The Analysis of Whether the Number of Hospitals Meet Elderly People’s Needs in LA County

PPD631 Final Project
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Problem Definition

Population distribution is quite important for hospital location selection, because spatial distribution of the population determines the residents’ medical demands of and disease trends, then, it determines the design of the hospital and its service orientation. This paper is aimed to study whether there are enough hospitals in areas with dense elderly population in LA County, and where hospitals should be built in the future.

I will use the GIS method to analyze the locations of existing hospitals in LA County to determine whether they meet the needs of the aging population and provide advice for the future government budget.

To cope with the increasing demand for local residents’ health care, the government or private sectors will continue building more medical facilities. Based on the existing geographic data and analysis, they can easily explore the location of potential hospitals and determine the best geographical locations.

Project Rationale

Although physical aging is not a disease, but it makes the dependency of the elderly to the medical institutions gradually increase. If the elderly have chronic diseases with minor health problems from time to time, they often need to go to hospitals. Long distance will be a waste of time and makes them uncomfortable, so hospitals are required to be close to the places the elderly live in. If the elderly have any emergency, the waste of time on the road could be disastrous for first aid. It also requires adequate hospitals in the elderly-intensive areas.

I chose two variables in this paper,

• The geographical distribution of hospitals in LA county
• The number of aged population in each county subdivisions

I will study whether there are enough hospitals in areas with dense aged population, and whether hospitals can meet the demands of the elderly, such as medical care, counseling, health care, nursing and hospitalization.

I did not include clinics or medical centers or health centers in my research. I think that in many conditions the elderly must go to the hospital rather than other medical institutions, so I will focus only on hospitals in the research.

I used 1-mile buffers of hospitals in LA County and it seems small under normal circumstances. But in this research, I want to use buffers to study whether many hospitals are close to each other and waste resources. If two or more hospitals are less than one mile away, the supply will exceed demand of the elderly in this area. In that case the government can relocate one of the hospitals.
Data Preparation and Modeling

Based on variables listed above, I decided to use the following data to build the GIS model.

• **Existing Hospitals Locations.** Source: Google Maps and My maps.

First, in Google Maps, I found all the hospitals in LA County except the children's hospitals. Second, I imported the coordinates of these stores into Google My Maps, which generated a KML file. Then, I converted the KML file into a layer in ArcMap.


I chose the population data of population 60 years and over in the United States from U.S. Census Bureau, and the geography is divided by all 20 county subdivisions within Los Angeles County, California.

Analysis of Data

First of all, I joined excel containing the elderly population into the layer of county subdivisions.

Then I cleaned up the attribute tables to display only needed attributes, NAME and OVER 60.

Then I used color to fill in polygons to represent numeric attribute values, 8 as the number of classes, to show how much the population of different county subdivision has.

Then I converted the .KML file containing hospital information into a layer.

In order to show areas with many and few elderly population, I chose the OVER 60 field and sorted Ascending. Selecting areas with population of less than 50,000, the layout could show them. Then I used the same method to show areas with more than 50,000.

Finally, I used buffering points for proximity analysis. I created circular 1-mile buffers (polygons) around the points of hospitals.

Existing Hospitals Site Analysis
Figure 1: The Hospitals and Elderly Population Distribution in LA County
Areas with More than 50,000 Elderly People

Los Angeles
Los Angeles County Subdivisions, as a relatively bustling area, has a dense population, so it has the most elderly population (shown in Figure 1). This requires Los Angeles to have lots of hospitals. There are some hospitals near downtown but these hospitals have a lot of overlapped buffers (shown in Figure 2). And there are only some children's hospitals in Korea Town (not shown in the map), some UCLA specialist hospitals in Hollywood and only few private clinics near the seashore (not shown in the map).

San Fernando Valley
There are two Kaiser Permanente hospitals in the San Fernando Valley, one in Panorama City and one in Woodland Hills. Also, there are two Providence hospitals in Burbank and Mission Hills. Besides Kaiser Permanente and Providence Hospitals, most of the valley is served by non-profit hospitals such as Valley Presbyterian Hospital in Van Nuys, and Sherman Oaks Hospital in Sherman Oaks.
There are numerous elderly people in the region (shown in Figure 2), but there are many hospitals that can match the medical needs of the elderly (shown in Figure 2).

**Long Beach-Lakewood**
There are two major hospitals in the Long Beach area: VA Hospital Long Bch, and Community Hospital Long Beach.

In the Lakewood area, there are only several medical centers, such as the Lakewood Regional Medical Center (not shown in the map).

There are many elderly people in the region, but there are few hospitals in the Long Beach area and there are so close according to buffer map (shown in Figure 2). They may not be able to meet the medical needs of the aging population.

**East/Southwest/Upper San Gabriel Valley**
There are two main hospitals throughout the San Gabriel area, Methodist Hospital and San Gabriel Hospital. There are still some health centers (not shown on the map). There are a large number of elderly people in the area, but the two hospitals are not enough for the elderly (shown in Figure 2).

**Downey-Norwalk**
In this area, there are PIH Health Hospital and a Kaiser Permanente hospital, which is a chain medical institution. The two hospitals’ buffers are overlapped.

There are a number of elderly people in the area, so the two hospitals are unable to meet the needs of older patients (shown in Figure 2).

**South Gate-East Los Angeles**
In this area, there are Los Angeles Community Hospital and Hospital East Los Angeles, which may not be able to meet the needs of so many elderly people in the area (shown in Figure 2).

**Whittier**
This region has Whittier Hospital Medical Center and Presbyterian Hospital Breast Health Center, which may not be able to meet the medicinal needs of the local elderly.

**Pasadena**
Currently this area only has Huntington Hospital. Although the hospital is very large, more hospitals should be established in this area.

**Inglewood**
Although according to the buffers overlap, the hospitals in Inglewood are so close to each other, there are enough general hospitals for the elderly in this area.
Compton

In this area, besides Martin Luther King Jr. Community Hospital, there are various medical centers, family clinics, specialist clinics, health centers, health centers (not shown in the map). Although there are many elderly people in this area, so many existing hospitals and medical institutions are enough.

Areas with Less than 50,000 Elderly People

Hospitals in Areas with Less Than 50,000 Elderly Population

Figure 3: Hospitals in Areas with less than 50,000 Elderly People
Newhall
This area not only has Henry Mayo Newhall Hospital, there are several medical centers (not shown on the map). There are not so many elderly people in this area, the existing hospitals and medical institutions are sufficient (shown in Figure 3).

Torrance
There are two hospitals in the area, and one of them is a large hospital-Torrance Memorial Hospital whose buffer is overlapped with the hospital in other areas. And considering the fact that the number of local elderly is not large, two hospitals are enough (shown in Figure 3).

North/ South Antelope Valley
The area has Antelope Valley Hospital and Palmdale Regional Medical Center, which are not sufficient for the elderly, even if there are not many elderly people in this area (shown in Figure 3).

Palos Verdes
Palos Verdes has a lot of health centers (not shown on the map) and near the area there are Seacrest Convalescent Hospital, Kaiser Permanente Harbor City, Vermont Pavilion and other hospitals. These medical institutions are adequate for the elderly population in the region.

South Bay Cities
There are two general hospitals in the area, Ami South Bay Hospital and Kindred Hospital South Bay. There are also numerous medical centers and health centers in this area. For few elderly population in this area, these medical institutions are adequate.

Santa Monica
This area not only has UCLA Medical Center, Santa Monica, there are many UCLA medical institutions in its neighborhood and Providence Saint John's Health Center (not shown on the map). Nonetheless, they are enough for so few elderly people.

Agoura Hills-Malibu
Malibu only has some urgent care, and family clinics (not shown on the map). However, on the other side of Santa Monica Mountains, there are Thousand Oaks Surgical Hospital, Pacific Shores Hospital and a large number of medical centers, which are not far away. This place has small elderly population, so these medical institutions are sufficient (shown in Figure 3).

Potential Hospitals Location Analysis

Areas Requiring More Hospitals
Los Angeles
I found that there are not enough hospitals in the downtown area (there were some clinics), and according to the buffer map, these hospitals are very close (shown in Figure 2). There are only some private clinics (not shown on the map) in the area near the shore where the rich live. Because the wealthy have money to visit the family clinic or go to far hospitals with better medical condition, it is not necessary to establish a large hospital. The government can consider building a hospital in Koreatown and downtown to meet the medical needs in the region.

Long Beach-Lakewood
Long Beach is the second largest city in the Los Angeles Metropolitan area (Wikipedia) and is also a large port with large population, which explains that it has a lot of elderly people. Consequently, now local hospitals are not enough.

East/Southwest/Upper San Gabriel Valley
Significant percentages of all major minority groups reside in San Gabriel Valley communities, and the majority of people residing in the San Gabriel Valley are Hispanics and Asian Americans who are not so rich (Wikipedia). And with so much elderly population and only one general hospital, this region has to build more hospitals for the poor elderly people (shown in Figure 2).

South/North Antelope Valley
The antelope valley includes the western end of the Mojave Desert, open to the Victoria Valley and the Great Basin. This area is not suitable for the elderly people to live, and the local hospital medical conditions are not enough (Wikipedia), so residents go to UCLA hospitals and it is essential to build more hospitals in this region.

There are only one or two large hospitals in these areas like Whittier, Downey-Norwalk, South Gate-East Los Angeles, and Pasadena. With so many elderly people in this area, more hospitals need to be established.

Areas with Enough Hospitals

San Fernando Valley
Much of the population of the San Fernando Valley is below the poverty level. Thirty percent of households in 2009 earn less than $35,000 a year (Wikipedia). Although its elderly population is very large, the existing hospital is enough and it is unnecessary to establish more hospitals (shown in Figure 2).

Palos Verdes
Palos Verdes Peninsula contains some wealthy cities. Although there are also some elderly people, it has a better economic condition and health status. Therefore, existing hospitals are enough.

**South Bay Cities**
There are not many elderly people in the area. Therefore Ami South Bay Hospital and Kindred Hospital South Bay, as well as many small medical institutions are enough for them.

**Santa Monica**
As a famous tourism city, and the home of the headquarters of numerous notable businesses, Santa Monica does not have so many aging population, and it already has UCLA Santa Monica Hospital and St. John's Hospital. There is no requirement to build more hospitals.

In the areas like Compton, Newhall, Torrance, Inglewood, South Bay Cities and Agoura Hills-Malibu, there are not too many elderly people, so existing hospitals and medical institutions are enough.

**Chain medical institutions**
What’s more, Kaiser is the largest managed care organization in the United States. There are medical institutions in Los Angeles, San Fernando Valley, Downey-Norwalk, Palos Verdes, Inglewood and South Bay Cities. I suggest that Kaiser Permanente can establish a medical center or hospital in Antelope Valley, Pasadena and San Gabriel.

**Limitations**

1. I use the county subdivisions as age demographics, which is too big of a geography for a meaningful analysis. In my current ability I cannot find the information of elderly population in census tracts. And no matter quantity or area of the county subdivisions in LA county are both well suited to my research. If I take the census tracts as units, there will be too many colors so that readers cannot see clearly. So I chose county subdivisions instead of cities. But in that case the city's governments are unable to refer to this paper to build hospitals.

2. I did not include the health centers and clinics into the map. In my current ability I cannot find the addresses of all the small health centers and clinics. So I cannot study whether these small medical institutions can meet the medical needs of the elderly.

3. I leave Catalina island off the maps. Because it is far from LA County, and cannot be clearly displayed in the layout, I removed it for the purpose of making the other
regions maps a bit bigger for clarity. In that case I cannot study whether the hospitals on island are enough for the elderly.

Conclusions

1. 53.84% of the county subdivisions with more than 50,000 elderly people have more than 2 hospitals, while 46.16% of the county subdivisions with more than 50,000 elderly people only have one or two hospital (shown in Figure 1, 3 and 4).

2. In the LA County, large general hospitals are in or around Los Angeles city, while the northern mountains and desert areas rarely have many comprehensive hospitals, and the hospital distribution in coastal areas is not intensive. This may have three reasons (shown in Figure 1). First of all, traffic in Los Angeles downtown is more convenient and suitable for hospital operation. Second, the economic development in northern mountainous and desert cannot meet the profitability of hospital. Finally, the coastal area is either rich areas or tourism cities, and the population density is so small that family clinics can totally meet the medical needs. According to the analysis of elderly population density map, most areas with more than 50,000 elderly people need more hospitals. Los Angeles and the areas nearby like East/Southwest/Upper San Gabriel Valley, South Gate-East Los Angeles, Downey-Norwalk, Whittier, Pasadena and Long Beach-Lakewood do not have enough hospitals for their large number of elder population. However, San Fernando Valley and Inglewood have sufficient hospitals for a substantial number of elderly people.

Most areas with less than 50,000 elderly people have adequate hospitals, like Compton, Newhall and Torrance. For rich areas like Palos Verdes, South Bay Cities and Santa Monica, the wealthy elderly have enough family clinics. For Agoura Hills-Malibu, the elderly people can drive to the hospitals nearby. However, in North/South Antelope Valley, a small quantity of hospital with poor medical conditions cannot satisfy the demands of the aged.

3. In the buffer map, I found in many areas the 1-mile buffers of hospitals overlap with each other (shown in Figure 2). Some hospitals, in Los Angeles, Long Beach-Lakewood, Downey-Norwalk, South Gate-East Los Angeles and Inglewood are so close to each other. For example, some regions have dense distribution of UCLA specialist hospitals. One hospital in Torrance and one in South Bay Cities are close. The elderly in Agoura Hills-Malibu (not shown in buffers) and Palos Verdes can just drive through a short distance to the hospitals in other areas. There are not many overlaps of buffers in other areas.
Reference


