

The Statistical Relationship between the Elderly Population and Allocation of Welfare Facilities in Seoul, South Korea

By Seung Whan Lee

Advisor : Prof. Joyce Klein Rosenthal

Submitted in fulfillment of requirements for M.S. Urban Planning
Graduate School of Architecture, Planning & Preservation

Columbia University

May 06, 2016

Chapter headings

1. Introduction

1.1	Background	3
1.2	Research Purpose	7
1.3	Research Range	7
1.4	Research Method	9

2. Current Situation

2.1	Elderly Population	12
2.2	Number of the Elderly Welfare Facilities	15
	2.2.1 Elderly Residential Welfare Facility	16
	2.2.2 Elderly Medical Welfare Facility	16
	2.2.3 Elderly Leisure Welfare Facility	17
	2.2.4 Elderly Ambulatory Care Facility	17

3. Allocation of Elderly Welfare Facility

3.1	Relationship between population and facility allocation	18
3.2	Dissimilarity Index	
3.2.1	Elderly Residential Welfare Facility	20
3.2.2	Elderly Medical Welfare Facility	20
3.2.3	Elderly Leisure Welfare Facility	24
3.2.4	Elderly Ambulatory Care Facility	27
3.2.5	Dissimilarity Index Map	30
3.3	Relationship between indicator of aging and facility	
3.3.1	Proportion of the Elderly	31
3.3.2	Correlation Analysis	33
<u>4. Conclusion</u>		34
<u>References</u>		36
<u>Appendix</u>		39

1. Introduction

1.1 Background

Life expectancy has been increasing in most developed countries worldwide over very long time periods while fertility rates have decreased significantly. Because of this phenomenon, proportions of senior citizens are increasing rapidly in many parts of the world.

According to the World Health Organization (WHO), “...most countries have accepted the chronological age of sixty-five years as a definition of elderly or older person.” However, like many westernized concepts, this does not adapt well to the situation in other part of the world. While this definition is somewhat arbitrary, the term elderly is often associated with the age at which one can begin to receive pension benefits. Currently, there is no United Nations (UN) standard numerical criterion, but the UN agreed number for referring to the older population is sixty-plus years¹. This research will define elderly, senior, older, and aging population as aged sixty-five or over and use data with same criteria.

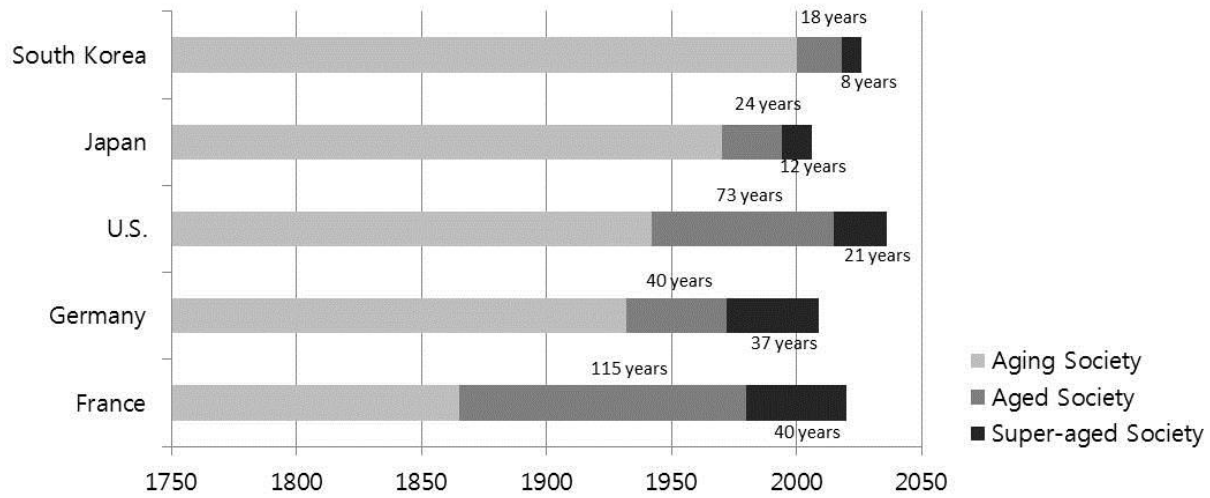
Among the total population, the ratio of the elderly is increasing or ratio of the elderly is significantly high is classified as aging society. The United Nations defines a population aged sixty-five and over consisting of 7% of the total population as aging society, 14% as an aged society, and 20% as a super aged society or post-aged society.

¹ WHO, Definition of an older or elderly person, Accessed April 20, 2016, <http://www.who.int/healthinfo/survey/ageingdefnolder/en/>

In South Korea, the elderly population aged sixty-five and over has entered into a full-fledged aging society (7.2 % of the total population) in 2000; it will become an aged society in 2018 (14.3 %), and it is expected to become a super-aged society at 20.8% in 2026². South Korea's rapidly increasing proportion of aging population is unparalleled in history. In contrast with other developed nations which gradually entered into aging society, South Korea is expected to take only eighteen years to enter into the aged society category, and is expected to enter into a super-aged society eight years from then. It is expected to take only twenty-six years to move into being a super-aged society from an aging society, so the county must be prepared in the short term. In contrast, the United States took seventy-three years to become an aged society and it will take twenty-one years to become a super-aged society. See table 1.

² Statistics Korea, Population Projection 2013-2040, Accessed in May 04, 2016, http://kostat.go.kr/portal/korea/kor_nw/3/index.board?bmode=download&bSeq=&aSeq=332520&ord=3

Table 1 Pace of Aging



Source : Statistics Korea, International population projection, 1960-2060 / Japan National Institute of Population and Social Security Research, 2014

In this situation, it is important to provide an age-friendly environment to increasing senior population. According to the study “Creating Elder-friendly Communities: Preparations for an Aging Society,”³ to have an elder-friendly community, the elderly need to be provided with services related to health (e.g., accessible and affordable health and health care services and opportunities to stay active), participation (e.g., accessible public transportation, information services, recreational programs, social connections, volunteer opportunities, place to worship, and the need to be valued and respected), and security (e.g., home and community safety, transportation safety, financial security, and affordable housing and services). In the study “The

³ Alley D, Liebig P, Pynoos J, Banerjee T, Choi IH. Creating elder-friendly communities: preparations for an aging society. *J Gerontol Soc Work*. 2007, 49, 1-18

Quality of Life of Older Adults Living in an Urban Environment,”⁴ health and independence, financial security, social integration, health care services, housing, accessibility of community services, and decision-making power affect older adults’ quality of life in urban environments. According to the World Health Organization’s Global Age-Friendly Cities⁵, opportunities for health, participation, and security are important factors in enhancing quality of life as people age. In South Korea, those services are provided by elderly welfare facilities, excepting transportation. See Table 2.

The origin of senior facility was related to the desire of the elderly population to meet with other people in similar ages. Senior facility was a place where seniors enjoy social activities and exchange information⁶. Later, senior facility became an important place, providing not only social activities but also providing food, recreation, volunteering, information and health promotion⁷. Senior facility also provided mental security by giving opportunities to seniors to interact with people of similar ages and interest. Seniors gain friendship, support, a sense of

⁴ L. Richard, S. Laforest, F. Dufresne and J.P. Sapinski, The Quality of Life of Older Adults Living in an Urban Environment: Professional and Lay Perspectives, *Canadian Journal on Aging / La Revue canadienne du vieillissement* Vol.24 Issue.01 DOI: 10.1353/cja.2005.0011, 2005, 19-30

⁵ World Health Organization. *Global Age-Friendly Cities: a guide*. France: WHO, 2007

⁶ Donald Kent, The how and why of senior centers, *Aging and Work: A Journal on Age, Work and Retirement*, 1978, 281-282

⁷ Manoj Pardasani, Bobbie Sackman, New York City senior centers: A unique, grassroots, collaborative advocacy effort. *Activities, Adaptation & Aging*, 38:3,2014, 200-219

belonging, and resources⁸. Notion of senior center was more expanded in South Korea. Elderly welfare facility is an umbrella term for senior center. Elderly welfare facility provides residential, medical, leisure, ambulatory care service for seniors aged 65 or older.

1.2 Research Purpose

Due to the South Korea's increased aging rate, Seoul will rapidly enter into the aging society. It has been actively conducting research related to the elderly and elderly welfare. However, based upon the available research related to the elderly, the welfare facility is still lacking. Therefore, this study focused on what effects the most for the elderly welfare facility and the allocation of the elderly welfare facility and defines whether if they are evenly allocated or not.

This study will focus on the elderly welfare facility that will help senior citizens cope with local community districts. Therefore, this study attempts to deduce how Seoul allocates urban resources for senior citizens, and evaluate allocation of urban resources for senior citizens. The findings will cast a long shadow in the study of urban planning. Also, it will be a good lesson for Seoul to share its findings with other cities.

1.3 Research Range

The subject of this research is the city of Seoul, South Korea. Seoul is a representative city and

⁸ Nancy R. Hooyman, H. Asuman Kiyak, *Social gerontology: A multidisciplinary perspective* (8th Ed.). New York, NY: Pearson. 2008

it has the largest population and highest population density in South Korea⁹. To determine the distribution of the elderly population aged sixty-five and over, twenty-five districts of Seoul were analyzed.

The elderly welfare facility is defined in Senior Welfare Law #31. For further information, see South Korea Elderly Welfare Law¹⁰. Senior Welfare Law #31 defines the categories of senior welfare facility and they are categorized into four types: residential, medical, leisure, ambulatory. There are three types of residential welfare facility: nursing homes, senior group homes, and senior welfare homes. This is different from affordable housing or ordinary housing offered to the seniors. There are two types of medical welfare facility, the elderly care facility and elderly care group home. These are also different from normal hospitals or medical centers because they only provide services to those seniors with dementia or those debilitated by stroke. There are three types of leisure welfare facility, including senior welfare center, senior center, and senior education center. These centers provide a place where seniors can spend their time, provides a variety of useful information, and offers educational programs. Lastly, there are five types of ambulatory care facility and they provide visiting services to the elderly.

⁹ Ministry of Government Administration and Home Affairs, Out of the total population, 10,094,889 people, or roughly 20% of the population, live in Seoul, the capital city of Korea. 2015

¹⁰ South Korea Elderly Welfare Law, Accessed in May 04, 2016, https://ko.wikisource.org/wiki/%EB%8C%80%ED%95%9C%EB%AF%BC%EA%B5%AD_%EB%85%B8%EC%9D%B8%EB%B3%B5%EC%A7%80%EB%B2%95

Table 2 Definition of Elderly Welfare Facility

Type	Facility	Description
Residential	Nursing Home	Residential home for the elderly that provides meals, minor medical service and other necessary services.
	Senior Group Home	Residential home for the elderly that provides meals, social activities and other necessary services.
	Senior Welfare Home	For the convenience of the elderly, pre-sale or rental housing to provide the facilities necessary for everyday life, such as counseling and safety management.
Medical	Elderly Care	Facility that provides meals, and other necessary medical service for the elderly with dementia or stroke.
	Elderly Care Group Home	Facility that provides meals and other necessary medical service for the elderly with dementia or stroke, with social activities and other necessary services.
Leisure	Senior Welfare Center	Provides education for the elderly with hobbies, health promotion, disease prevention, and senior activity.
	Senior Center	Facility that offers social activities, provides a variety of information, and leisure activities.
	Senior Education Center	Facilities that provides hobby, health, income security, and related learning programs for the elderly.
Ambulatory	Visit Care	Service to the elderly who live at home and struggle with physical and/or mental disabilities.
	Day Care	Facility that provides the elderly who are physically and mentally unable to obtain the protection of the family
	Temporary Care	Facility that provides the elderly who are temporarily physically or mentally incapacitated and unable to be under the care of family.
	Bathing Service	With bath equipment, visit the elderly to provide bathing services.
	Ambulatory Support	Counseling, education and other services.

Source : South Korea, Senior Welfare Law #31

1.4 Research Method

"A Study on the present states and problems of Supply Estimation and Arrangement of Long-Term Care Facilities for The Elderly in Gyeonggi Province"¹¹ by Seok Joon Kim and Teuk Gu Lee,

¹¹ Seok Joon Kim, Teuk Gu Lee, A Study on the present states and problems of Supply Estimation and Arrangement

forecasted demand of the elderly welfare facility on the basis of elderly population and found a statistical relationship between the elderly population and elderly welfare facilities, but did not provide other factors that could influence the allocation of resources for these facilities.

“Measuring Accessibility of Day Care Centers for the Elderly in Seoul Using GIS Spatial Analysis Techniques”¹² by Jung Yul Sohn, Soo Kyung Oh aimed to suggest policy implications of allocating elderly day care facilities more efficiently by calculating the accessibility of neighborhood to elderly day care facilities using Geographic Information System (GIS). The study found that the distribution of the facilities does not correspond to the distribution of the elderly population.

“A Study on Local Variations of Elderly Welfare Facilities by Care Type”¹³ by Ju Hee Kang, Soon Duck Yoon examined elderly welfare facilities by type and analyzed their local variations. The study analyzed welfare centers, homebased facilities (home helper centers), and asylums for the elderly in sixteen cities and provinces to determine a difference between urban and rural areas.

of Long-Term Care Facilities for The Elderly in Gyeonggi Province, Architecture Institute of Korea Journal Vol.21 No.5 KSI000650634, 2005, 69-76

¹² Jung Yul Sohn, Soo Kyung Oh, Measuring Accessibility of Day Care Centers for the Elderly in Seoul Using GIS Spatial Analysis Techniques, The Korean Association of Regional Geographers Journal Vol.13 No.5 1226-7392 KCI, 2007, 576-594

¹³ Ju Hee Kang, Soon Duck Yoon, A Study on Local Variations of Elderly Welfare Facilities by Care Type, Korean Journal. Community Living Science Vol.18 No.3 1229-8565 KCI, 2007, 369-378

“Characterization of Cities in Seoul Metropolitan Area by Cluster Analysis”¹⁴ by Min Kyung Song and Hoon Chang analyzed the Seoul metropolitan area on the basis of cluster analysis to find a characteristic of each area. Ten indicators were used including population, activities, land-use and facilities. Following analysis, similar characteristics or congenialities of the variables were derived as a common factor. However, this study was limited because it did not provide causal relationships between variables.

“Accessibility to Welfare Facilities for the Aged through GIS Network Analysis: Focused on Inland Areas in Incheon”¹⁵ by Sein Ma and Heungsoon Kim used GIS analysis to examine allocation of the welfare facilities. The study determined spatial allocation of welfare facilities specifically by using distance to the facilities, but has a limitation of not reflecting the capacity of each facility and population of the elderly.

Prior research used statistical analysis or GIS to examine allocation and locational patterns of the elderly welfare facilities. Type and classification of the facilities varied, and indicators of aging population used in the research were diverse. Therefore, this study had to set the criteria for analysis.

First, this research examined one elderly population and determined whether the number and

¹⁴ Min Kyung Song, Hoon Chang, Characterization of Cities in Seoul Metropolitan Area by Cluster Analysis, Journal of the Korean Society for GeoSpatial Information Science Vol.18 No.1 1508-2955 KCI, 2010, 83-88

¹⁵ Sein Ma, Heungsoon Kim, Accessibility to Welfare Facilities for the Aged through GIS Network Analysis: Focused on Inland Areas in Incheon, Korea Research Institute for Human Settlements Vol.70, 2011, 61-75

proportion of the elderly actually increased, since 2001, by district. In addition, among the elderly population, the number of elderly who live alone, who receive income support, and who have disability was included to determine a relationship with an elderly welfare facility. Thus, to find whether the elderly welfare facility has a relationship based on financial factors, total tax revenue, median income, percentage of seniors with no income, and percentage of seniors with high income of each district were also included. Next, the number and capacity of each elderly welfare facility was analyzed by district. The facilities varied in size so capacity was used in the further research.

Second, a correlation analysis (defined in chapter 3.1) was conducted to find which variable affects the capacity of each facility the most. Third, after determining the variable that affects the allocation of the elderly welfare facility, an index of dissimilarity (defined in chapter 3.2.2) was used to find those districts providing services below the city average. Lastly, this study conducted another correlation analysis to determine if there is a relationship between indicators of aging (proportion of the elderly, aged child ratio, dependency ratio) and districts providing service below the average.

2. Current Situation

2.1 Elderly Population

To determine the distribution of the elderly population aged sixty-five and over, twenty-five districts of Seoul were analyzed. In 2001, the population of senior citizens was 563,913, a

proportion of 5.5%. In 2014, population of senior citizens was 1,221,616 and the proportion was 11.8%. Number and proportion nearly doubled within thirteen years.

Table 3 Elderly Population (Seoul)

Seoul	2001	2014
Total Population	10,263,336	10,369,593
Population aged 65 and over	563,913	1,221,616
Ratio	5.5%	11.8%

Source : Statistics Korea. 2002/2015

The number of senior citizens was highest in Eunpyeong, followed by the Nowon and Songpa districts. The number of senior citizens increased the most in Eunpyeong, followed by the Gangseo and Gwanak districts. Based on the total population difference, the top three districts with a changed proportion of the elderly population were Jung, Jongno, and Gangbuk (which is the old central business district of Seoul). Songpa, Nowon, Gangnam districts showed an increase in senior population but lowest change in ratio due to a large-scale housing development and a total population increase accordingly.

Table 4 Elderly Population Change by District

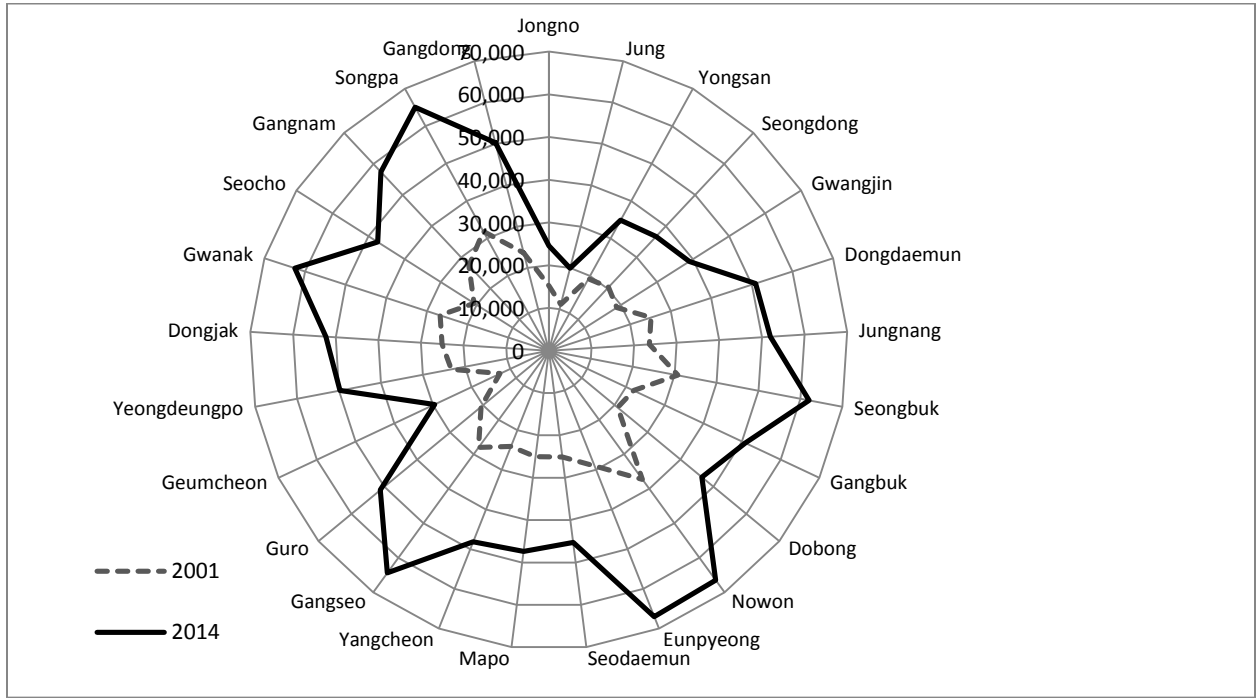


Table 5 Elderly Population Change by District

Year	2001				2014				
	District	Total	Male	Female	Ratio	Total	Male	Female	Ratio
Seoul		563,913	227,261	360,301	5.5%	1,221,616	536,758	684,858	11.8%
Jongno		15,144	6,223	8,921	2.7%	24,537	10,764	13,773	14.8%
Jung		11,220	4,422	6,798	2.0%	19,960	8,591	11,369	14.7%
Yongsan		19,193	7,946	11,247	3.4%	34,896	14,667	20,229	14.0%
Seongdong		20,401	8,184	12,217	3.6%	36,684	15,959	20,725	12.1%
Gwangjin		18,810	7,264	11,546	3.3%	38,974	17,373	21,601	10.3%
Dongdaemun		25,138	10,292	14,846	4.5%	50,915	22,453	28,462	13.5%
Jungnang		23,558	8,992	14,566	4.2%	51,995	22,873	29,122	12.3%
Seongbuk		30,746	12,267	18,479	5.5%	62,066	26,834	35,232	13.0%
Gangbuk		21,958	8,960	12,998	3.9%	50,841	22,096	28,745	15.0%
Dobong		20,913	8,096	12,817	3.7%	46,471	20,514	25,957	13.1%
Nowon		37,266	13,471	23,795	6.6%	66,480	27,206	39,274	11.3%

Eunpyeong	29,060	11,854	17,206	5.2%	67,002	29,226	37,776	13.3%
Seodaemun	25,115	10,244	14,871	4.5%	45,309	19,126	26,183	14.1%
Mapo	25,013	10,160	14,853	4.4%	47,360	19,984	27,376	12.0%
Yangcheon	24,136	8,680	15,456	4.3%	48,175	21,001	27,174	9.8%
Gangseo	27,986	10,077	17,909	5.0%	64,287	28,003	36,284	10.9%
Guro	20,613	7,933	12,680	3.7%	51,187	23,545	27,642	11.2%
Geumcheon	12,652	4,841	7,811	2.2%	29,553	13,392	16,161	11.5%
Yeongdeungpo	23,278	9,343	13,935	4.1%	49,829	22,473	27,356	11.8%
Dongjak	25,051	10,112	14,939	4.4%	52,327	22,987	29,340	12.5%
Gwanak	26,784	10,610	16,174	4.7%	62,577	28,282	34,295	11.8%
Seocho	20,704	7,848	12,856	3.7%	47,469	21,604	25,865	10.4%
Gangnam	27,292	9,662	17,630	4.8%	57,444	25,737	31,707	9.8%
Songpa	31,882	11,506	20,376	5.7%	65,025	29,518	35,507	9.7%
Gangdong	23,649	8,274	15,375	4.2%	50,253	22,550	27,703	10.4%

Source : Statistics Korea. 2002/2015

2.2 Number of the Elderly Welfare Facilities

In this study, data from 2008 to 2014 was used to see how the number and capacity of the elderly welfare facilities has changed. Among the elderly welfare facilities, there are 3,748 leisure welfare facilities which was the largest. The number of each facility has increased except for the residential welfare facility.

Table 6 Number of Elderly Welfare Facilities

	2008	2011	2014
Residential Welfare	36	30	28
Medical Welfare	136	448	532
Leisure Welfare	3,335	3,542	3,748
Ambulatory Care	265	394	446
Total	3,772	4,414	4,754

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

2.2.1 Elderly Residential Welfare Facility

In 2008, there were thirty-six elderly residential welfare facilities in Seoul, but this number has decreased, and in 2014 there were twenty-eight. There are twenty-five districts in Seoul and the number of residential welfare facilities is twenty-eight. See Appendix 2 for further details.

Table 7 Number of Elderly Residential Welfare Facility

		2008	2011	2014
Total	Number	36	30	28
	Capacity	3,880	3,034	3,094
Nursing Home	Number	25	15	14
	Capacity	947	823	1,460
Senior Group Home	Number	1	5	4
	Capacity	5	32	27
Senior Welfare Home	Number	10	10	10
	Capacity	2,928	2,176	1,607

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

2.2.2 Elderly Medical Welfare Facility

In 2008, there were 136 elderly medical welfare facilities in Seoul and there were 532 in 2014. This number was nearly quadrupled and capacity was doubled, which shows that the demand of elderly medical welfare facilities is increasing. The data also showed that the size of the facilities is decreasing. See Appendix 3 for further details.

Table 8 Number of Elderly Medical Welfare Facility

		2008	2011	2014
Total	Number	136	448	532
	Capacity	6,111	14,159	14,222
Elderly Care	Number	84	227	176
	Capacity	5,077	11,405	11,109
Elderly Care Group Home	Number	49	215	369
	Capacity	402	1,856	3,224

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

2.2.3 Elderly Leisure Welfare Facility

Elderly leisure welfare facilities comprise 88% of senior centers. The number of senior centers and senior education centers has increased since 2008, but the number of senior welfare center has more than doubled from 2008. See Appendix 4 for further details.

Table 9 Number of Elderly Leisure Welfare Facility

		2008	2011	2014
Total	Number	3,335	3,542	3,748
Senior Welfare Center	Number	29	30	74
Senior Center	Number	3,004	3,173	3,298
Senior Education Center	Number	302	344	371

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

2.2.4 Elderly Ambulatory Care Facility

The total number of the elderly ambulatory care facilities also increased from 2008, primarily due to the increase in the number of day care facilities and bathing services. The capacity of day care facilities has tripled since 2008, while visit care and temporary care facilities has decreased

or stayed constant. See Appendix 5 for further details.

Table 10 Number of Ambulatory Care Facility

		2008	2011	2014
Total	Number	265	394	446
	Capacity	2,526	4,309	5,378
Visit Care	Number	105	103	94
	Capacity	-	-	-
Day Care	Number	90	206	233
	Capacity	1,677	3,985	4,940
Temporary Care	Number	43	27	44
	Capacity	849	324	438
Bathing Service	Number	27	58	65
	Capacity	-	-	-
Ambulatory Support	Number	-	-	8
	Capacity	-	-	-

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

3. Allocation of Elderly Welfare Facility

3.1 Relationship between population and facility allocation

To determine the relationship between each variable and elderly welfare facilities, a correlation analysis was conducted. Correlation analysis is a means to determine a relationship among variables. The value of correlation analysis is in the correlation coefficient, which is always between -1 and +1. If the value is close to 1, it represents a linear association between two variables. Results of the analysis shows which variable has the greatest effect.

Table 11 Correlation Analysis in the 25 districts of Seoul, 2014

	Tot_Pop	65+ in 2014	65+ Live Alone	65+ Inc Sup	65+ Disabled	Tax Revenue	Med_Inc	65+ High Inc	65+ No Inc	Resi	Medi	Leis	Ambu
Residential	0.02	-0.04	0.03	0.05	0.09	-0.10	-0.22	0.05	-0.09	1.00***	0.21	-0.03	-0.09
Medical	0.57**	0.66***	0.69***	0.83***	0.80***	-0.38	-0.27	-0.34	0.28	0.21	1.00***	0.56**	0.61**
Leisure	0.80***	0.76***	0.68***	0.58**	0.76***	0.09	0.31	-0.17	-0.11	-0.03	0.56**	1.00***	0.63***
Ambulatory	0.68***	0.78***	0.77***	0.77***	0.81***	-0.12	0.09	-0.46**	-0.12	-0.09	0.61**	0.63***	1.00***

Data Source : See Table below

*p<0.05, **p<0.01, ***p<0.001

Table 12 Description and Data Source

Seoul	Variable	Description	Data Source
Population	Tot_Pop	Total Population	Statistics Korea. 2002/2015
	65+ in 2014	Population 65 and over (2014)	
Status	65+ LiveAlone	Population 65 and over who lives alone	Seoul City Welfare Bureau, Department of Elderly Welfare. 2015
	65+ Inc_Sup	Population 65 and over who gets National Basic Livelihood Security Beneficiary	
	65+ Disabled	Population 65 and over with disability	Seoul City Welfare Bureau, Department of Independent Living. 2015
Financial Status	Tax Revenue	Tax Revenue by Municipality	Ministry of Government Administration and Home Affairs, Local Tax Stats, 2014
	Med_Inc	Median Income by Municipality	
	65+High Inc	% of Population 65 and over who earns more than 3,000,000Won/Month	Seoul City Survey (Household Survey) 2014
	65+No Inc	% of Population 65 and over with No Income	
Welfare Facility	Residential	Capacity of Residential Welfare Facility for Senior	Seoul City Welfare Bureau, Department of Elderly Welfare. 2015
	Medical	Capacity of Medical Welfare Facility for Senior	
	Leisure	Number of Residential Welfare Facility for Senior	
	Ambulatory	Capacity of Ambulatory Care Facility for Senior	

Before looking into each elderly welfare facility, the results of correlation analysis showed there is no relationship between financial status and allocation of elderly welfare facilities. Total tax revenue, median income of each municipal district, and income of the elderly did not affect

the allocation of elderly welfare facilities.

3.2 Dissimilarity Index

3.2.1 Elderly Residential Welfare Facility

The null hypothesis for the elderly residential welfare facility was based on poverty related variables, including the number of elderly who receive income support and number of the elderly who have no income; this demonstrates a significant relationship with the elderly residential welfare facility.

Table 13 Summary of Elderly Residential Welfare Facility Correlation

Residential	65+ Disabled	65+ Inc_Sup	65+ LiveAlone	Tot_Pop	65+ in 2014
	0.094	0.046	0.027	0.025	-0.040

However, none of the variables related to the capacity of the elderly residential facilities. Ten among twenty-five districts had no elderly residential welfare facility at all, and the variance of the capacity was too high to get statistically significant results. The results do not show whether there are enough facilities, but the elderly residential welfare facility should consider for the elderly.

3.2.2 Elderly Medical Welfare Facility

The null hypothesis for the elderly medical welfare facility was the health conditions variable, including the number of the elderly who are disabled, and shows a high relationship with the

elderly residential welfare facility.

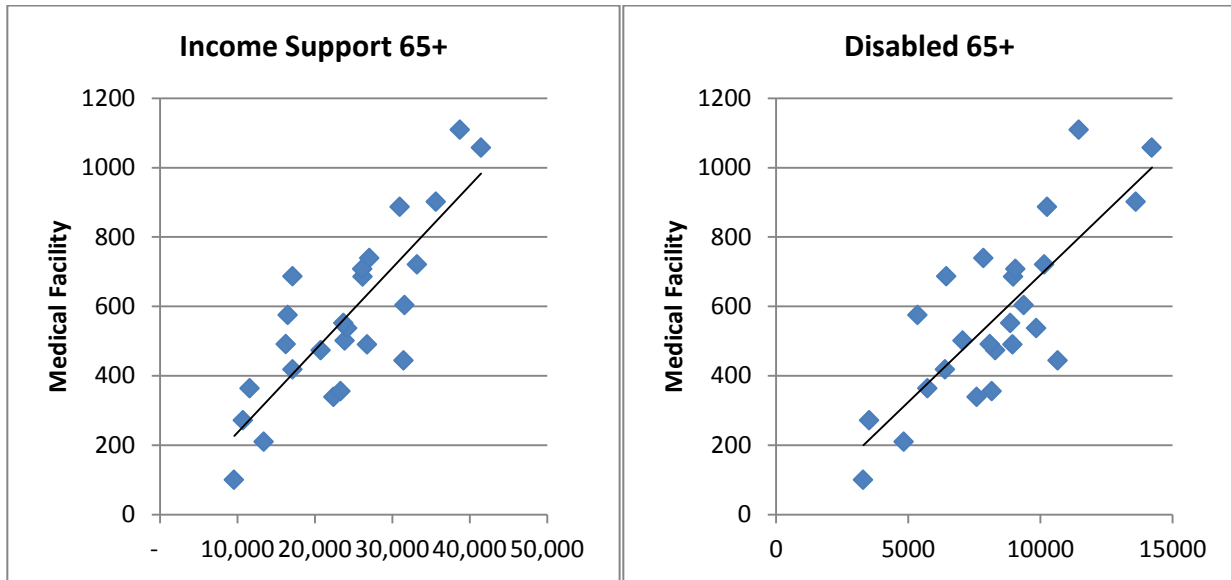
Table 14 Summary of Elderly Medical Welfare Facility Correlation

Medical	65+ Inc_Sup	65+ Disabled	65+ LiveAlone	65+ in 2014	Tot_Pop
	0.827	0.797	0.693	0.656	0.566

Regarding the elderly medical welfare facility, the correlation coefficient was highest in the number of the elderly who receive income support, followed by the elderly population with disabilities. To find the reason why number of the elderly who receive income support has the highest relationship with elderly medical welfare facilities, requirements for the elderly medical welfare facilities were checked. Elderly medical welfare facilities give priority to: 1) the long term care beneficiary; 2) aged sixty-five or over and income support beneficiary; 3) aged sixty-five or over who is unable to get support from person with duty of care¹⁶.

¹⁶ The Welfare Law of the Aged #34, Ordinance of the Ministry of Health

Table 15 Scatter Plot



The scatter plot shows a relationship between elderly medical welfare facility and the top two variables which had the highest coefficient. To find districts which provide medical welfare facilities below the average, the dissimilarity index was used. The index of dissimilarity is a demographic measure of the evenness with which a number of groups are distributed across component geographic areas that make up a larger area. This was calculated by dividing total capacity of facility by total number of each variable, multiply the result to each value of variables for each district. This provides capacity of even distribution for each district. Dissimilarity index was 9.9% (1413/14,222) with number of the elderly population who gets income support and 10.5% (1492/14,222) with the elderly population with disability, which means 9.9% or 10.5% of the capacity has to be moved for fair service. There were eleven districts that get service below the average. (Jung, Yongsan, Dongdaemun, Seongbuk, Gangbuk,

Mapo, Yeongdeungpo, Dongjak, Gwanak, Songpa, Gangdong).

Table 16 Dissimilarity Index of Elderly Medical Welfare Facility

District	Medical	Income Support 65+		Disabled 65+	
	Capacity	Number	Capacity for even distribution	Number	Capacity for even distribution
Total	14,222	599,770	-	208,097	-
Jongno	272	10,732	254.5	3,528	241.1
Jung	100	9,573	227.0	3,299	225.5
Yongsan	210	13,388	317.5	4,835	330.4
Seongdong	418	17,137	406.4	6,393	436.9
Gwangjin	687	17,122	406.0	6,450	440.8
Dongdaemun	490	26,762	634.6	8,952	611.8
Jungnang	887	30,963	734.2	10,262	701.3
Seongbuk	721	33,213	787.6	10,147	693.5
Gangbuk	604	31,601	749.3	9,376	640.8
Dobong	739	27,040	641.2	7,848	536.4
Nowon	1,057	41,469	983.3	14,219	971.8
Eunpyeong	1,109	38,760	919.1	11,460	783.2
Seodaemun	501	23,877	566.2	7,060	482.5
Mapo	339	22,416	531.5	7,601	519.5
Yangcheon	686	26,172	620.6	8,980	613.7
Gangseo	901	35,629	844.8	13,608	930.0
Guro	708	26,154	620.2	9,060	619.2
Geumcheon	575	16,491	391.0	5,358	366.2
Yeongdeungpo	474	20,777	492.7	8,297	567.0
Dongjak	356	23,312	552.8	8,166	558.1
Gwanak	444	31,478	746.4	10,655	728.2
Seocho	364	11,574	274.4	5,726	391.3
Gangnam	491	16,257	385.5	8,096	553.3
Songpa	537	24,185	573.5	9,850	673.2
Gangdong	552	23,688	561.7	8,871	606.3

Data Source : See Table 12

3.2.3 Elderly Leisure Welfare Facility

The null hypothesis for the elderly leisure welfare facility was living condition variables; the number of elderly and number of the elderly who live alone has the highest relationship with the elderly residential welfare facility.

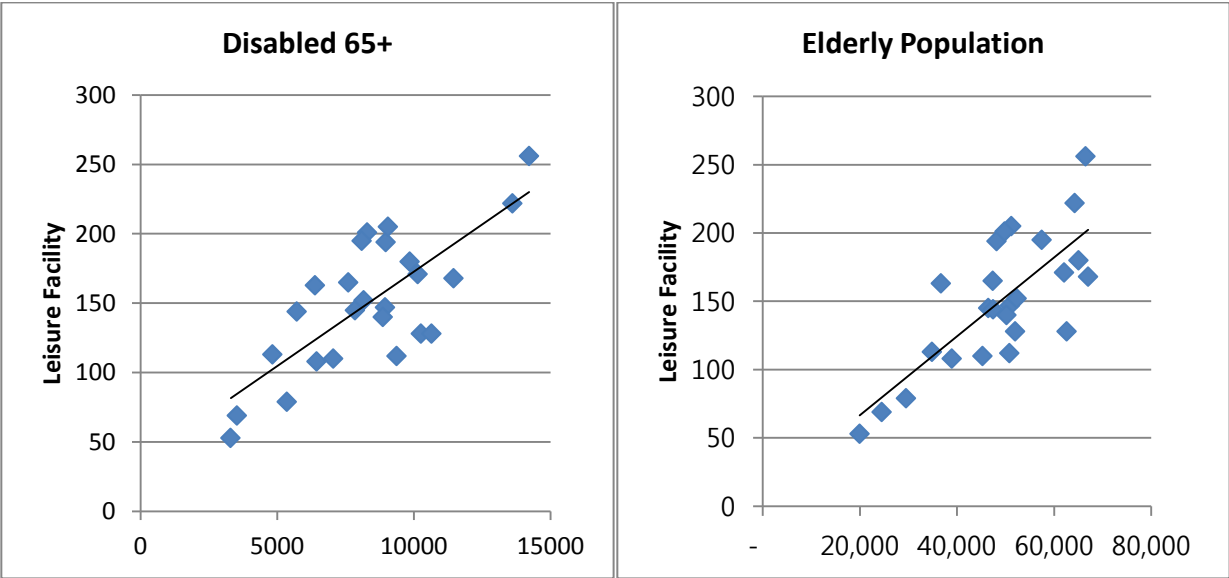
Table 17 Summary of Elderly Leisure Welfare Facility Correlation

Leisure	Tot_Pop	65+ Disabled	65+ in 2014	65+ LiveAlone	65+ Inc_Sup
	0.798	0.759	0.757	0.675	0.583

Regarding the elderly leisure welfare facility, the correlation coefficient was highest in total population, followed by the elderly population, and elderly population with disability. The number of the elderly who live alone also had high value of coefficient. The reason the total population had the highest value can be assumed from the governmental standard of senior center establishments. According to the housing construction standards (enforced 03.16.1991; amended 12.28.2011; Presidential Decree #23422): "Housing Construction Standard #55 Senior Center: apartment complex with more than 100 units must install senior center with a size of 40 square meters. Add additional 0.1 square meters per one unit when there are more than 150 units. If the size exceeds 300 square meters, (it could be built 300 square meters), apartment complex must build senior center." Among the elderly leisure welfare facilities in Seoul, 88.0% (3298/3748) of them are senior centers and, according to the Seoul City Housing Policy Department's census in 2011, 59% of the housing units in Seoul are apartment complexes. In

this research, total population is not a subject so the population of the elderly and number of the elderly with disability was used for next analysis.

Table 18 Scatter Plot



The scatter plot shows a relationship between elderly leisure welfare facilities and the top two variables which had the highest coefficient. To find districts which provide the leisure welfare facilities below the average, a dissimilarity index was used. Dissimilarity index was 8.9% (334/3,748) with the elderly population with disability and 8.4% (316/3,748) with the elderly population, which means 8.9% or 8.4% of the capacity has to be moved for fair service. There were nine districts that get service below the average. (Gwangjin, Jungnang, Seongbuk, Gangbuk, Eunpyeong, Seodaemun, Geumcheon, Gwanak, Gangdong).

Table 19 Dissimilarity Index of Elderly Leisure Welfare Facility

District	Leisure	Disabled 65+		Population 65+	
	Capacity	Number	Capacity for even distribution	Number	Capacity for even distribution
Total	3,748	208,097	-	1,221,616	-
Jongno	69	3,528	63.5	24,537	75.3
Jung	53	3,299	59.4	19,960	61.2
Yongsan	113	4,835	87.1	34,896	107.1
Seongdong	163	6,393	115.1	36,684	112.5
Gwangjin	108	6,450	116.2	38,974	119.6
Dongdaemun	147	8,952	161.2	50,915	156.2
Jungnang	128	10,262	184.8	51,995	159.5
Seongbuk	171	10,147	182.8	62,066	190.4
Gangbuk	112	9,376	168.9	50,841	156.0
Dobong	145	7,848	141.3	46,471	142.6
Nowon	256	14,219	256.1	66,480	204.0
Eunpyeong	168	11,460	206.4	67,002	205.6
Seodaemun	110	7,060	127.2	45,309	139.0
Mapo	165	7,601	136.9	47,360	145.3
Yangcheon	194	8,980	161.7	48,175	147.8
Gangseo	222	13,608	245.1	64,287	197.2
Guro	205	9,060	163.2	51,187	157.0
Geumcheon	79	5,358	96.5	29,553	90.7
Yeongdeungpo	201	8,297	149.4	49,829	152.9
Dongjak	152	8,166	147.1	52,327	160.5
Gwanak	128	10,655	191.9	62,577	192.0
Seocho	144	5,726	103.1	47,469	145.6
Gangnam	195	8,096	145.8	57,444	176.2
Songpa	180	9,850	177.4	65,025	199.5
Gangdong	140	8,871	159.8	50,253	154.2

Data Source : See Table 12

3.2.4 Elderly Ambulatory Care Facility

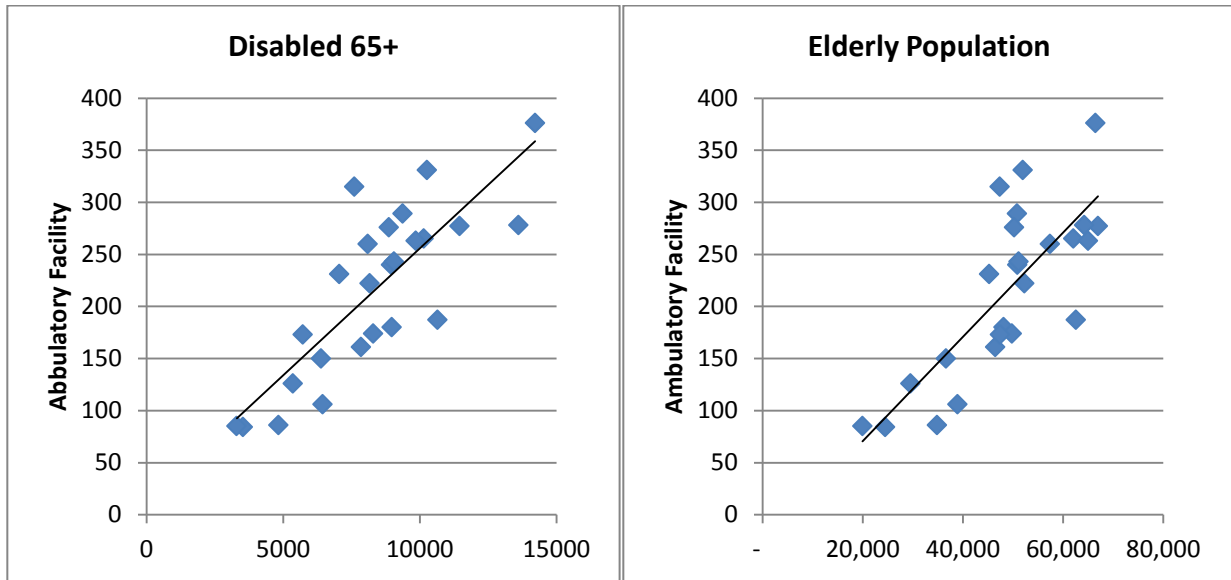
The null hypothesis for the elderly ambulatory care facility was the health condition variable (such as number of the elderly who are disabled) which showed the highest relationship with elderly residential welfare facilities.

Table 20 Summary of Elderly Ambulatory Care Facility Correlation

Ambulatory	65+ Disabled	65+ in 2014	65+ Inc_Sup	65+ LiveAlone	Tot_Pop
	0.813	0.784	0.766	0.765	0.677

For the elderly ambulatory care facility, the correlation coefficient was highest in the number of the elderly with disability, followed by the elderly population. The variables of income support and living situation (living alone) also had relationship.

Table 21 Scatter Plot



The scatter plot shows a relationship between elderly ambulatory care facility and the top two variables with the highest coefficient. To find districts which provide the ambulatory care facility below the average, the dissimilarity index was used. Dissimilarity index was 8.4% (450/5,378) with the elderly population with disability and 9.0% (484/5,378) with the elderly population, which means 8.4% or 9.0% of the capacity has to be moved for fair service. There were twelve districts that get service below the average (Jongno, Jung, Yongsan, Seongdong, Gwangjin, Dobong, Eunpyeong, Yangcheon, Gangseo, Geumcheon, Yeongdeungpo, Gwanak).

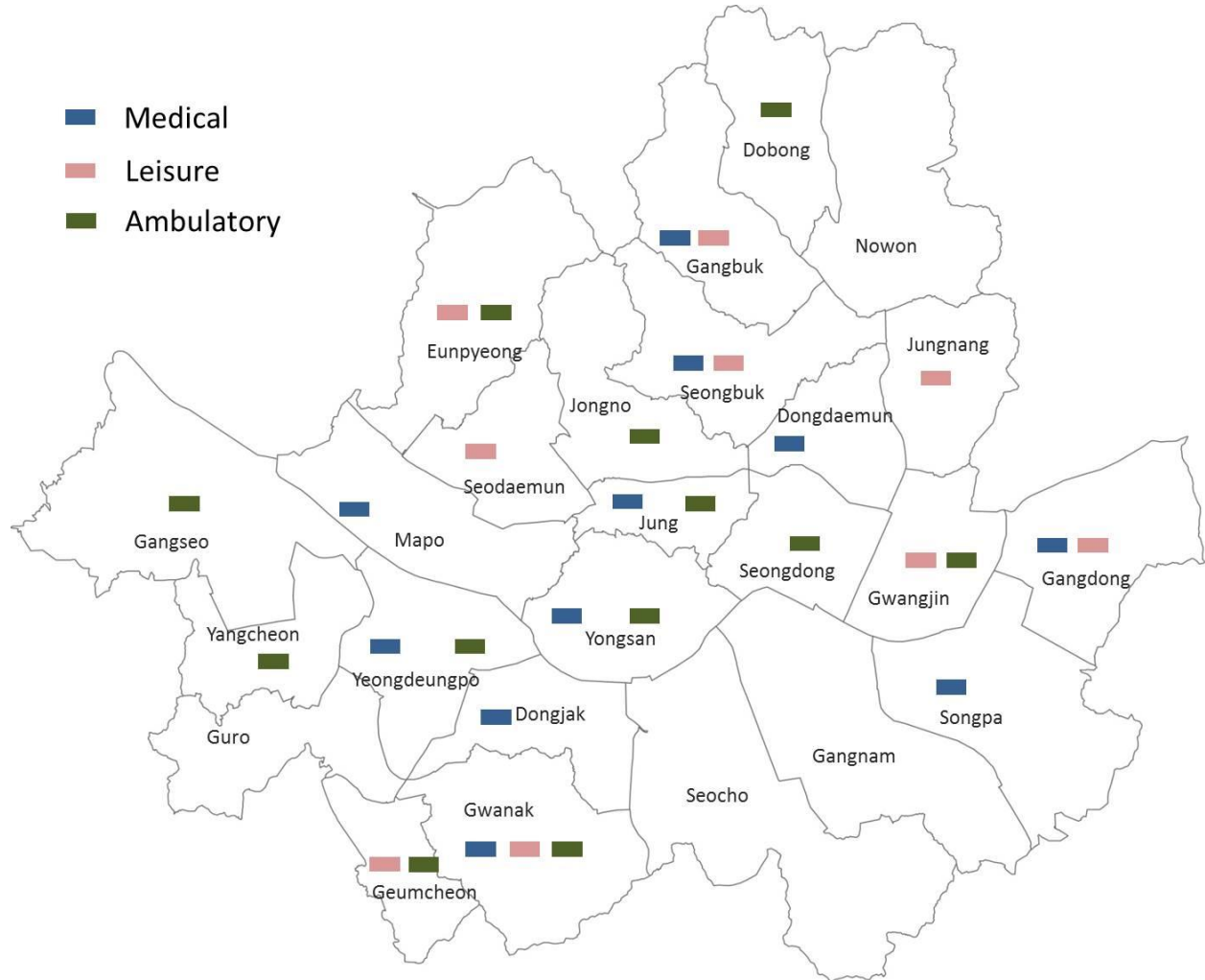
Table 22 Dissimilarity Index of Elderly Ambulatory Care Facility

District	Ambulatory	Disabled 65+		Population 65+	
	Capacity	Number	Capacity for even distribution	Number	Capacity for even distribution
Total	5,378	208,097	-	1221616	-
Jongno	84	3,528	91.2	24,537	108.0
Jung	85	3,299	85.3	19,960	87.9
Yongsan	86	4,835	125.0	34,896	153.6
Seongdong	150	6,393	165.2	36,684	161.5
Gwangjin	106	6,450	166.7	38,974	171.6
Dongdaemun	240	8,952	231.4	50,915	224.1
Jungnang	331	10,262	265.2	51,995	228.9
Seongbuk	265	10,147	262.2	62,066	273.2
Gangbuk	289	9,376	242.3	50,841	223.8
Dobong	161	7,848	202.8	46,471	204.6
Nowon	376	14,219	367.5	66,480	292.7
Eunpyeong	277	11,460	296.2	67,002	295.0
Seodaemun	231	7,060	182.5	45,309	199.5
Mapo	315	7,601	196.4	47,360	208.5
Yangcheon	180	8,980	232.1	48,175	212.1
Gangseo	278	13,608	351.7	64,287	283.0
Guro	243	9,060	234.1	51,187	225.3
Geumcheon	126	5,358	138.5	29,553	130.1
Yeongdeungpo	174	8,297	214.4	49,829	219.4
Dongjak	222	8,166	211.0	52,327	230.4
Gwanak	187	10,655	275.4	62,577	275.5
Seocho	173	5,726	148.0	47,469	209.0
Gangnam	260	8,096	209.2	57,444	252.9
Songpa	263	9,850	254.6	65,025	286.3
Gangdong	276	8,871	229.3	50,253	221.2

Data Source : See Table 12

3.2.5 Dissimilarity Index Map

Table 23 Elderly Welfare Facility Provided Below Average



This map shows those districts where elderly welfare facilities reflect the key variables below the average. It is difficult to find a spatial pattern in this map; in the following chapter this map is compared with the map showing the proportion of the elderly population.

3.3 Relationship Between Indicator of Aging and Facility

3.3.1 Proportion of the Elderly

All facilities, except for the elderly residential welfare facility, had a relationship with the elderly population. This study looked into the elderly population and proportion of the elderly in this chapter. Working under the assumption that the proportion of the elderly has a relationship with the number of elderly welfare facilities makes finding those districts lacking of elderly welfare resources more simple. It is difficult to identify spatial characteristics of the districts so this study sorted twenty-five districts into four groups (groups with a proportion of the elderly over 14%, 12–14%, 10–12%, below 10%).

Table 24 Proportion of the Elderly

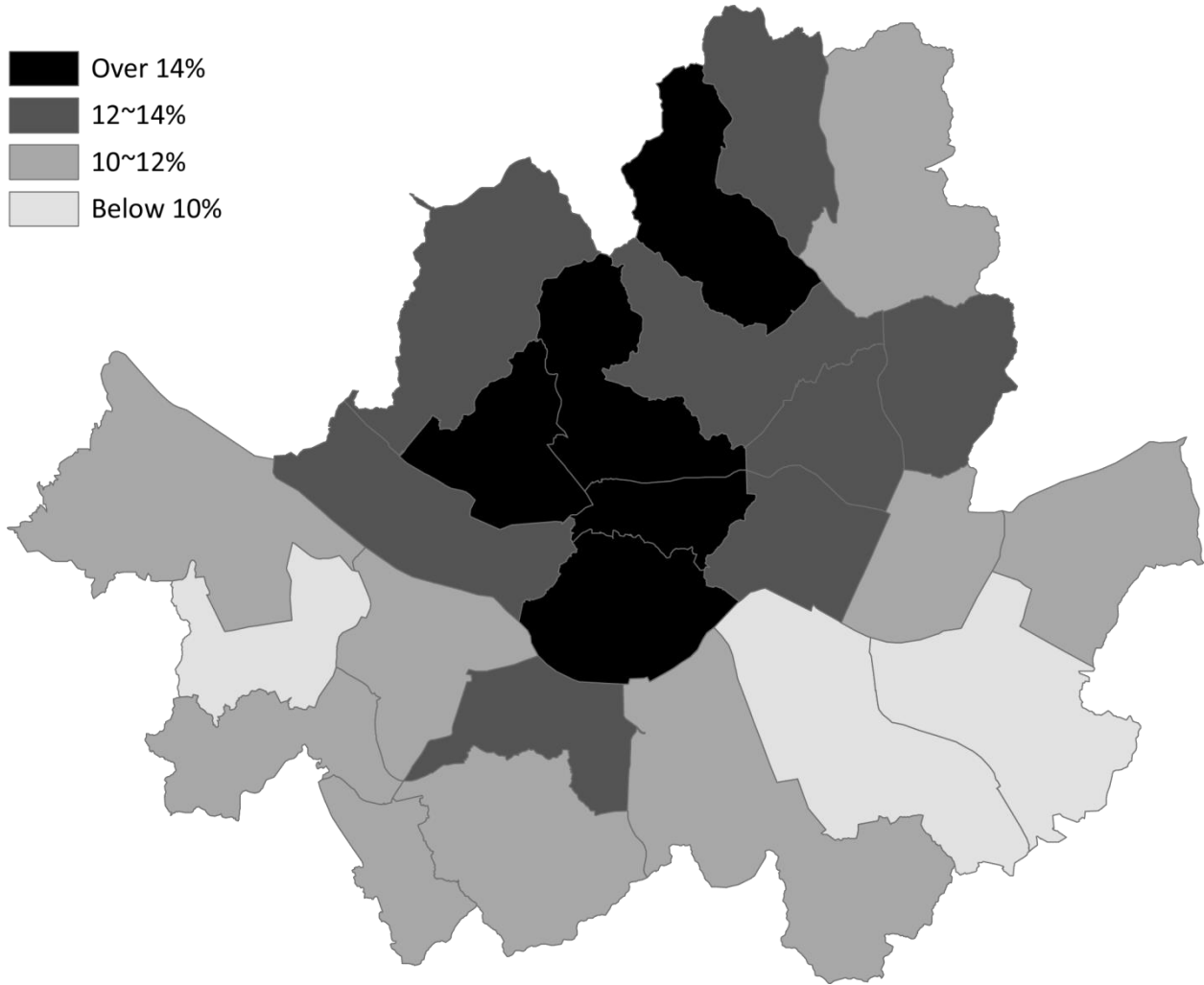


Table 25 #/Capacity of Elderly Welfare Facility by Proportion of the Elderly

Proportion of Elderly	Population 65+	Med: #/capacity	Lei: #/capacity	Amb: #/capacity
over 14%	175,543	104.1	384.1	226.5
12~14%	414,820	82.0	334.8	211.5
10~12%	460,609	79.9	310.6	237.5
below 10%	76,256	44.5	134.0	108.5

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

For each group, number of the elderly population per capacity of each welfare facility seems to have relationship with the proportion of the elderly. The value increases in groups with higher elderly proportion, which means each facility has to cover more seniors in that area. To confirm the assumption that there is a relationship between indicators of population aging and the elderly welfare facility, correlation analysis was used. This study used not only the capacity of each facility, but also the number of elderly population divided by capacity as a variable which could indicate the burden of each facility.

3.3.2 Correlation Analysis

Table 26 Correlation Analysis

	Elderly Ratio	Med #/capacity	Lei #/capacity	Amb #/capacity	Med capacity	Lei capacity	Amb capacity
Elderly Ratio	1						
Med #/capacity	0.22	1					
Lei #/capacity	0.40	0.09	1				
Amb #/capacity	-0.01	0.21	0.00	1			
Med capacity	-0.26	-0.80**	-0.03	-0.29	1		
Lei capacity	-0.56**	-0.28	-0.61**	-0.25	0.56**	1	
Amb capacity	-0.22	-0.30	0.02	-0.76***	0.61**	0.63***	1

Data Source : See Table 12

*p<0.05, **p<0.01, ***p<0.001

Most of the variables were not statistically significant and only the capacity of leisure facilities had a relationship with elderly ratio, but they were all inversely proportional. The results show that the indicators of aging can't explain the allocation of the elderly welfare facilities. Therefore, it can be concluded that the distribution of the elderly welfare facilities considers the number of the elderly population instead of indicators of population aging.

4. Conclusion

This study tried to find relationship between the elderly population and the elderly welfare facility and found statistically significant results for medical, leisure, and ambulatory welfare facilities. The residential welfare facility didn't show significant results. Meanwhile, financial status such as tax revenue, median income, income of the elderly didn't affect allocation of the facility. For the medical welfare facilities, the number of the elderly who receive income support and number of the elderly who have disabilities were the most critical factors that determine the number of facilities. Regarding the leisure welfare facilities, the total population and number of the elderly who has disability were the most critical factors. For the ambulatory care facilities, the number of elderly who are disabled and the elderly population were the most critical factors. However, every type of welfare facility were not evenly distributed in each district which was about 9% of the capacity. Therefore, this study determined those districts that receive welfare service below the average, and suggested more facilities for those places. Thus, in the research, indicators of aging society such as proportion the elderly, aged-child ratio, and dependency ratio didn't show a relationship with the elderly welfare facility. Therefore, the actual number of senior citizens has to be considered to determine fair allocation of the elderly welfare facilities.

In conclusion, the population of the elderly is projected to increase in the future and to achieve aged-friendly society, the number of elderly welfare facilities has to be increased accordingly. To ensure fairness of services, allocation of the facilities must consider the elderly

population. Furthermore, this study found out that allocation of elderly welfare facilities are also affected by the elderly welfare law. Therefore, elderly welfare law must enact just criteria for the establishment of welfare facilities and standards for qualification to use welfare facilities.

References

- AARP, Livable Community- An Evaluation Guide, 2004
- Donald Kent, The how and why of senior centers, Aging and Work: A Journal on Age, Work and Retirement, 1978, 281-282
- Ed Harding – International Longevity Center UK, Sustainable planning for housing in an aging population, 2008, 15
- Gerard F Anderson, Peter Sotir Hussey, Population aging: A comparison among industrialized countries. Health Aff (Millwood) 2000,191–203
- HAPPI, Housing our Ageing Population, 2009, 12
- Hyung Sook Lee, Walkable Neighborhood Facility and Recognized Accessibility, 2011
- Jin Soo Go, Residence Consumption Patterns for Senior Household, 2012
- Korea Industrial Development Institute, Pace of Aging(OECD), 2014
- Korea Ministry of Government Administration and Home Affairs, Population of Seoul City, 2015
- Korea Ministry of Health and Welfare, Health Plan 2010
- Korea Ministry of Interior, <http://www.mogaha.go.kr/frt/sub/a02/publicPriceList/screen.do>
- Kyung Whan Lee, What Affects Local Residents’ Pedestrian Environment in the Case Study of Neighborhood Environment, 2008
- L. Richard, S. Laforest, F. Dufresne and J.P. Sapinski, The Quality of Life of Older Adults Living in an Urban Environment: Professional and Lay Perspectives, Canadian Journal on Aging / La

Revue canadienne du vieillissement Vol.24 Issue.01 DOI: 10.1353/cja.2005.0011, 2005, 19-30

- M. Scott Ball, Livable Communities for Aging Populations: Urban Design for Longevity, 2012, 259

- Manoj Pardasani, Bobbie Sackman, New York City senior centers: A unique, grassroots, collaborative advocacy effort. *Activities, Adaptation & Aging*, 38:3,2014, 200-219

- Nancy R. Hooyman, H. Asuman Kiyak, *Social gerontology: A multidisciplinary perspective* (8th Ed.). New York, NY: Pearson. 2008

- Nicholas Eberstadt, *World population prospects: The shape of things to come*. AEI on the Issues, 2001, <http://www.aei.org/oti/12811.htm>

- Rebecca Tunstall, *The links between housing and poverty*, 2013

- Sae In Ma, *Study on Spatial Distribution of Welfare Facilities for the Aged*, 2011, 12-16

- South Korea Eldelry Welfare Law, Accessed in May 04, 2016,

https://ko.wikisource.org/wiki/%EB%8C%80%ED%95%9C%EB%AF%BC%EA%B5%AD_%EB%85%B8%EC%9D%B8%EB%B3%B5%EC%A7%80%EB%B2%95

- Statistics Korea, *Future Population Estimate*, 2011

- Statistics Korea, *Population Projection 2013-2040*, Accessed in May 04, 2016,

http://kostat.go.kr/portal/korea/kor_nw/3/index.board?bmode=download&bSeq=&aSeq=332520&ord=3

- Statistics Korea, *Population, changing family structures and residential properties*, 2011

- Teresa A. Keenan, *Home and Community Preferences of the 45+ Population*, AARP Public

Policy Institute, 4, 8. "AARP is a nonprofit, nonpartisan organization that helps people 50 and older improve the quality of their lives.", 2010, 2-4

- The Academy of Korean Studies, Encyclopedia of Korean Culture "Population Aging", 2010

- The World Bank, Population ages 65 and above (% of total), Accessed April 12 2016,
http://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS?order=wbapi_data_value_2014%20wbapi_data_value%20wbapi_data_value-last&sort=asc

- U.S. Department of State Why Population Aging Matters. A Global Perspective, 2007

- United Nations Population Division, 2005

- WHO, Global Age-friendly Cities 2007

- Yvonne L. Michael, Mandy K. Green, Stephanie A. Farquhar, Neighborhood design and active aging, 2005, 734-740

Data Source

- Ministry of Government Administration and Home Affairs, Local Tax Stats, 2014

- Seoul City Population Projection. 2015

- Seoul City Survey (Household Survey) 2014

- Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

- Seoul City Welfare Bureau, Department of Independent Living. 2015

- Statistics Korea. 2002/2015

Appendix

Appendix 1 Data for the Elderly Population (Seoul)

District	Tot_Pop	65+	65+ in 2033	LiveAlone	Income Support	Disabled	Tax	MedInc	65+highinc	65+molnc	Res	Med	Lei	Amb
Jongno	165,344	24,537	43,566	7,604	10,732	3,528	626,660,517	2,990,000	9.4	6.3	140	272	69	84
Jung	136,227	19,960	37,159	5,344	9,573	3,299	1,002,940,049	2,812,000	0	2	278	100	53	85
Yongsan	249,914	34,896	62,378	8,391	13,388	4,835	484,995,961	3,078,000	8.8	0.9	85	210	113	86
Seongdong	303,891	36,684	70,229	7,562	17,137	6,393	317,808,142	3,308,000	1.3	4.2	0	418	163	150
Gwangjin	377,375	38,974	79,178	8,799	17,122	6,450	241,671,627	2,979,000	8.4	11.1	775	687	108	106
Dongdaemun	376,319	50,915	86,957	12,050	26,762	8,932	289,123,021	3,207,000	0	1.8	0	490	147	240
Jungnang	423,411	51,995	104,096	11,714	30,963	10,262	213,574,474	2,640,000	0.7	0	0	887	128	331
Seongbuk	475,961	62,066	112,014	14,530	33,213	10,147	266,689,490	2,909,000	5	2.9	259	721	171	265
Gangbuk	338,410	50,841	94,806	12,588	31,601	9,376	146,995,543	2,785,000	1.6	25.5	0	604	112	289
Dobong	355,712	46,471	88,233	10,228	27,040	7,848	154,779,617	2,908,000	0	36.4	26	739	145	161
Nowon	586,056	66,480	131,067	16,632	41,469	14,219	240,989,959	2,978,000	0.6	3.4	124	1057	256	376
Eumbyeong	503,243	67,002	137,462	15,424	38,760	11,460	231,326,103	2,923,000	1.6	13.6	168	1109	168	277
Seodaemun	320,861	45,309	82,293	9,870	23,877	7,060	227,529,581	3,324,000	2.5	1.8	0	501	110	231
Mapo	395,830	47,360	86,495	11,260	22,416	7,601	487,090,964	3,602,000	0	0.4	240	339	165	315
Yangcheon	490,708	48,175	97,935	10,130	26,172	8,980	324,164,046	3,362,000	1.3	8	0	686	194	180
Gangseo	591,653	64,287	122,736	14,073	35,629	13,608	470,181,855	2,926,000	0.9	2.5	699	901	222	278
Guro	457,131	51,187	105,511	10,688	26,154	9,060	335,836,687	3,173,000	3.7	10.3	0	708	205	243
Geumcheon	258,030	29,553	56,756	7,197	16,491	5,358	279,304,759	2,418,000	3.7	12.1	92	575	79	126
Yeongdeungpo	421,436	49,829	94,874	12,620	20,777	8,297	817,961,836	3,375,000	6.7	5.1	0	474	201	174
Dongjak	419,261	52,327	92,081	11,170	23,312	8,166	260,036,779	3,167,000	4.3	1.5	5	356	152	222
Gwanak	531,960	62,577	114,605	14,318	31,478	10,655	254,061,534	2,667,000	2.4	10.5	0	444	128	187
Seochu	454,288	47,469	108,651	7,903	11,574	5,726	1,211,912,617	4,798,000	10.1	0.7	0	364	144	173
Gangnam	583,446	57,444	109,580	11,249	16,257	8,096	2,093,900,218	4,536,000	4.9	1.8	7	491	195	260
Songpa	671,794	65,025	143,944	11,300	24,185	9,850	865,765,292	3,762,000	7.9	9.3	12	537	180	263
Gangdong	481,332	50,253	130,042	10,546	23,688	8,871	349,486,813	3,373,000	1.9	1.8	184	552	140	276

Data Source : see table 12

Appendix 2 Elderly Residential Welfare Facility

District	Total		Nursing Home		Senior Group Home		Senior Welfare Home	
	Number	Capacity	Number	Capacity	Number	Capacity	Number	Capacity
Jongno	2	140	1	57	0	0	1	83
Jung	2	278	1	180	0	0	1	98
Yongsan	1	85	0	0	0	0	1	85
Seongdong	0	0	0	0	0	0	0	0
Gwangjin	2	775	2	775	0	0	0	0
Dongdaemun	0	0	0	0	0	0	0	0
Jungnang	0	0	0	0	0	0	0	0
Seongbuk	2	259	1	20	0	0	1	239
Gangbuk	0	0	0	0	0	0	0	0
Dobong	1	26	1	26	0	0	0	0
Nowon	2	124	2	124	0	0	0	0
Eunpyeong	3	168	1	25	1	6	1	137
Seodaemun	0	0	0	0	0	0	0	0
Mapo	1	240	0	0	0	0	1	240
Yangcheon	0	0	0	0	0	0	0	0
Gangseo	4	699	1	25	0	0	3	674
Guro	0	0	0	0	0	0	0	0
Geumcheon	2	92	2	92	0	0	0	0
Yeongdeungpo	0	0	0	0	0	0	0	0
Dongjak	1	5	0	0	1	5	0	0
Gwanak	0	0	0	0	0	0	0	0
Seocho	0	0	0	0	0	0	0	0
Gangnam	1	7	0	0	1	7	0	0
Songpa	1	12	1	12	0	0	0	0
Gangdong	3	184	1	124	1	9	1	51

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

Appendix 3 Elderly Medical Welfare Facility

District	Total		Elderly Care		Elderly Care Group Home	
	Number	Capacity	Number	Capacity	Number	Capacity
Jongno	8	272	6	254	2	18
Jung	4	100	3	95	1	5
Yongsan	5	210	3	192	2	18
Seongdong	6	418	3	391	3	27
Gwangjin	21	687	9	579	12	108
Dongdaemun	24	490	5	322	19	168
Jungnang	46	887	5	520	41	367
Seongbuk	21	721	13	650	8	71
Gangbuk	29	604	5	391	24	213
Dobong	50	739	10	386	40	353
Nowon	38	1057	11	820	27	237
Eunpyeong	25	1109	15	1022	10	87
Seodaemun	24	501	9	383	15	118
Mapo	6	339	3	312	3	27
Yangcheon	31	686	11	514	20	172
Gangseo	30	901	14	761	16	140
Guro	14	708	6	639	8	69
Geumcheon	22	575	8	449	27	237
Yeongdeungpo	23	474	4	320	19	154
Dongjak	13	356	4	275	9	81
Gwanak	27	444	6	256	21	188
Seocho	8	364	5	338	3	26
Gangnam	10	491	6	456	4	35
Songpa	19	537	6	425	13	112
Gangdong	28	552	6	359	22	193

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

Appendix 4 Elderly Leisure Welfare Facility

District	Total	Senior Welfare Center	Senior Center	Senior Education Center
	Number	Number	Number	Number
Jongno	69	2	56	11
Jung	53	1	49	3
Yongsan	113	2	85	26
Seongdong	163	2	146	15
Gwangjin	108	1	92	10
Dongdaemun	147	1	128	18
Jungnang	128	4	116	8
Seongbuk	171	5	159	7
Gangbuk	112	1	96	15
Dobong	145	5	135	5
Nowon	256	2	241	13
Eunpyeong	168	6	145	17
Seodaemun	110	5	95	10
Mapo	165	3	146	16
Yangcheon	194	3	161	30
Gangseo	222	5	200	17
Guro	205	2	188	15
Geumcheon	79	3	68	8
Yeongdeungpo	201	2	172	27
Dongjak	152	2	135	15
Gwanak	128	1	108	19
Seocho	144	3	128	13
Gangnam	195	7	165	23
Songpa	180	162	15	
Gangdong	140	3	122	15

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

Appendix 5 Elderly Ambulatory Care Facility

District	Total		Visit Care		Day Care		Temporary Care		Bathing Service		Ambulatory Support	
	Number	Capacity	Number	Capacity	Number	Capacity	Number	Capacity	Number	Capacity	Number	Capacity
Jongno	7	84	2	0	4	78	1	6	0	0	0	0
Jung	5	85	1	0	3	85	0	0	1	0	0	0
Yongsan	6	86	1	0	4	86	0	0	1	0	0	0
Seongdong	13	150	2	0	7	146	1	4	2	0	1	0
Gwangjin	20	106	7	0	6	106	0	0	6	0	0	0
Dongdaemun	21	240	2	0	10	206	6	34	1	0	2	0
Jungnang	36	331	9	0	10	194	10	137	7	0	0	0
Seongbuk	17	265	2	0	14	265	0	0	1	0	0	0
Gangbuk	26	289	8	0	10	217	6	72	2	0	0	0
Dobong	16	161	4	0	9	161	0	0	3	0	0	0
Nowon	34	376	6	0	14	299	9	77	5	0	0	0
Eunpyeong	18	277	3	0	13	277	0	0	2	0	0	0
Seodaemun	15	231	2	0	11	218	2	13	0	0	0	0
Mapo	22	315	3	0	13	311	2	4	1	0	3	0
Yangcheon	8	180	0	0	8	180	0	0	0	0	0	0
Gangseo	16	278	5	0	11	278	0	0	0	0	0	0
Guro	13	243	1	0	10	243	0	0	1	0	0	0
Geumcheon	7	126	1	0	6	126	0	0	0	0	0	0
Yeongdeungpo	28	174	10	0	8	174	0	0	10	0	0	0
Dongjak	22	222	6	0	11	222	0	0	5	0	0	0
Gwanak	15	187	4	0	8	187	0	0	3	0	0	0
Seocho	14	173	2	0	9	166	1	7	2	0	0	0
Gangnam	19	260	3	0	11	252	1	8	4	0	0	0
Songpa	24	263	6	0	11	212	3	51	4	0	0	0
Gangdong	24	276	4	0	12	251	2	25	4	0	2	0

Data Source : Seoul City Welfare Bureau, Department of Elderly Welfare. 2015

Appendix 6 Data for the Elderly Proportion (Seoul)

District	Elderly Ratio	AgedChild Ratio	Dependency Ratio	Medical #/capacity	Leisure #/capacity	Ambulance #/capacity	Medical capacity	Leisure capacity	Ambulance capacity
Jongno	14.8%	160.3	20.2	90.2	355.6	292.1	272	69	84
Jung	14.7%	164	20	199.6	376.6	234.8	100	53	85
Yongsan	14.0%	129.5	19.3	166.2	308.8	405.8	210	113	86
Seongdong	12.1%	110.1	16.4	87.8	225.1	244.6	418	163	150
Gwangjin	10.3%	99.5	13.7	56.7	360.9	367.7	687	108	106
Dongdaemun	13.5%	132.7	18.6	103.9	346.4	212.1	490	147	240
Jungnang	12.3%	119.8	16.9	58.6	406.2	157.1	887	128	331
Seongbuk	13.0%	110.1	18.1	86.1	363.0	234.2	721	171	265
Gangbuk	15.0%	149.1	21.3	84.2	453.9	175.9	604	112	289
Dobong	13.1%	119.5	18.4	62.9	320.5	288.6	739	145	161
Nowon	11.3%	90.9	15.9	62.9	259.7	176.8	1057	256	376
Eunpyeong	13.3%	114.8	18.7	60.4	398.8	241.9	1109	168	277
Seodaemun	14.1%	132.3	19.4	90.4	411.9	196.1	501	110	231
Mapo	12.0%	102.3	16.1	139.7	287.0	150.3	339	165	315
Yangcheon	9.8%	76	13.5	70.2	248.3	267.6	686	194	180
Gangseo	10.9%	90.7	15	71.4	289.6	231.2	901	222	278
Guro	11.2%	96.1	15.6	72.3	249.7	210.6	708	205	243
Geumcheon	11.5%	120.6	15.6	51.4	374.1	234.5	575	79	126
Yeongdeungpo	11.8%	114.7	16	105.1	247.9	286.4	474	201	174
Dongjak	12.5%	115	17.2	147.0	344.3	235.7	356	152	222
Gwanak	11.8%	129.4	15.7	140.9	488.9	334.6	444	128	187
Seocho	10.4%	75.2	14.6	130.4	329.6	274.4	364	144	173
Gangnam	9.8%	82.8	13.4	117.0	294.6	220.9	491	195	260
Songpa	9.7%	77.7	13.4	121.1	361.3	247.2	537	180	263
Gangdong	10.4%	91.6	14.6	91.0	359.0	182.1	552	140	276

Data Source : see table 12