and multi-family)
- COM: Commercial (banks, auto repair, office buildings)
- GOVT: Government facilities (libraries, courts)
- NOPRO: Nonprofit organizations (YMCA, Cemetery)
- VACLOT: Vacant lots
- MISC: Miscellaneous

If a parcel featured a health-related land use, the type of health care activity was coded using the following scheme:

- PRI: Primary care (e. g., internal medicine, immunization clinics)
- SPEC: Non-Surgical Specialists (e. g., pediatricians, women's, ob/gyn)
- SURG: Surgical (Surgi-Centers)
- CAM: Complementary and alternative medicine
- EYE: Optometrist, ophthalmologist
- DRUG: Drug stores, botanicas, pharmacies
- SUP: Personnel and Material Durable goods, vendors
- DENT: Dentist
- HOSP: Hospitals
- HOME: Nursing homes, skilled nursing facilities, assisted living
- DIAG: Imaging and Diagnostics
- REHAB: Rehabilitation

Via these data, we established the extent to which health-care related industries cluster around hospitals and whether the clustering happens equally across hospitals located in neighborhoods with different demographics. All the land uses around each hospital were mapped using Geographic Information Systems software. Maps were

created that showed all the land uses, non-residential land uses, and both all health care land uses and specific coded health care uses. The maps for all land uses are not shown here since the inclusion of the residential obliterates any meaningful distinctions. The findings were also statistically analyzed, although we focus here on the mapped data.

Results

Land Use Around The Hospitals, By Hospital

The first level of analysis was to describe the patterns in the mapped data. From the parcel level census, one can describe the land uses around each hospital in terms of prevalence and intensity. Figure 3 shows the parcel census results for Kaiser Sunset. This map demonstrates the research strategy by highlighting the nature of the spatial parcel sampling boundary. The map shows the variety of land uses within a hospital's radius as well as the intermingling of land uses. Residential, health-related, retail, commercial, and other land uses occur proximate to each other and, aside from residential land uses, there is a decided lack of spatial concentration of a single land use.

Table 2 reports the incidence of land uses within the 1-mile radius around each hospital in terms of the percentage of all parcels that were devoted to a given land use.² The predominant land use everywhere is residential.

² Parcels that had multiple land uses were treated as contributing each relevant land use category.

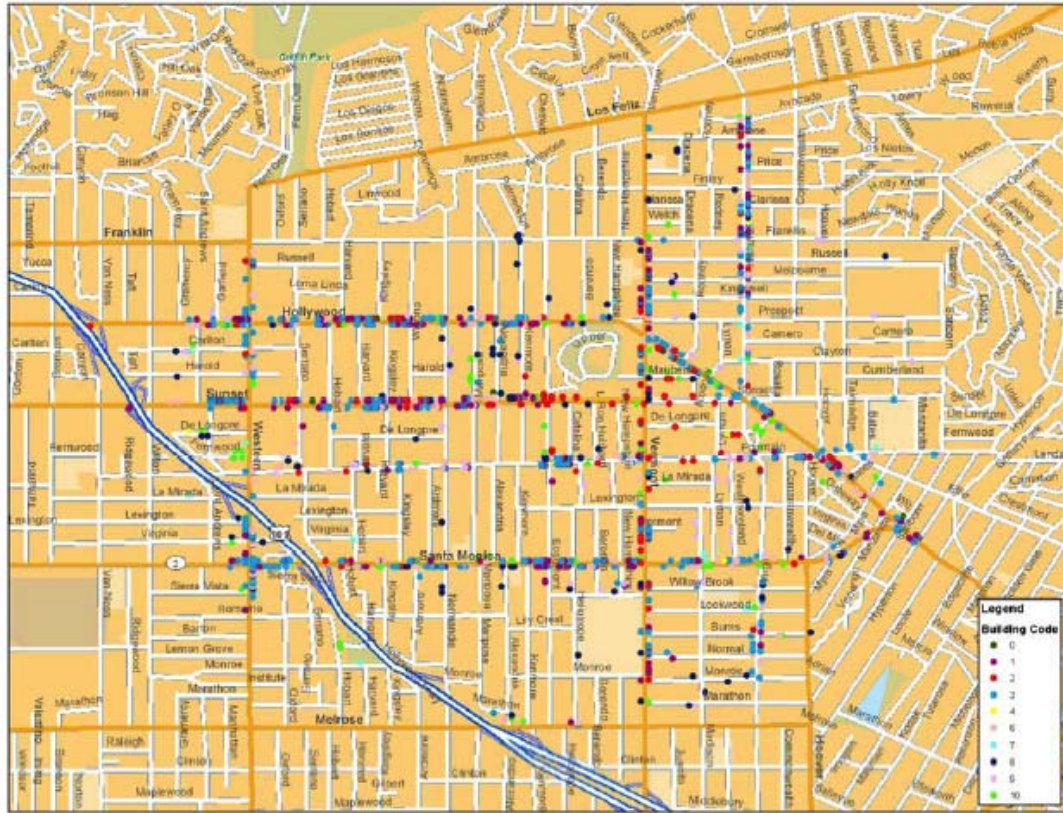


Figure 3: All non-residential land uses in a one-mile radius around Kaiser Sunset

Table 2. Distribution Of Non-Residential Land Use Around Each Hospital (Percent)

	Angels	Elastar	Glendale	Kaiser	Lakewood	Lancaster	Van Nuys
Food	1.7%	3.1%	2.9%	5.1%	0.9%	0.9%	1.7%
Medical	3.5%	1.4%	4.7%	3.7%	1.9%	2.7%	1.9%
Retail	3.1%	3.2%	4.6%	11.3%	1.2%	2.3%	5.8%
Mfging/Industrial	0.2%	1.1%	6.2%	0.1%	0.9%	0.4%	3.1%
Residential	85.7%	79.4%	68.0%	70.9%	71.9%	87.2%	75.1%
Commercial	3.5%	5.2%	6.7%	3.8%	2.2%	3.6%	7.8%
Government	0.3%	0.6%	0.6%	0.3%	0.1%	0.1%	0.7%
Non-profit	0.6%	1.9%	1.6%	1.9%	0.5%	0.7%	0.7%
Vacant	0.9%	2.6%	2.1%	1.1%	0.3%	0.9%	0.6%
Miscellaneous	0.7%	1.5%	2.4%	1.7%	0.5%	0.6%	2.6%
Missing	0.1%	0.0%	0.2%	0.1%	19.8%	0.6%	0.1%
Total Non-residential	14.3%	20.6%	32.0%	29.1%	12.8%	28.1%	24.9%

In Lancaster, a remote suburban community in northern Los Angeles County, nearly 90 percent of the parcels around the hospital were used for housing, most frequently in the form of single-family homes. The hospitals with the most intensive non-residential uses – Glendale, Kaiser, and Van Nuys – are located closer to the metropolitan core in areas featuring more dense populations. The larger non-residential presence in these instances might reflect the ability of these more compact communities to support a wider range of activities, among other things.

Two sources of variation are evident in examining the maps. The first significant variation is in non-residential land use prevalence across the hospitals in the sample, which as been noted above. The second source of variation pertains to the relative importance of corridors in shaping the spatial layout of commercial activity. For some hospitals, such as City of Angels (see Figure 4), Lancaster, and Kaiser Sunset, nearly all the commercial activity occurs on main street corridors. By contrast, it is distributed more widely in the areas around the Lakewood and Elstar hospitals (see Figure 5).

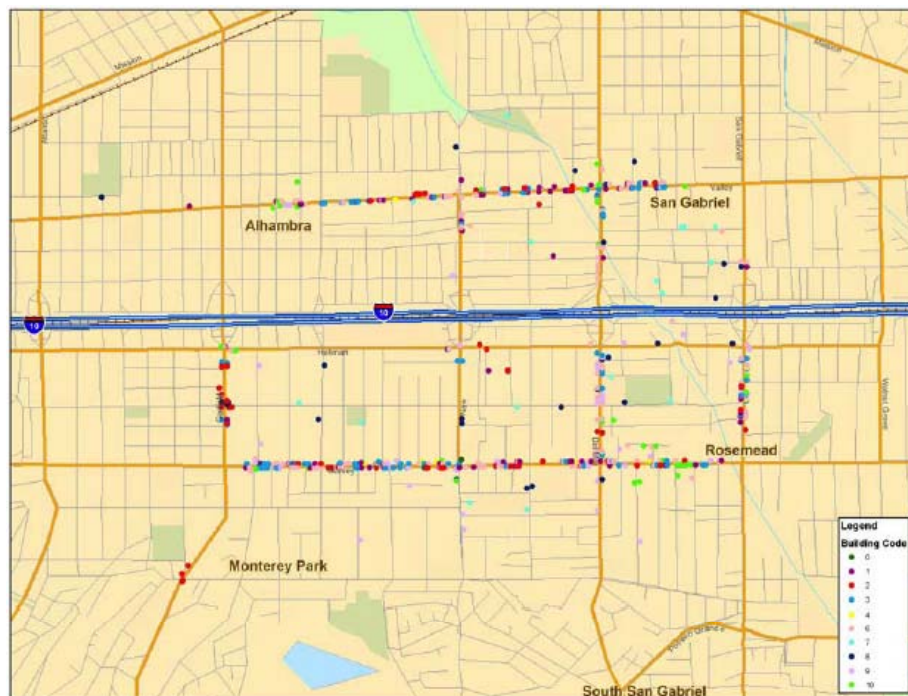


Figure 4: Corridor Pattern of Non-residential Land Uses, City of Angels Hospital

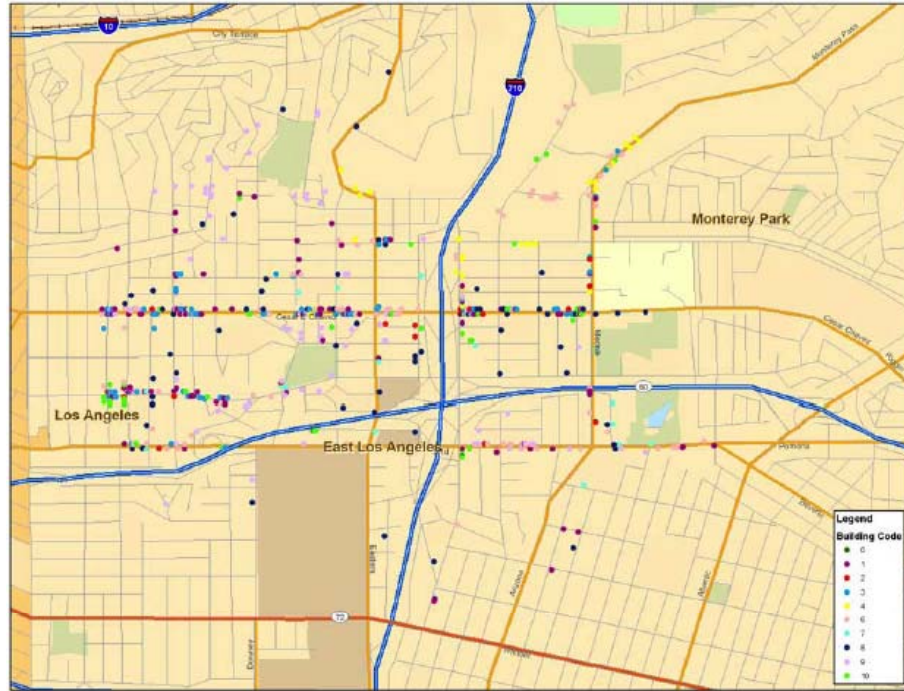


Figure 5: Corridor Pattern Showing Broader Commercial Pattern, El Estor Hospital

These differences in how commercial activity is distributed might provide some indication of the economic vitality of these neighborhoods as well as the role of the hospital as an anchor of activity. For instance, those places with less corridor development might “rely” on the hospital more than other locales since the commercial activity seems more directly connected to the hospital’s presence.

We further considered whether the non-residential land use grew in intensity by proximity to the hospital by considering whether any particular land uses are more intensively located close to the hospital. Table 3 shows how non-residential land uses are distributed across parcels (1) within one-half mile of the hospital and (2) further than one-half mile by within one mile of the hospital. Non-residential intensity increases with proximity to the hospital in 5 of the 7 cases, with only the Lancaster and Lakewood facilities having more intensive residential uses in close proximity. Strikingly, these two

hospitals are both community hospitals located in iconic suburban places; Lakewood being a model city from the 1950s, Lancaster from the 1970s.

Table 3. Land Uses, By Proximity To Hospital (Percent)

	Total		Within half mile		Outside half mile		Percent within
	Non-residential	Health	Non-residential	Health	Non-residential	Health	
Angels	14.3	3.5	16.6	2.8	13.9	3.6	14
Elastar	20.6	1.4	32.7	1.9	18	1.3	17.5
Glendale	32.0	4.7	45.4	13.5	30.5	3.9	9.1
Kaiser	29.1	3.7	31.6	14.6	28.7	3.6	13.9
Lancaster	12.8	2.7	1.4	0.5	14.1	3.1	14.4
Lakewood	28.1	1.9	5.1	1.1	11.1	2.5	8.9
Van Nuys	24.9	1.9	34.7	2.2	24	2	7.3

Among those hospitals with more intensive proximate non-residential land use, as was the case for the entire 1-mile radius, Glendale hospital has the most intensive non-residential land usage in close proximity. Elastar hospital shows the greatest differential in intensity across the two areas, with the frequency of non-residential land usage within one-half mile being 81 percent higher than that outside the one-half mile circle. City of Angels and Kaiser Sunset showed the least within-outside differentials.

Health Care Land Use Around The Hospitals

Because of our particular interest in how hospitals may contribute to the local economy, the analysis pays particular attention to health-related land uses within the parcel sample area. Table 4 reports how activities are distributed among the health-related parcels within the sample area. Non-surgical specialists, dentists, primary care facilities, and complementary/alternative medical service providers were the most common health-related land uses across the seven hospitals. The highly specialized

imaging and diagnostic businesses, which are frequently embedded in hospitals and medical centers, were the least frequently observed.

Table 4. Parcels By Health-Related Land Use Around Each Hospital (Percent)

	Angels	Elastar	Glendale	Kaiser	Lakewood	Lancaster	Van Nuys	Average
Prim care (1)	8.6	18.0	15.5	17.6	19.3	2.2	16.2	13.9
Non-surg specialist (2)	34.2	14.0	25.2	8.3	40.4	13.5	19.0	22.1
Surgi Ctr (3)	6.3	2.0	2.9	1.4	3.7	6.7	1.9	3.6
Comp/Alt medicine (4)	18.9	6.0	16.0	11.6	9.2	14.6	9.5	12.3
Eye care (5)	4.5	4.0	1.5	3.2	1.8	5.6	1.0	3.1
Pharm (6)	6.3	10.0	4.4	7.9	6.4	5.6	5.7	6.6
Personnel/ Goods (7)	4.1	18.0	6.3	5.1	4.6	3.4	5.7	6.7
Dentist (8)	10.8	20.0	14.6	20.8	7.3	29.2	30.5	19.0
Hospital (9)	0.9	4.0	0.5	13.9	0.9	5.6	1.0	3.8
Nursing home (10)	0.9	4.0	3.9	7.9	2.8	4.5	1.0	3.6
Diagnostic (11)	1.8	0.0	6.8	1.4	0.9	1.1	4.8	2.4
Rehab. (12)	2.7	0.0	2.4	0.9	2.8	7.9	3.8	2.9

The data indicate tremendous variation in the health services provided near hospitals, both in terms of scope and prevalence. In terms of scope, some activities are absent altogether for some hospitals and important for others. For example, while there are no rehabilitation facilities within one mile of Elastar, they represent 8 percent of the parcels around Lancaster. Although non-surgical specialists were the most common overall, the range of prevalence was significant, spreading from 40.4 percent of the health-related parcels for Lakewood to 8.3 percent for Kaiser. Similar variation is observed across several other categories, suggesting that the health care economy is not uniformly located spatially.

The variation noted earlier regarding non-residential land uses around hospitals holds similarly for the health-related land uses. Once again corridors play an important role for the geography of health around hospitals. For example, nearly all of the health-

oriented land uses are on main corridors, such as Garvey, Garfield, Valley, and Del Mar Avenues (see Figure 6). Interestingly, the uses seem to be fairly evenly distributed along these corridors with no particular affinity for them to be located close to the hospital itself. The pattern differs significantly around Kaiser Sunset (see Figure 7), for which corridors are equally important but health uses are clustered more heavily around the hospital along these clusters.

The two exceptions to this general rule are Elastar and Van Nuys hospitals (see Figures 8 and 9). Elastar is the lone hospital in the sample that does not have a strong corridor orientation. Health-related land uses are relatively dispersed, with only limited affinity to Cesar Chavez Boulevard. This weakness in influence might be tied to the poor performance of the hospital, which closed shortly after it was selected for this study.

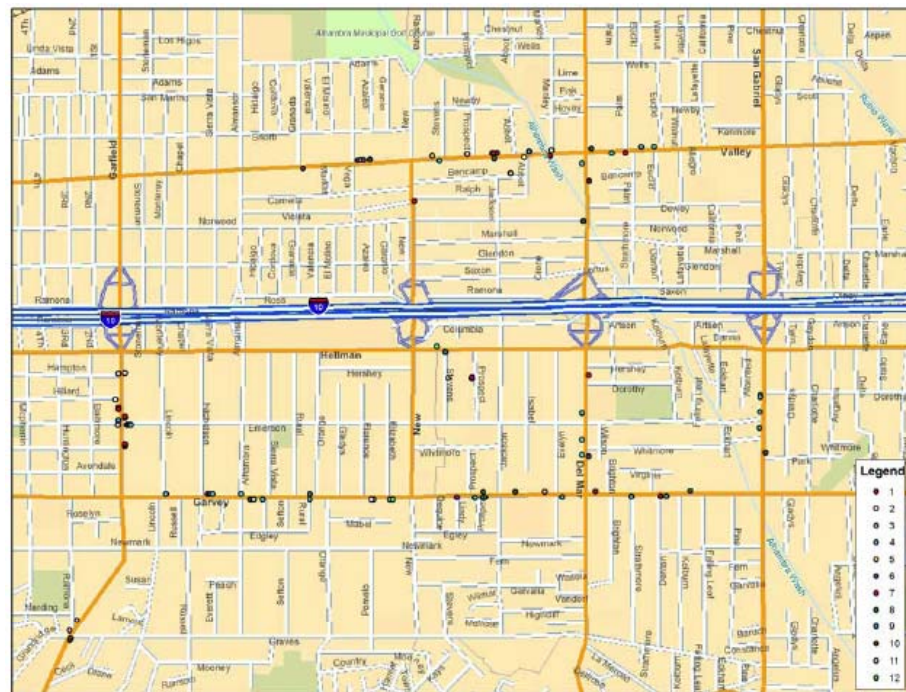


Figure 6: Health Care Land Use in a Strong Corridor Pattern, City of Angels

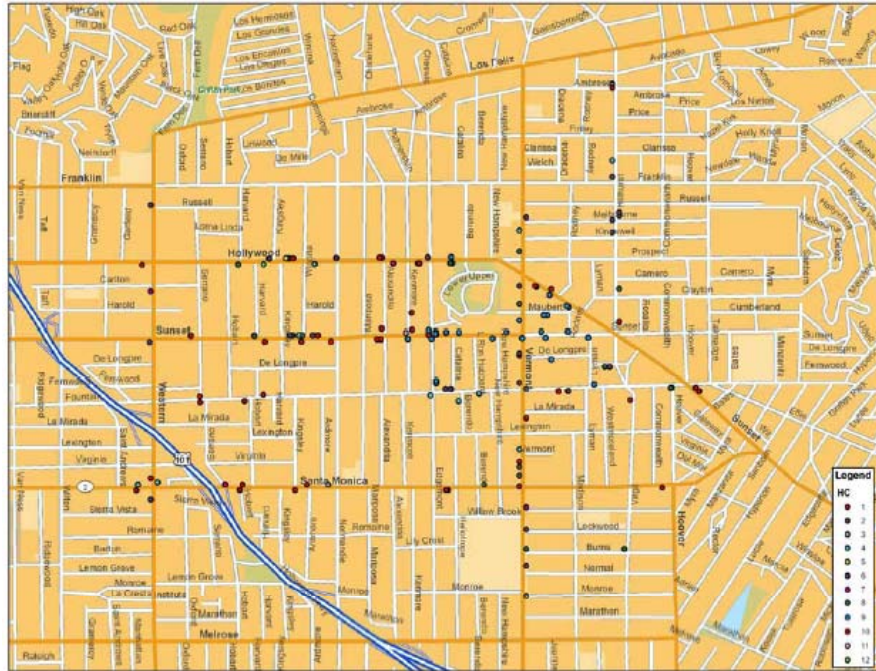


Figure 7: Health Care Land Use Patter With Clusters and Corridors, Kaiser Sunset

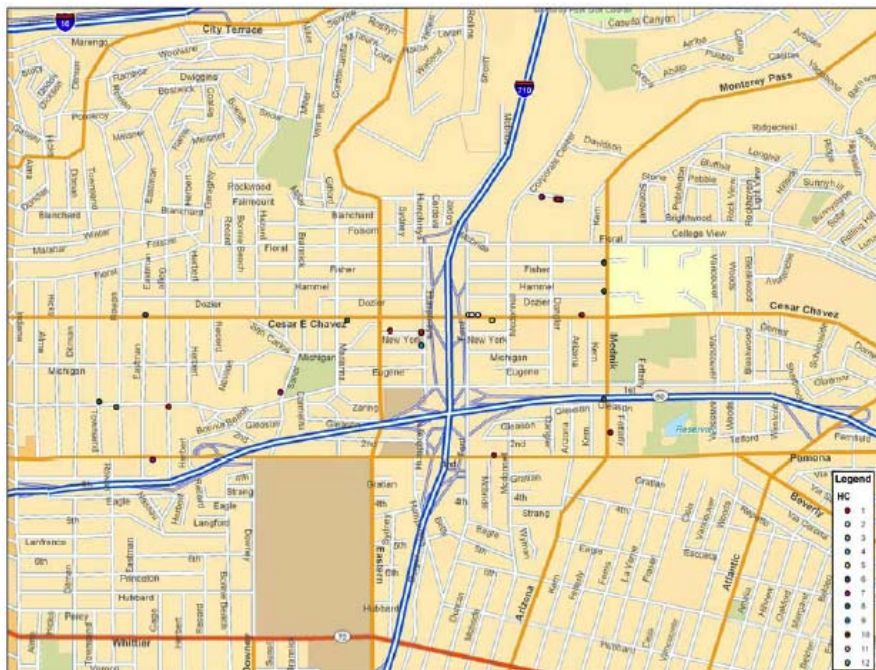


Figure 8: Health Care Land Use Pattern, Not in Corridors, Elstar

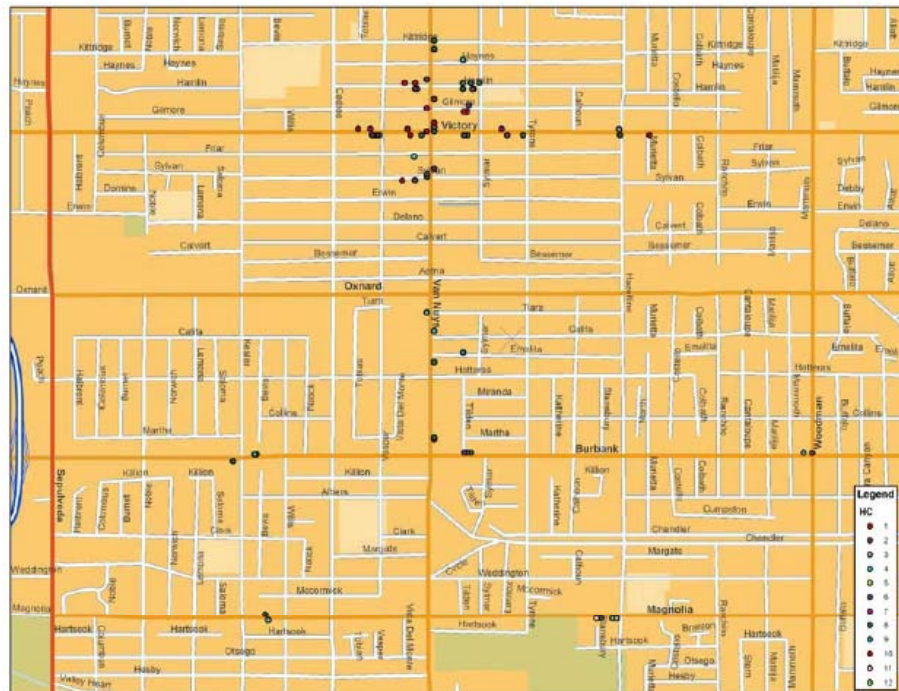


Figure 9: Health Care Land Use Pattern, Strong Clustering, Van Nuys

Van Nuys Hospital, conversely, has a clear health cluster just north of the hospital at the intersection of Victory and Van Nuys Boulevards. Very few health-related land uses fall outside of this cluster and, when they do, these uses are also bunched to some extent. Van Nuys is the only case a clear clustering is observed within the 1-mile radius.

Finally, the one-half mile radius analysis was replicated with a health land use focus (see Table 3). In all cases save one (Angels), the pattern for health-related land uses mirrored that for non-residential land uses generally. If non-residential land uses were more (less) intensive within one-half a mile from the hospital as compared with the area beyond this boundary, health-related land uses were as well. Of those with greater intensity, the health intensity differential was greater for Glendale and Kaiser and less for Elstair and Van Nuys. Glendale stands out in particular, with the proportion of parcels with health-oriented land uses within the half-mile radius being 3.5 times greater than the proportion outside of the radius area.

Health-Related Land Use and Neighborhood Effects

Given these general descriptive results, a key question is whether these effects are correlated with characteristics of the hospitals or their neighborhoods. In an ideal world, such correlations would not exist since a hospital should play the same role as an economic anchor and catalyst regardless of where it is located. Realistically, we did expect to find differences. Those differences raise questions as to the necessary conditions for better economic integration, the answers to which might help provide insights into how to maximize a hospital's role as an economic development engine.

Given the pilot nature of this study, with only seven hospitals in the sample, a full-blown econometric model is impractical. Instead, we present crosswise comparisons showing how land use intensity varies with particular neighborhood characteristics.

In particular, we report how the parcel share for non-residential and medical-related land uses varies across hospitals ranked from lowest to highest along a given dimension. Even here, though, we caution that the small sample size means that smooth relationships are unlikely, meaning that one must draw conclusions using "rough" bases. The following discussion should be read with this caution in mind.

Figure 10 shows how these land uses vary with the relative income of the neighborhood in which the hospital is located. In the figures, the lowest income neighborhoods are leftmost. The data show no discernable pattern regarding non-residential land use. Put another way, the degree of non-residential land use around a hospital does not appear to vary systematically with the relative affluence of the hospital's neighborhood.

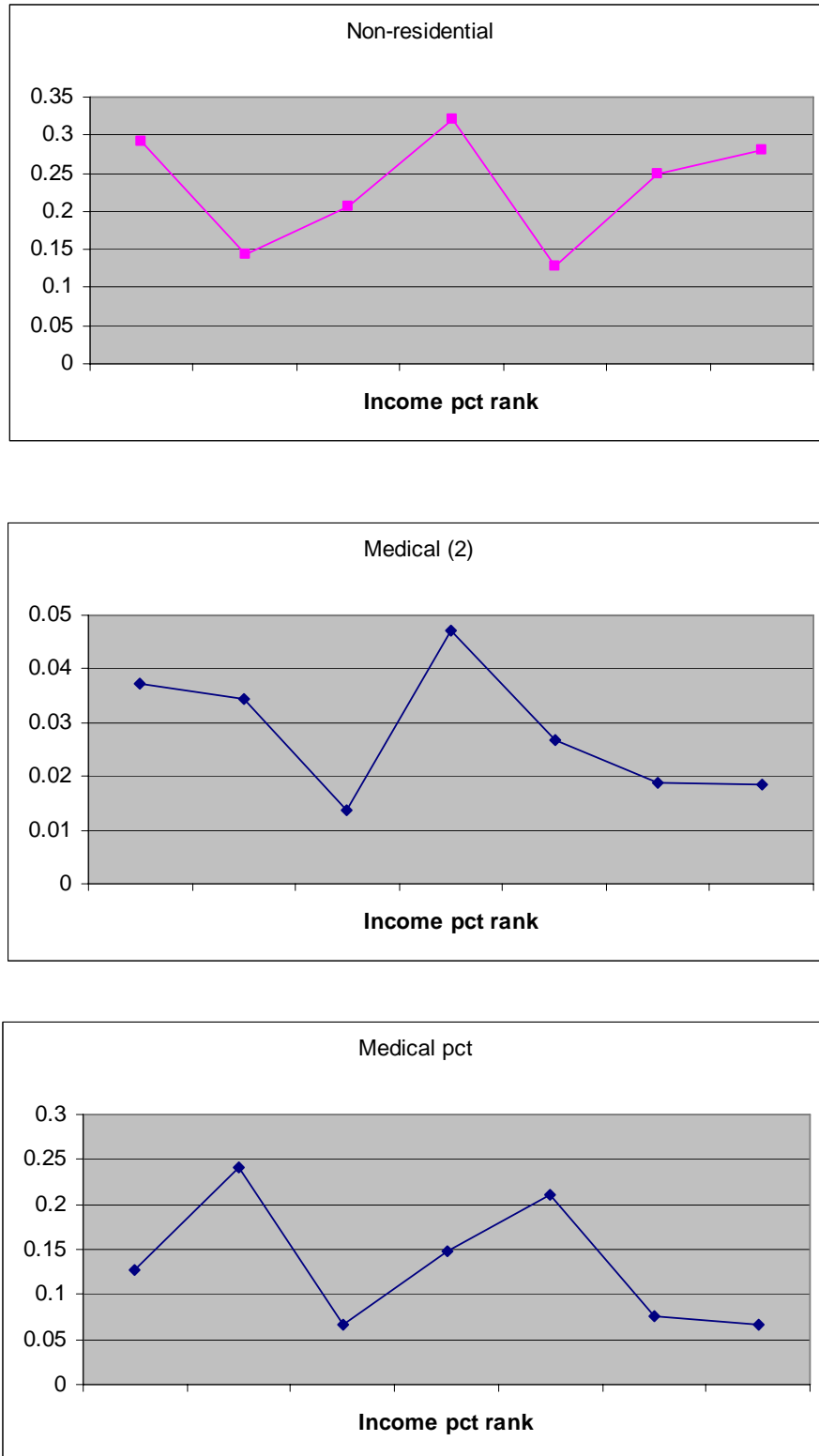


Figure 10: Selected Land Use Intensities By Neighborhood Relative Income

In contrast, the data suggest a weakly negative relationship between relative neighborhood income and the propensity for medical-related land uses. While considerable variation exists among 2 of the intermediate neighborhoods, the general trend is downward. This suggests that hospitals located in lower-income neighborhoods are more likely to have medical land uses within its proximate area, which could be due to higher income neighborhood success in keeping such land uses away or higher medical needs for residents of lower-income areas.

The data (not shown) also indicate positive relationships between neighborhood income and the presence of several medical-related land uses. In particular, non-surgical specialists, rehabilitation centers, and dentists were all proportionately more common as the relative income of a hospital's neighborhood increased. Lakewood Hospital proved to be an exception to this in the case of dentists, as its neighborhood is high-income with few dentists, possibly due to Lakewood's suburban location.

Then analyses were conducted with a focus on black and Hispanic or Asian population presence. The panels of Figure 11 show patterns similar to those seen for income. No systematic relationship is found with non-residential land uses, but a weak negative relationship appears between the presence of medical land uses and the proportion of a neighborhood's population that is black or Hispanic. Aside from two outliers, the clear trend is for declines in the presence of health-related activities as the presence of black and Hispanic households rises.

The data (not shown) for the specific health-related land uses in this regard suggests that this negative relationship is in part due to the lower propensities of black and Hispanic neighborhoods to have personnel and equipment vendors and complementary and alternative medicine service providers. Conversely, drug stores and pharmacies become increasingly more common as a hospital neighborhood's black and Hispanic presence increases, a somewhat surprising result.

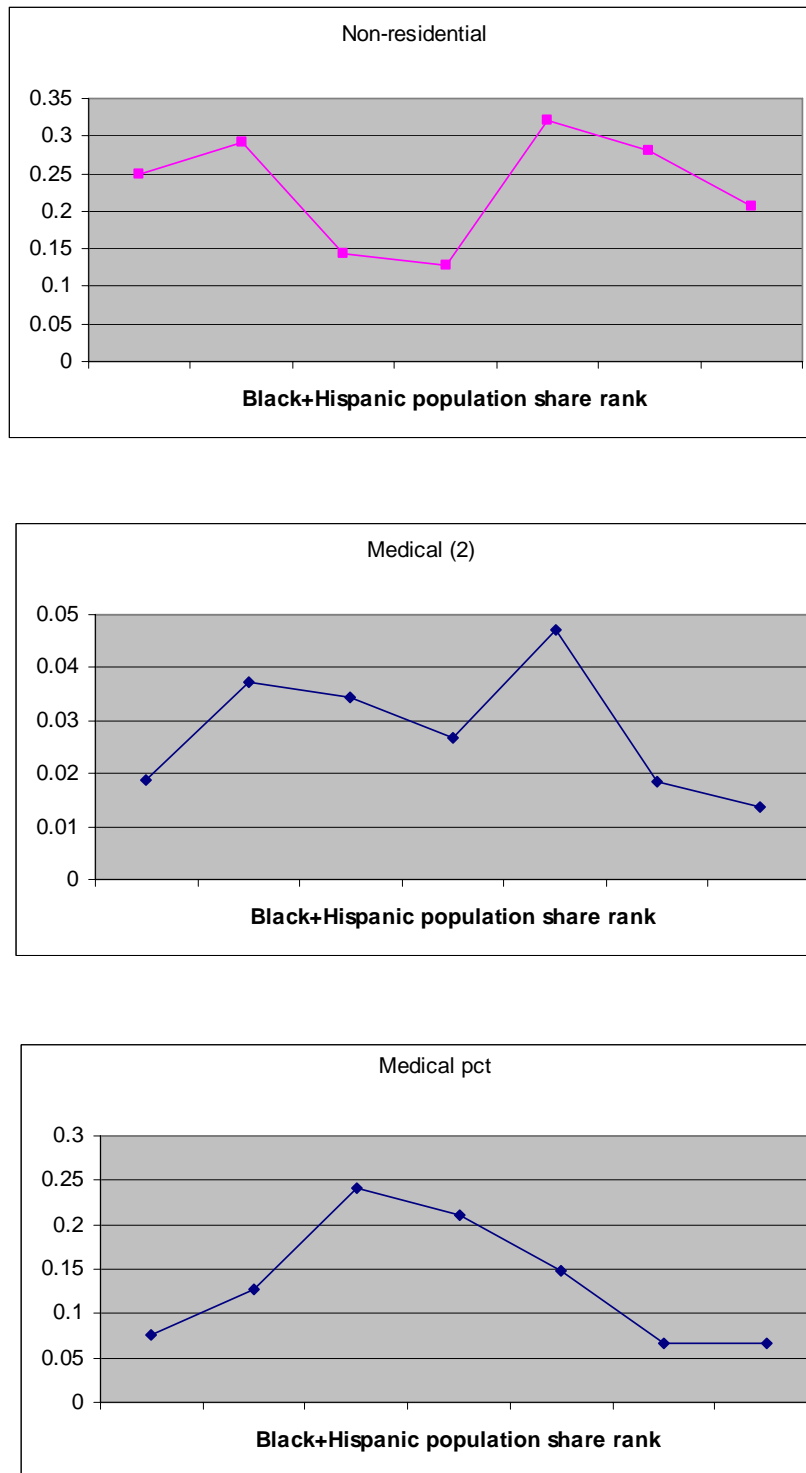


Figure 11: Selected Land Use Intensities By Black And Hispanic Population Share

The patterns for Asian population share, shown in Figure 12, are quite different than those presented thus far. While non-residential land use appears to be weakly positively correlated with Asian population share, the positive relationship is quite strong for health-related uses, in contrast to the results seen along both the income and black and Hispanic population dimensions. The positive relationship appears to be strongly driven by similar strong relationships for the presence of non-surgical specialists, surgical centers, and complementary and alternative medicine service providers. This latter relationship is very consistent with conventional wisdom regarding the role of such medical services for Asian communities.

Possible by-products of the strong presence of complementary and alternative medicine in these neighborhoods are the negative relationships between Asian presence and primary care facilities, drug stores, and pharmacies. In this view, these latter land uses are substituted for by complementary and alternative services.

In addition, we observe a negative relationship between Asian population intensity and the relative presence of dentists. That finding reflects concerns recently raised by a study conducted through the Center for the Advancement of Underserved Children the Medical College of Wisconsin and Children's Hospital of Wisconsin that found that the fraction of Asian American children having teeth in less than excellent condition was 80% higher than in the general population, the highest disparity among surveyed minority groups (Flores & Tomany-Korman, 2006).

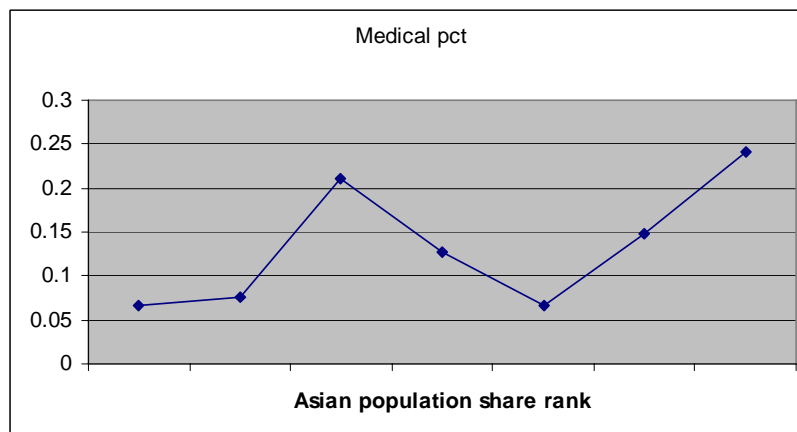
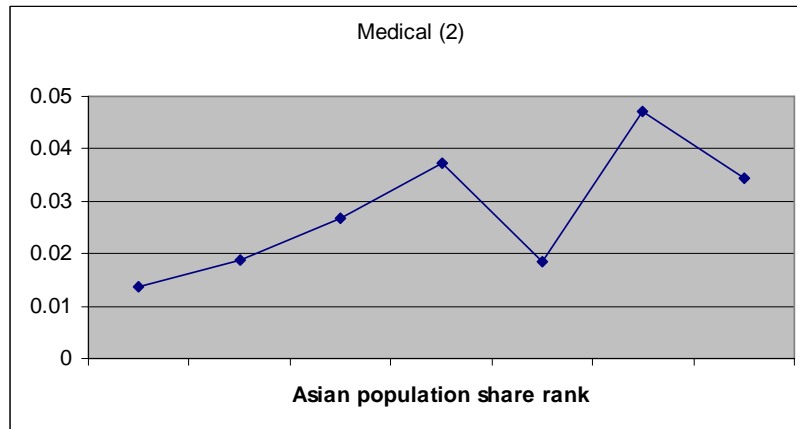
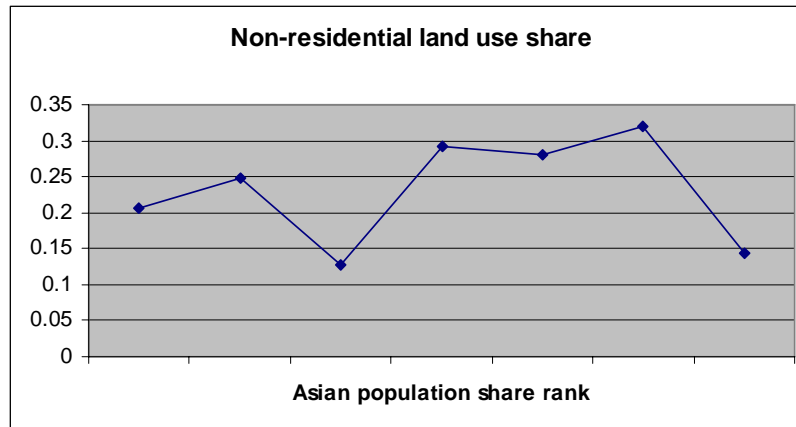


Figure 12: Selected Land Use Intensities By Asian Population Share

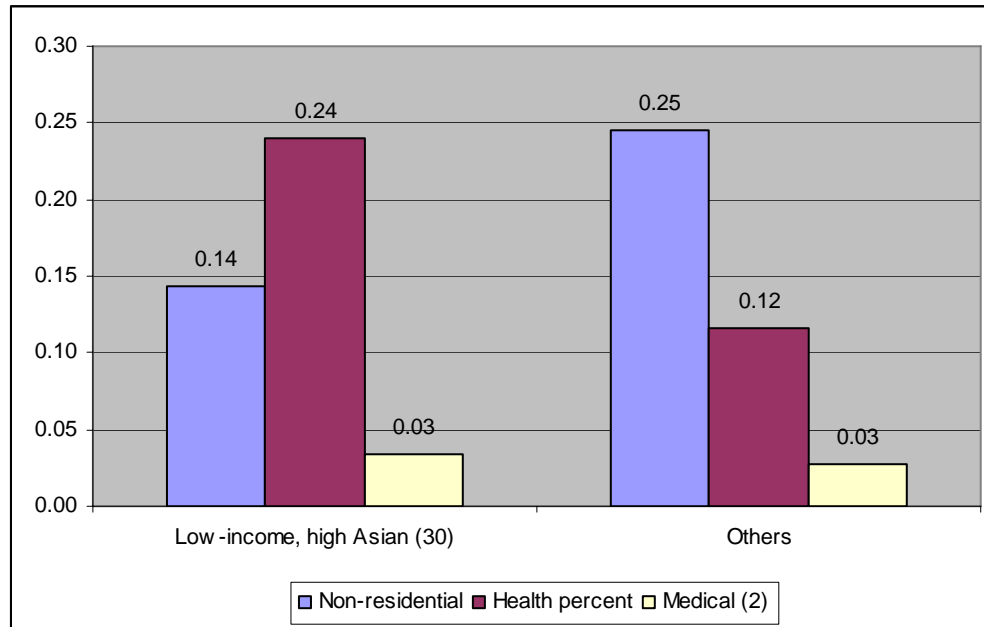


Figure 13: Land Use Intensity By Relative Income and High Asian Population

While the single dimension neighborhood results presented above provide some insights regarding land uses, we believe that by replicating the approach while interacting the dimensions, we could elicit further information. So, we categorize hospitals according to whether they are located in lower-income, high-minority neighborhoods and compare the land use patterns of those in such neighborhoods with the other hospitals in the sample (see Figures 13-15). We take the average land use over all hospitals falling in a given category. In categorizing hospitals, a neighborhood is considered high-minority if more than 30 percent of its population is of a particular ethnic or racial minority. As above, we do separate runs for Asians and blacks and Hispanics.

We start with with a comparison of land use patterns around hospitals located in lower-income neighborhoods with lower-income Asian communities (see Figure 13). City of Angels hospital is the only hospital that is located in a lower-income Asian community as defined. Our low-income Asian community has a far lower non-residential land use

intensity, yet its medical presence in that non-residential land use greatly exceeds the medical presence for the other hospital neighborhoods (24 percent versus 12 percent). Clearly, low-income Asian households see proportionally more health-related service providers given their access to local non-residential land uses than households in other communities.

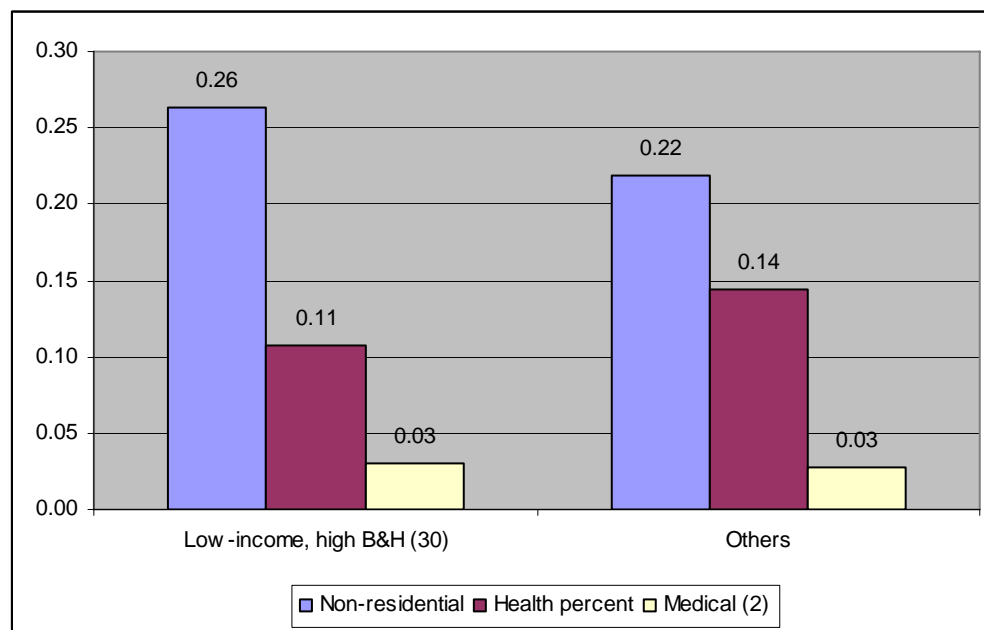


Figure 14: Land Use Intensity By Relative Income and 30% Black/Hispanic Population

Figure 14 shows the comparison between land use patterns around hospitals located in lower-income neighborhoods with 30% black and Hispanic population (Elastar and Glendale hospitals) and the others in the sample. The comparison is strikingly different from that in the Asian community. Here, non-residential land use is more common in the lower-income black and Hispanic neighborhoods than elsewhere (26 percent of parcels versus 22 percent), a finding consistent with other research showing

that lower-income minorities often live surrounded by commercial locations (Avery, Bostic, Calem, and Canner, 1999).

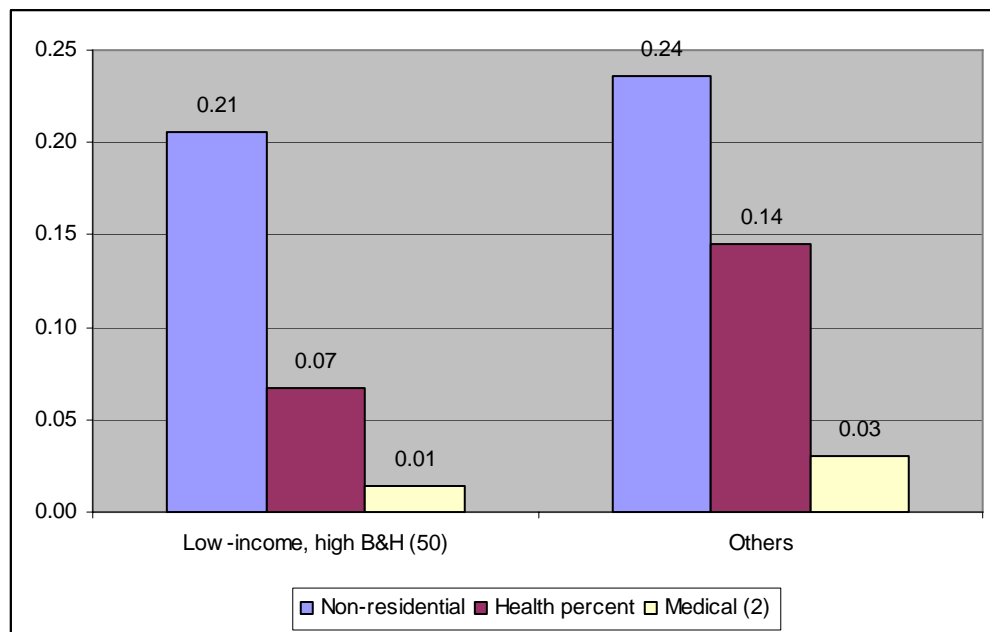


Figure 15: Land Use Intensity By Relative Income and 50% Black/Hispanic Population

Despite having a greater commercial presence, the high black and Hispanic neighborhoods have a smaller presence of medical-related land uses. Medical-related land uses in the lower-income black and Hispanic neighborhoods account for only 11 percent of the commercial land use parcels while they represent 14 percent of the commercial land usage in the neighborhoods around the other hospitals. Thus, health-related activities are underrepresented in these communities, despite their being more commercially oriented.

The third figure presents a further analysis of this comparison, assessing lower-income black and Hispanic neighborhoods, this time with the threshold raised to 50 percent (see Figure 15). Only Elastar falls in this category. In this case, the lower-

income black and Hispanic community has both lower non-residential land use intensity and, within its non-residential land uses, relatively less health-related land use activity. Tentatively, we conclude that this case represents a community in health-related crisis. Given that Elastar closed shortly after our sample selection, the findings here suggest strongly that crisis was a prevailing condition. Elastar's closing coupled with the land use findings shown in Figure 14 suggests that a healthy, functioning hospital might contribute to a vibrant, stable, healthy local economy more broadly.

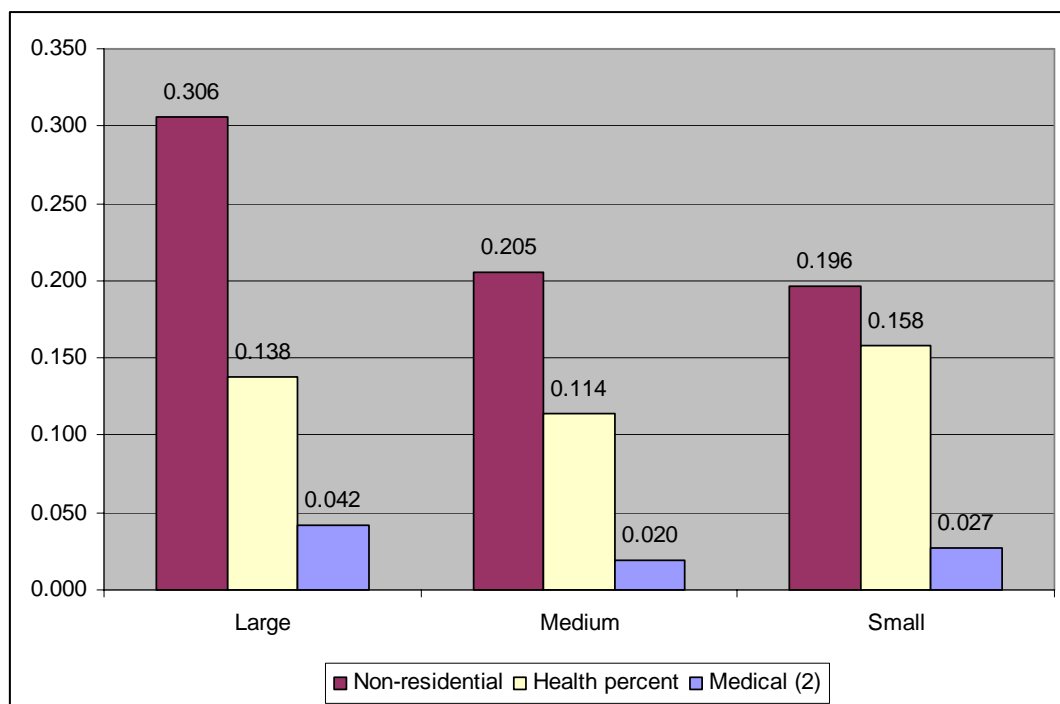


Figure 16: Land Use Intensity By Size of Hospital Facility

As a final exercise, the hospitals were grouped according to their size, with size defined by the number of beds. Three categories were defined – small, medium, and large – with the size thresholds being 100 and 300 beds. We thus have 2 small hospitals (City of Angels and Van Nuys), 3 medium-sized hospitals (Elastar, Lakewood, and Lancaster), and 2 large hospitals (Glendale and Kaiser). The results, presented in Figure

16, show that large hospitals are located in neighborhoods that have more intensive non-residential land uses relative to smaller hospitals. The comparison found relatively little difference in non-residential intensity between medium-sized and small hospitals. Perhaps surprising, given a level of non-residential land use, the greatest medical-related intensity was found among the small hospitals in the sample. We present this finding cautiously, since it represents a further division of our small sample of hospitals.

Discussion

The purpose of this study was to analyze the contribution of hospitals to community economies by using data collected via a parcel-level census of land use to describe the nature of land use, with a particular focus on health-related land uses, surrounding hospitals in a stratified set of neighborhoods. We hypothesized that neighborhood differences would affect the presence of non-residential land uses and the agglomeration of health care land uses, as would the type and size of the hospital.

The descriptions described here confirm at least part of our hypothesis. First, health care economies, as represented by the economic activity around hospitals, do differ across neighborhoods. Not surprisingly, hospitals in the urban core were surrounded by a greater percentage of non-residential uses. Similarly, the pattern of the health-related land uses also differed across space, as great variation was found in the amounts and types of health care businesses. Some activities were simply absent in one place, particularly present in others.

Second, most of the hospitals had non-residential and health-related land uses increase with proximity to the hospital. This finding suggests that “land use gradients” may exist around hospitals, with hospitals playing the same role that central cities or cluster nodes play in neoclassical models of urban areas (Mills, 1967; Giuliano and Small, 1991). If this is observed to be generally true, it would imply that hospitals are

an important anchor for local economies. There were two exceptions to this pattern: Lakewood and Lancaster. These two hospitals are embedded in suburban communities, where perhaps the relationship of the hospital to other non-residential activity is affected by the style of development and explicit zoning strategies.

Third, and somewhat surprisingly, the patterns of the non-residential and health-related land uses around each hospital fell into discernible and distinct patterns. We found a clear distinction between hospitals with distinct corridor and cluster patterns. Regarding health-related land uses, only Kaiser Sunset had both a strong cluster and a strong corridor pattern, perhaps influenced by the presence of another hospital, Children's Hospital Los Angeles, nearby. Only Elstar did not have a strong corridor orientation, symptomatic, we believe, of its general weakness as an economic engine in this poor and heavily minority community. Overall, these distinctions might indicate that in the places with weak corridor development, surrounding land uses are more closely tied to the hospital than in places with strong commercial corridors.

Fourth, the data suggest that, while the degree of non-residential land use around a hospital did not vary with the relative affluence of a neighborhood, the health-related land uses had a weak negative relationship. Hospitals in lower income neighborhoods are more likely to have such uses nearby, suggesting the importance of the hospital as an economic engine in these neighborhoods. However, we also found that some health-related land uses were more likely to in wealthier neighborhoods. Not surprisingly, these uses included non-surgical specialists and rehabilitation centers, often more expensive medical providers that many poorer residents would not be able to afford.

Fifth, considering the relationship between race/ethnicity and health-related land uses, the patterns across the races were somewhat contradictory. On one hand, we found a weak negative relationship between the presence of health-related land uses and the proportion of the neighborhood's black or Hispanic population. On the other

hand, a strong positive relationship was found between the presence of health-related land uses and the proportion of the neighborhood's Asian population. The positive relationship was driven particularly by the presence of non-surgical specialists, surgical centers, and complementary medical providers, even in the absence of primary care facilities and pharmacies. Though only univariate, these results are consistent with considerable evidence suggesting that neighborhood racial composition is an important factor shaping neighborhood outcomes, with disadvantage more prevalent in black and Hispanic areas.

Sixth, we attempted to move beyond the single-dimension studies by comparing our three hospitals in low income, high minority communities with the other sampled hospitals regarding the percentage of non-residential and health-related land uses. The Asian community had a strong health-related economy that was far more intense than the remainder of the non-residential land uses. However, the two black and Hispanic communities had a dramatically different story, with a weak health-related land use pattern. Such weakness is made particularly evident looking at Elastar Hospital, which was located in a very heavily black and Hispanic neighborhood. This hospital was surrounded by a very weak health-related economy, symptomatic of its larger financial problems. Elastar's closing coupled with the other land use findings points to a conclusion that a healthy, functioning hospital might contribute to a vibrant, stable, healthy local economy more broadly.

Given the small sample represented in this study, these results can only be viewed as suggestive rather than definitive. However, we believe that they clearly point to the important role that hospitals play in local economies. This would expand the influence and importance of hospitals beyond their impact on health outcomes and into a broader economic context. While studies have demonstrated that health-related land uses are economic engines for regional economies, this study argues that a healthy hospital is not

only crucial to a community's health, it is also strongly related to its economic health. In light of the hospital industry's expectations that further hospital closings will occur, this broader context is extremely important and more research is needed in this area, to inform academics, industry practitioners, and public policymakers.

References

- Avery, RB, Bostic, RW, Calem, PS, & Canner, GB (1999). "Consolidation and Bank Branching Patterns," *Journal of Banking and Finance*, 23 (February), 497-532.
- Buchmueller, TC., Mireille J, & Wold, C. (2004). How Far to the Hospital? The Effect of Hospitals on Access to Care. *Journal of Health Economics* 2006 25 (July): 740-761.
- DeVol, R, Koepp, R, Wong P, & Bedroussian, A. (2003). *The Economic Contributions of Health Care to New England*. Milken Institute Research Report.
- Flores, G, & Tomany-Korman, SC. (2006). Racial/Ethnic (R/E) Disparities in Medical and Oral Health, Access to Care, and Use of Services in US Children. Paper presented at the Pediatric Academic Societies annual meeting, San Francisco, April.
- Accessed at <http://www.mcw.edu/display/router.asp?docid=16698>).
- Freeman, G, Sidhu, ND, & Montoya, M. (2006). *Hidden in Plain Site: The Economic Contributions of Southern California Hospitals and Related Health Services*. Los Angeles County Economic Development Corporation Report, February.
- Giuliano G. and KA Small (1991). "Subcenters in the Los Angeles Region," *Regional Science and Urban Economics*, 21, 163-182.
- Melnick, GA, Nawathe, AC, Bamezai, A, & Green, L. (2004). "Emergency Department Capacity And Access In California, 1990-2001: An Economic Analysis." *Health Affairs* Web Exclusive, March.
- Mills, ES (1967), "An aggregative model of resource allocation in a metropolitan area," *American Economic Review*, 57, 197-210.
- Scheffler, R, Kagan, R, Maiuro, LS, Schmittiel, J, & Yu, W. (3001). "California's Closed Hospitals, 1995-2000." (2001). Report of the Nicholas C. Petris Center, April.