

Regional Difference in Preventable Hospitalizations in South Korea*

JUNGWON PARK
Korea Institute of Public Administration
235 Jinheung-ro
Eunpyung-gu, Seoul
REPUBLIC OF KOREA
jwpark@kipa.re.kr

SANGSOO KIM¹
National Assembly Secretariat
1 Euisadang-daero
Youngdeungpo-gu, Seoul
REPUBLIC OF KOREA
kss7210@naver.com

KEON-HYUNG LEE
Askew School of Public Administration and Policy
Florida State University
Tallahassee, FL
U.S.A.
klee2@fsu.edu

Abstract - Governments are responsible for guaranteeing the right to health and for providing equitable use of health care services to the people under their jurisdiction. The numbers of preventable hospitalizations are used to indicate the adequacy of primary care. This study used inpatient discharge data and hospital data from 2012 to examine regional variation in preventable hospitalizations among the populations who were under 226 local governments in South Korea. Regional variables related to this variation were also explored. The social determinants of a health framework—local healthcare resources, socioeconomic factors, and political factors—were used to estimate the number of hospital admissions for ambulatory care sensitive conditions. The results of a multiple regression analysis show that the availability of healthcare resources and economic wealth have a strong association with the number of preventable hospitalizations; however, no statistically significant difference was found with regard to the left- and right-wing political party affiliations of the governmental heads. The implications of the findings are also discussed.

Key-Words: - preventable hospitalizations, equity in health care, publicness, South Korea

* This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education (NRF-2015S1A5A2A03050000)

¹ Correspondence: SANGSOO KIM

1 Introduction

In a modern society, one of various governmental responsibilities is to guarantee the right to health and to provide equitable use of health care services to the people. According to the World Health Organization’s Constitution that was adopted in 1946, “the objective of the World Health Organization ... shall be the attainment by all peoples of the highest possible level of health.” In South Korea, in the Framework Act of Health and Medical Services that was enacted in 2000, it is clearly mentioned that central and local governments should be equipped with legal and institutional devices, including financial resources, in order to protect and promote the health of their residents. As such, the expansion of publicness in health care is recognized as an important policy objective of the government.

Although the importance of equity in health care has been emphasized, there have been many variations when defining equity in health care such as equality of utilization, distribution according to need, equality of access, and equality of health [1]. In this study, we focus on equality of access. Such access to care can then be divided into potential access, realized access, equitable access and inequitable access [2]. Previous research on access to care dealt not only with individual differences such as age, income, diagnosis type and health status, but also regional differences such as personnel, facility, and health insurance [3-12]. Although there were several previous research efforts on access to care, the topics of access to preventive care/primary care and regional differences in quality of care have not been examined. Especially, the relationship between access to care as an independent variable and the number of preventable hospitalizations as a dependable variable has not been examined. Therefore, to fill the research gap, this research investigates how potential access, financial resources and political factors affect preventable hospitalization at the local government level using an empirical dataset.

2 Problem Formulation

In this section, we review previous research on access to care and preventable hospitalization to formulate the research problems.

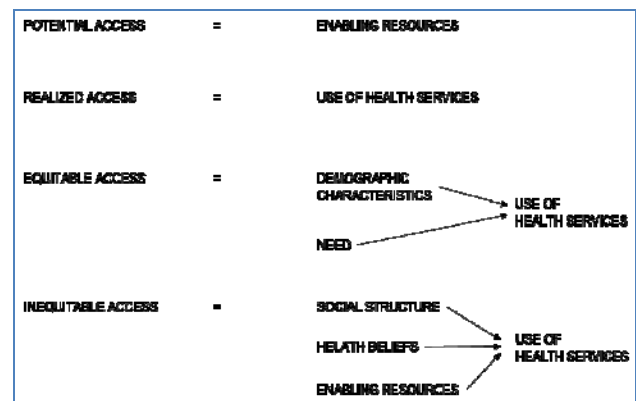
2.1 Defining and Measuring Access to Care

The Institute of Medicine [13] defines access to health care as “the timely use of personal

health services to achieve the best health outcome.” High access to care primarily means higher financial accessibility and enabling resources, and further describes a health care system that guarantees necessary medical services whenever and wherever [14]. Thus, access to care is a multifaceted concept that includes financial accessibility, enabling resources, and medical needs.

In order to measure such a multifaceted concept as access to medical care, in Figure 1, Anderson [2] revised the framework that he proposed in which access can be measured as potential, realized and equitable access. First, potential access is measured as the presence of available resources. That is, the more resources available, the greater the likelihood of health services usage. Second, realized access means the actual use of the medical services. Third, equitable access, similar to realized access, measures access to medical care, but differs from realized access in that it includes explanatory variables that affect the use of medical care services.

Figure 1: Measure of access

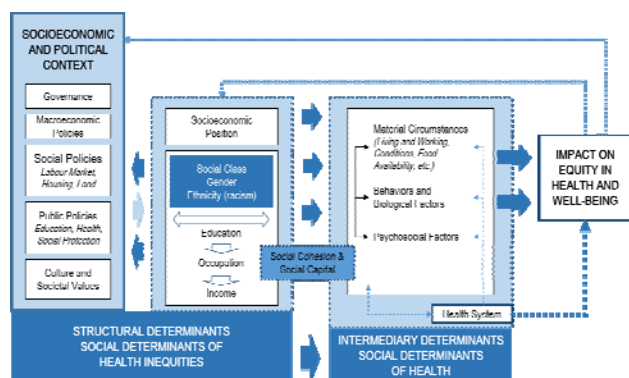


Access to care is one of the most important characteristics of a nation’s health care system’s quality and is measured by various indicators such as health insurance coverage, usual source of care, unmet needs, mental health and substance abuse, as well as structural barriers in the system including traffic time, referral to other providers, and wait time [15]. Most of the Korean studies on equitable access are based on the equitable distribution of health care resources [9,16], equitable medical use [10], and unmet needs [17]. Furthermore, these studies include factors such as health insurance type [17,18], health status [19,20], income level [11], and local economic conditions [9] that may affect the equitable access to medical care.

2.2 Regional Factors and Equity in Access to Medical Care

As for the social determinants of health, these are not simply determined by individual factors, but rather by the combination of the "socio-political environment, social structure, and the socio-economic status of the individual through mediating mechanisms that affect health" [21]. More specifically, social, economic, and political mechanisms create social class, and an individual's health status is also affected by social class [21]. Each social class differs in the degree of exposure and the vulnerability to conditions that negatively affect health status. For example, it is often reported that health status depends on level of income, which is an important element indicating social class. Because health risks are different from one income level to another, access to medical care is also affected by income level. Therefore, a redistribution policy that resolves income inequality can be a fundamental solution to minimize the differences in health status. Furthermore, it can be said that an individual's health status is not only due to unique personal characteristics but also influenced by local environmental characteristics such as socio-economic level, political situation and social resources. Thus, equity in access to health can also be understood as a product of the socio-economic and political environment of each country and region.

Figure 2: Commission on Social Determinants of Health (CSDH) Conceptual Framework



The framework for the social determinants of health shows the importance of including regional variables (e.g., socioeconomic factors, political factors, local health care systems) when analyzing equity in access to care. Although several previous studies in Korea have investigated the regional differences in education, income, economic power, and physical environment that affect health [22-24], there have been few research studies that

examine the effects of differences in regional characteristics on equity in access to care. In Korea, there is a considerable difference in demographic structure, economic activity, physical environment, and range and composition of local government budgets depending on the administrative district [25]. Thus, it can be expected that there will be differences in health status and access to medical care between regions based on administrative boundaries. Therefore, it is appropriate to include variables related to local autonomous entities that have a wide impact on the social, cultural, economic and political situation in each region when studying regional differences in access to medical care. However, empirical studies on the effect of the activities of local autonomous entities on access to care are still lacking in spite of the fact that they are important actors in health policy decision making in local governments.

2.3 Political Factors and Equity in Access to Medical Care

While economists in the 1950s and 1960s emphasized social and economic factors as a determinant of public policy, the relative importance of political factors was emphasized in the 1960s and 1970s, mainly among political scientists and public administration researchers. Key [26,27] and Lockard [28] employ a political theoretical model as a determinant of public policy. In their research, they emphasize the importance of inter-party competition, which affects social welfare policy decisions. Key [26] argues that high levels of party competition and voter turnout within the political system are more beneficial to low-income and large population areas, whereas low competition and voter turnout are more beneficial to high-income population areas with a small number of interest groups. This occurs when there is more competition in the political system, and therefore greater need to sensitively respond to the needs of the local constituents [29]. Scholars who employ a political theory framework have argued that competition among political parties, partisan control over important policy-making entities, and the political ideology of voters will act as important incentives for policy making.

The theory that explains policy decision making through political variables can be used to analyze the difference in equity of medical access at the local level. This is because equity in medical access as a health policy can be understood not only through the economic factors of a region but also as a product of competition within a local political system. In addition, the head of a local autonomous

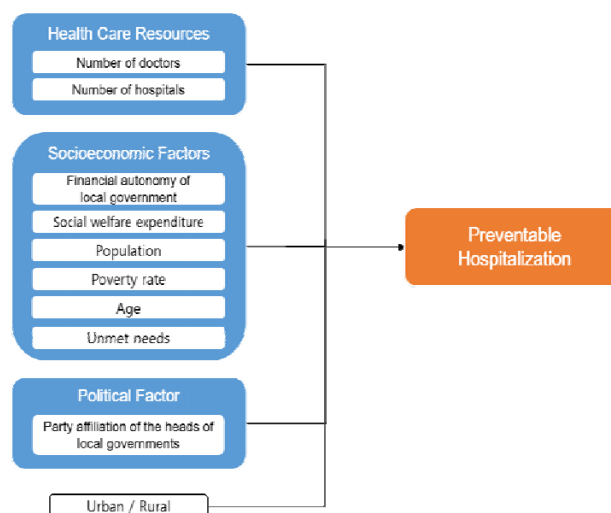
entity in Korea is not only the general manager of the local administration, but also the main political actor of the party that they belong to. Thus, the political ideology of the party leaders and the party itself are the main factors influencing policies that affect equity in medical access. Studying the effects of political variables on health status and access to medical care in local governments can show whether the results of previous studies on the relationship between political variables and health status can be applied to the local level. Previous cross-country comparative studies employ the political ideology of the ruling party as one of the explanatory factors that shows the difference in health status among various countries [30,31]. Political parties with egalitarian ideologies tend to implement redistributive policies, which help to ease social inequalities through welfare and labor policies and, as a result, improve health status [31].

After the implementation of local assemblies (1991) and the election of heads of local governments (1995), researchers began to examine the effects of political variables as a determinant of local government policies and social welfare expenditures. Since local elections are held in conjunction with local autonomy, the financial autonomy of a local government is expanded. Thus, health and welfare policies are not merely socioeconomic factors (economic rationality) but rather political factors (political rationality) that serve as policy determinants. In this study, we try to analyze whether there is a difference between the heads of conservative and progressive political parties in the degree of equity of access to medical care.

2.4 Analytical Framework for Preventable Hospitalization

Based on theoretical factors and previous empirical studies, it is possible to find that health care resources, socioeconomic factors, and political factors are the major factors affecting preventable hospitalization at the regional level. Based on these factors, Figure 3 shows an analytical framework for preventable hospitalization. Health care resources consist of the number of doctors and hospitals in charge of primary care in a region. Socioeconomic factors consist of financial autonomy of local governments, social welfare expenditure level, population size, poverty rate, average age, and unmet needs.

Figure 3: Analytical framework for preventable hospitalization



With respect to political factors, the party affiliation of the heads of local governments is included. In order to examine the difference in preventable hospitalization in different types of local government, a variable of urban/rural is included. This is because rural and urban areas are expected to differ in terms of available medical resources, population size, average age, and budget size.

3 Method & Data

3.1 Data Collection

This study is a cross-sectional study using secondary data. The unit of analysis is the smallest region in South Korea which has its own local government. As of 2011, South Korea is composed of 17 first-level administrative divisions, and these are further subdivided into 226 second-level administrative divisions around the country. Only first- and second-level administrative divisions can set-up self-government and have some degree of autonomy with regard to revenue, manpower, organization, and legislation. Therefore, the sample for this study is 226 lower-level autonomous regions which include 3 types of municipal-level divisions; *Si* (City), *Gun* (County), and *Gu* (District).

The sample unit of this study is communities (or regions), thus community-level data were obtained. However, the outcome variable—the number of preventable hospitalizations—was collected at the patient level, and we aggregated patient-level data into community-level data. This study used multiple data sources, which were combined together for analysis: 1) 2012 Hospital Discharge Data (HDD) (Korea Institute for Health and Social Affairs, 2012); 2) 2011 National Health Care Source Survey (Ministry

of Health and Welfare, 2011); 3) 2011 Community Health Survey (Ministry of Health and Welfare, 2011); 4) 2011 Statistical Yearbook on the Usage of Medical Service by Region (NHI Service, 2011); 5) Financial Yearbook of Local Government (Ministry of the Interior and Safety, 2011); 6) 2011 Livelihood Protection Recipients Statistics (Ministry of Health and Welfare, 2011); 7) Results of the 5th local elections (National Election Commission, 2010); and 8) Population Census (Korea Statistical Information Service, 2010).

The main database used in this study is the HDD from the Korea Institute for Health and Social Affairs. The HDD contains demographic and clinical information on inpatients at selected hospitals in South Korea. The selected hospitals report their discharge data for a one-month period every quarter. This study focuses on an adult group (20 years and older); therefore, subjects do not include pediatric patients (0-19 years). Previous studies show that different age groups have different health problems and needs. Since the HDD is on individual-level data, the data was aggregated into community-level data according to the patient address directory. We used the National Health Care Source Survey, the Community Health Survey, the National Health Care Source Survey, the Community Health Survey, and the Statistical Yearbook on the Usage of Medical Service by Region to obtain information on healthcare resources and usage at the community-level. To identify the party affiliation of elected chief executives in a local government, we used the results of local elections from the National Election Commission. The Financial Yearbook of Local Government provides information on both financial independence and welfare spending of local governments. The Livelihood Protection Recipient Statistics from the Ministry of Health and Welfare give information on the total number of recipients of national basic livelihood funds by administrative division. Lastly, both average age and number of adult population were collected from the Korea Statistical Information Service.

3.2 Outcome Measure

The outcome of interest is the hospitalizations for ambulatory care sensitive conditions. Ambulatory care sensitive conditions are “diagnoses for which timely and effective outpatient care can help to reduce the risk of hospitalization by either preventing the onset of an illness or condition, controlling an acute episodic illness or condition, or managing a chronic diseases or condition” [32]. ACSCs are often used as measure for quality of

access of primary care. This study also used hospitalizations for ACSCs to compare the level of access to care across communities in South Korea. In this study, we defined 12 conditions as ACSCs from the Agency for Healthcare Research and Quality (AHRQ). The AHRQ provides 14 ACSCs and we chose 12 among them which are related to adult populations: diabetes short-term complications, diabetes long-term complications, chronic obstructive pulmonary disease, asthma, hypertension, heart failure, dehydration, bacterial pneumonia, urinary tract infections, angina without procedure, uncontrolled diabetes, and lower-extremity amputation.

3.3 Explanatory variables

In this section, we explain the variables used in the data analysis.

Doctors: number of primary care physicians (internal medicine, otorhinolaryngology, OB/GYN, family medicine); 2011 National Health Care Source Survey (Ministry of Health and Welfare, 2011)

Hospitals1: number of primary-level (1st level) hospitals; 2011 Statistical Yearbook on the Usage of Medical Service by Region (NHI Service, 2011)

Hospitals2: number of secondary (general)- and tertiary-level hospitals (superior general hospitals); 2011 Statistical Yearbook on the Usage of Medical Service by Region (NHI Service, 2011)

IRF: Financial independence of local governments; Financial Yearbook of Local Government (Ministry of the Interior and Safety, 2011); Financial independence is the proportion of own revenues out of the total budget of the local government.

WELFARE: Percentage of social welfare budget, in general account budget; Financial Yearbook of Local Government (Ministry of the Interior and Safety, 2011);

POPULATION: total population (age 20 and above); Population Census (Korea Statistical Information Service, 2010).

POVERTY: number of recipients of national basic living security (NBLs) per 100,000 population; 2011 Livelihood Protection Recipients Statistics (Ministry of Health and Welfare, 2011)

AGE: average age of residents; Population Census (Korea Statistical Information Service, 2010).

DELAYED CARE: Percentage of population who have delayed medical treatment in the past 12 months; 2011 Community Health Survey (Ministry of Health and Welfare, 2011)

LEFT-WING PARTY: chief executives with left-wing party affiliation (Left-wing parties [Democratic Party or Democratic Labor Party] = 1, others [Grand National Party, Liberty Forward Party, Independence, etc.] = 0); Results of the 5th local elections (National Election Commission, 2010)

RURAL: rural/urban classification, rural community = 1; *Gun* (County) = 1, others = 0

Table 1 shows the definitions of the variables used in the regression analysis.

Table 1: Definitions of variables

Variable	Definition
ACSC	Number of hospitalizations for ACSCs in given year (age 20 and above)
DOCTORS	Number of primary care physicians
HOSPITALS1	Number of primary-level hospitals
HOSPITALS2	Number of secondary- and tertiary-level hospitals
IRF	Financial independence of local governments
WELFARE	% of social welfare budget, in general account budget
POPULATION	Total population (age 20 and above)
POVERTY	Number of recipients of NBS per 100,000 population
AGE	Average age of residents
DELAYED CARE	% of population who have delayed medical treatment
LEFT-WING PARTY	Chief executives with left-wing party affiliation (Left-wing party = 1)
RURAL	Rural community (Rural = 1)

4.1 Characteristics of study samples

Table 2 shows the descriptive statistics of the variables used in the analysis. The mean number of preventable hospitalizations in a region is 243 with a relatively large range (minimum 9 and maximum 1,329). The mean number of primary care physicians is 84.9 with a standard deviation of 98.4. There are some regions with no PCPs. On average, there are 6 primary-level hospitals and 1.4 secondary- and tertiary-level hospitals in each region. The mean financial independence of local government is 28 percent and the mean percentage of social welfare budget is 27 percent of the general account budget. The mean population over 20 years old is 161,441 and the average age in a region is 41.5 years old. 13.6% of total population delayed their care due to various reasons. 40% of chief executives were affiliated with left-wing parties. 40% were from rural areas.

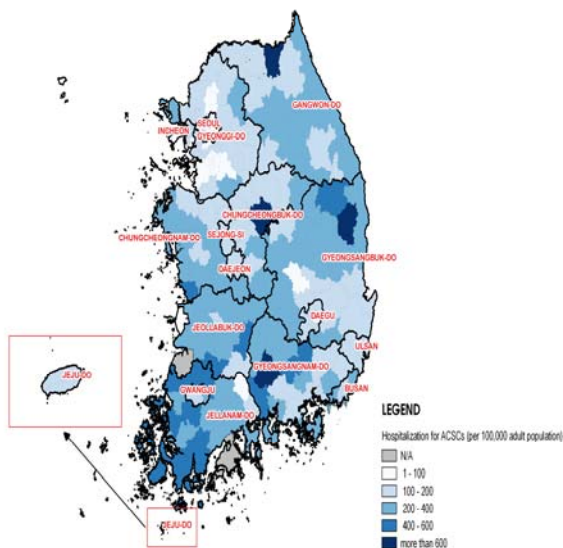
Table 2: Mean and standard deviation of variables

Variable	Mean	Std. Dev.
ACSC	242.8	179.0
DOCTORS	84.9	98.4
HOSPITALS1	6.1	6.8
HOSPITALS2	1.4	1.7
IRF	28.0	16.0
WELFARE	26.6	13.2
POPULATION	161,441.3	154,236.4
POVERTY	6,039.3	4,809.6
AGE	41.5	5.4
DELAYED CARE	13.6	4.1
LEFT-WING PARTY	0.4	-
RURAL	0.4	-

Figure 4 shows the regional differences in preventable hospitalization rates per 100,000 population in 2012 using geographic information system software. In general, preventable hospitalization rates are lower in large metropolitan areas than in rural areas. In Seoul, for example, there are less than 100 preventable hospitalizations, but a large number of rural areas have more than 600 preventable hospitalizations per 100,000 population.

4 Results

Figure 4: National map of preventable hospitalization rate for adults, 2012



4.2 Factors associated with preventable hospitalizations

Table 3 shows the regression analysis result of those factors affecting preventable hospitalizations. Three variables such as DOCTORS (the number of PCPs), IRF (financial independence), and WELFARE (percentage of social welfare budget in general account budget) are negatively associated with the number of PHs. With an increase of 10 PCPs, for example, the number of PHs per 100,000 would decrease by 5.62 ($p < .001$). Furthermore, the higher the IRF (i.e., more financially independent) and WELFARE, the number of PHs would decrease in the region. Rural regions had 33 PHs lower than the urban ones.

As the number of primary-, secondary- and tertiary-level increased, on the other hand the number of PHs also increased. As the number of recipients of NBLS per 100,000 population increased, the number of PHs increased as well.

Table 3: Estimation model for preventable hospitalization

Variable	Coefficient (Robust S.E.)	p-value
DOCTORS	-0.562 (0.130)	0.000
HOSPITALS1	5.369 (2.039)	0.009
HOSPITALS2	30.219 (6.851)	0.000

IRF	-1.046 (0.573)	0.069
WELFARE	-2.052 (0.692)	0.003
POPULATION	0.001 (0.000)	0.000
POVERTY	0.011 (0.003)	0.001
AGE	0.034 (1.615)	0.983
DELAYED CARE	0.283 (1.071)	0.792
LEFT-WING PARTY	-4.763 (11.035)	0.666
RURAL	-33.536 (15.193)	0.028
Intercept	127.046 (89.199)	0.156
<hr/>		
N	226	
R ²	0.847	
<hr/>		

5 Discussion and Implications

This study estimated the effects of various factors affecting the equity of access to health based on the social determinants of health. More specifically, access to care was measured as preventable hospitalizations and analyzed for differences in PHs based on health care resources, socioeconomic factors, and political factors in the regions.

First, our regression results show that the effects of health care resources on PHs are mixed. For example, as the number of primary care physicians increased, the number PHs decreased. As the number of hospitals increased, however, the number of PHs increased. This means that an increased primary care physician supply will improve access to care, so it helps to lower PHs. For primary care services, however, in South Korea, hospitals have not played a major role in lowering PHs. Instead, most of Korean hospitals are private and nonprofit; they are eager to increase their financial position as well as serving the community. The hospital reimbursement system in South Korea is based on fee-for-service, so a greater number of patients means higher revenues in their hospitals.

Second, socioeconomic factors also affect access to care. The better the financial condition of regional governments and the higher the proportion of the welfare budget, the higher the equity of access to care. As a result of this study using one-year data, it is difficult to directly examine the effect of financial variables on preventable hospitalizations. However, it can be inferred that a higher number of doctors and individuals with higher income can be found in a region with better financial conditions. Thus, such regions had lower PHs.

Third, political variables in the region were found to have no statistically significant relationship to preventable hospitalizations. It shows that there is no difference in access to care in a region according to the political ideology of the local government leaders. This is because health policy decision making is conducted by central government or metropolitan government rather than by local government. It can be assumed that the impact of political variables on the utilization of health care resources that affect preventable hospitalizations is quite limited.

The results of this study, which analyzed the influential factors of preventable hospitalizations with respect to equity of access to primary care services, provide the following suggestions. A reasonable number of primary care physicians should be provided and maintained in order to reduce preventable hospitalizations in a region. In short, it is necessary to have adequate supply and demand systems for internal medicine, obstetrics and gynecology, family medicine, and otorhinolaryngology in each region. Both central and local governments make an effort to attract primary care physicians to their regions to reduce regional disparities in access to care.

In South Korea, the proper use of public health physicians (PHPs) who treat patients at a public health center instead of enlisting in the military can be an excellent venue to increase access to care especially in urban areas since the PHP program has currently focused on rural and remote areas only. Based on our findings, however, urban residents are more vulnerable to limited access to care for preventable hospitalization. Thus, it is necessary to pay more attention to urban residents who have suffered from limited access to care.

References:

[1] Culyer A J, Wagstaff A. Equity and equality in health and health care. *Journal of Health Economics*, 1993, 12 (4), 431-457.

[2] Andersen R M. Revisiting the behavioral model and access to medical care: does it matter? *Journal of health and social behavior*, 1995, 1-10.

[3] Myoung J Y, Moon O R. Equity in the Delivery of Health Care in the Republic of Korea. *Korean J Health Policy Adm*, 1995, 5 (2), 155-172.

[4] Lim J H. Analysis of unmet medical need status based on the Korean Health Panel. *Health and Social Science*, 2013, 34, 237-256.

[5] Kim D J, Youn H M, Lee J A, Chae H R. Measurement of Inequalities in Health Care Utilization in Korea Using Korea Health Panel. *Health and Social Welfare Review*, 2014, 34 (3), 33-58.

[6] Lee Y J. The Relation between the kind of Medical institution and Utilization in National Health Insurance. *Journal of Korean Social Welfare Administration*, 2007, 9 (2), 1-28.

[7] Lee Y J. Regional Analysis of the Equity in Utilization of the National Health Insurance. *Korean Social Policy Review*, 2008, 15 (1), 5-38.

[8] Oh Y. A GIS-based Study of the Distribution of Major Health Manpower in Korea. *Health and Welfare Policy Forum*, 2008, 59-72.

[9] Jeon B Y, Choi S M, Kim C-y. Socioeconomic Equity in Regional Distribution of Health Care Resources in Korea. *Korean J Health Policy Adm*, 2012, 22 (1), 85-108.

[10] Shin H. Equity in Health: Regional Difference of Health Service Utilization. *Health and Welfare Policy Forum*, 2011, 6, 22-31.

[11] Kim J. Regional Differences in the Equity of Health Care Utilization in Korea. *Korean Social Security Studies*, 2012, 28 (2), 153-180.

[12] Kim J W, Ahn Y-J. Empirical Study on the Disparity between Capital Region and Non-Capital Region in terms of Quality in Cancer Treatment. *The Geographical Journal of Korea*, 2014, 48 (1), 149-159.

[13] Institute of Medicine. *Access to health care in America*. Washington, DC: National Academic Press, 1993.

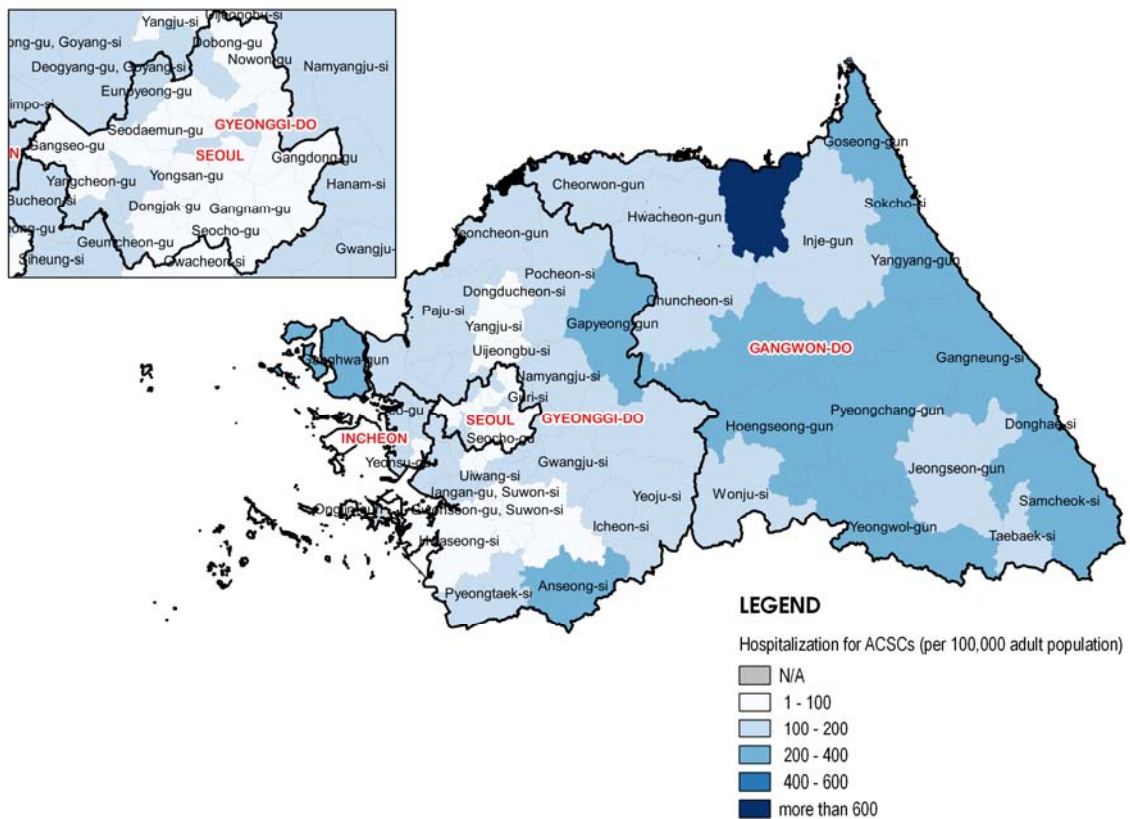
- [14] Aday L A, Andersen R. A framework for the study of access to medical care. *Health services research*, 1974, 9 (3), 208.
- [15] Agency for Healthcare Research and Quality. *Access to Care Measures: National Healthcare Disparities Report*. Rockville, MD: Agency for Healthcare Research and Quality, 2005.
- [16] Park K D. A Study of Regional Imbalance in Medical Utilization. *Korean Policy Studies Review*, 2012, 21 (3), 388-415.
- [17] Kim S J, Huh S I. Financial Burden of Health Care Expenditures and Unmet Needs by Socioeconomic Status. *Korean Health Economic Review*, 2011, 17 (1), 47-70.
- [18] Kim K S, Lee H O L. Household Catastrophic Health Expenditure and Unmet Needs depending on the Types of Health Care System. *Social Welfare Policy*, 2012, 39 (4), 255-279.
- [19] Shin H. The evolution of health and utilization inequalities over time. *Health and Welfare Policy Forum*, 2009, 26-35.
- [20] Lee Y J. A Equity in Health Care Utilization by Health Status. *Korean Social Policy Review*, 2010, 17 (1), 267-290.
- [21] Solar O, Irwin A. *A conceptual framework for action on the social determinants of health*. World Health Organization, 2010.
- [22] Kim K-k. Educational Gap in Korea and Determinant Factors. *Korean Journal of Sociology of Education*, 2005, 15 (3), 1-27.
- [23] Kim J-H. The Analysis of Local Economic Capacity through the Estimation of GRDP. *The Korea Local Administration Review*, 2010, 24 (1), 207-235.
- [24] Lee D-P, Park S-H, Kim T-Y, Seong J-I, Shin E-J, Kim J-H, Kim C-H. *The Analysis of the Reasons for Income and Development Gap between Urban and Rural Regions*. Seoul, Korea: Korea Rural Economic Institute, 2004.
- [25] Jung S-W, Cho Y-T. Neighborhood Characteristics and Individual Health under Korean Context. *Journal of Preventive Medicine and Public Health*, 2005, 38 (3), 259-266.
- [26] Key V O. *Southern Politics in State and Nation*. Knoxville, TN: University of Tennessee Press, 1949.
- [27] Key V O. *American State Politics: An introduction*. New York, NY: Alfred A. Knopf, 1956.
- [28] Lockard D. *The Politics of State and Local Government*. New York, NY: Macmillan, 1963.
- [29] Kim B K, Yi K S, Cho D H. The impact of Local political factors on welfare spending. *Korean Public Administration Quarterly*, 2009, 21 (1), 129-147.
- [30] Navarro V, Shi L. The political context of social inequalities and health. *Social science & medicine*, 2001, 52 (3), 481-491.
- [31] Navarro V, Muntaner C, Borrell C, Benach J, Quiroga Á, Rodríguez-Sanz M, Vergés N, Pasarín M I. Politics and health outcomes. *The Lancet*, 2006, 368 (9540), 1033-1037.
- [32] Billings J, Zeitel L, Lukomnik J, Carey T S, Blank A E, Newman L S. Impact of Socioeconomic Status on Hospital Use in New York City. *Health Affairs*, 1993, 12 (1), 162-173.
<http://eutils.ncbi.nlm.nih.gov/entrez/eutils/elink.fcgi?dbfrom=pubmed&id=8509018&retmode=ref&cmd=prlinks>

Appendix Table 1: Model estimations for preventable hospitalization (Backward elimination)

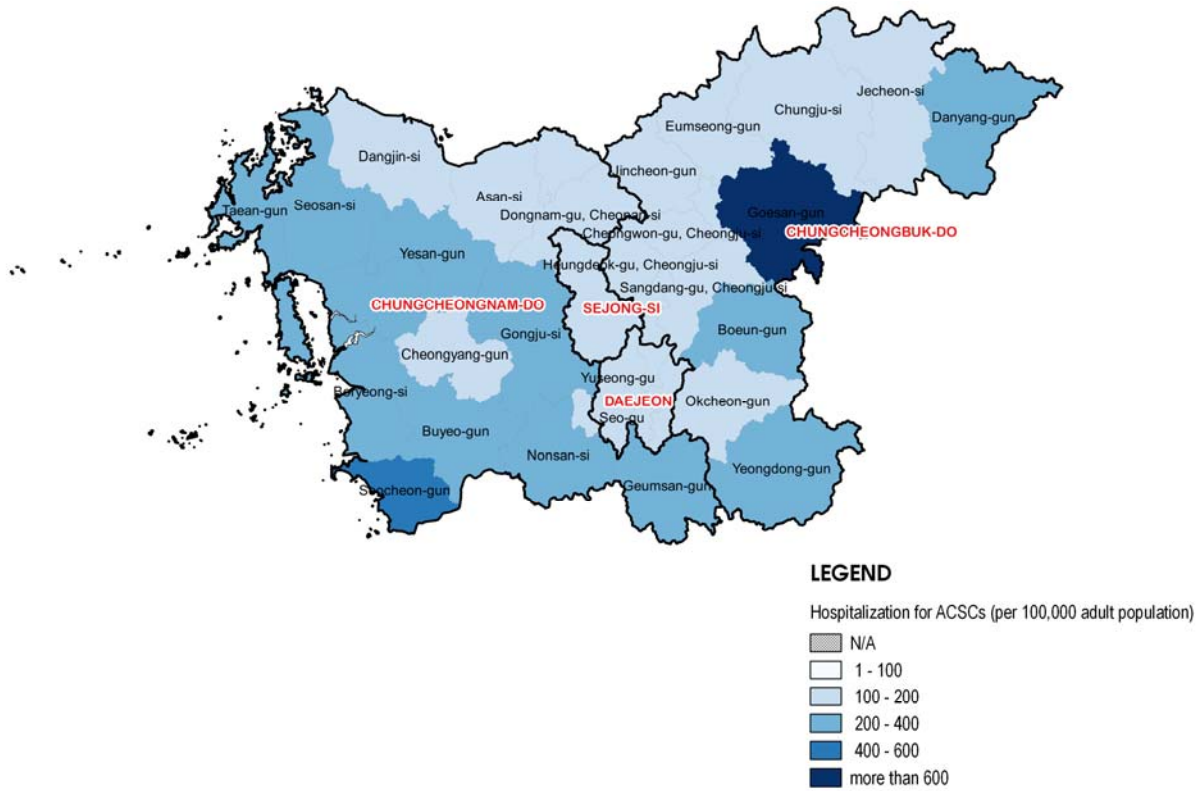
	Model 1		Model 2		Model3		Model 4	
	Coef.	<i>p</i> -value	Coef.	<i>p</i> -value	Coef.	<i>p</i> -value	Coef.	<i>p</i> -value
DOCTORS	-0.562	<.0001	-0.561	<.0001	-0.565	<.0001	-0.562	<.0001
HOSPITALS1	5.369	0.009	5.368	0.009	5.355	0.008	5.449	0.007
HOSPITALS2	30.219	<.0001	30.211	<.0001	30.390	<.0001	30.217	<.0001
IRF	-1.046	0.069	-1.052	0.030	-1.035	0.025	-1.074	0.022
WELFARE	-2.052	0.003	-2.056	0.002	-2.050	0.002	-2.064	0.002
POPULATION	0.001	<.0001	0.001	<.0001	0.001	<.0001	0.001	<.0001
POVERTY	0.011	0.001	0.011	0.001	0.012	0.001	0.011	0.001
AGE	0.034	0.983						
DELAYED CARE	0.283	0.792	0.282	0.792				
LEFT-WING PARTY	-4.763	0.666	-4.754	0.664	-5.125	0.637		
RURAL	-33.536	0.028	-33.435	0.030	-32.520	0.031	-33.402	0.028
Intercept	127.046	0.156	128.714	<.0001	131.619	<.0001	131.879	<.0001
N	226		226		228		228	
R ²	0.847		0.847		0.847		0.847	
F-test	71.18	<.0001	78.12	<.0001	85.84	<.0001	92.76	<.0001

Appendix Figure 1: Regional maps of preventable hospitalization rate for adults, 2012

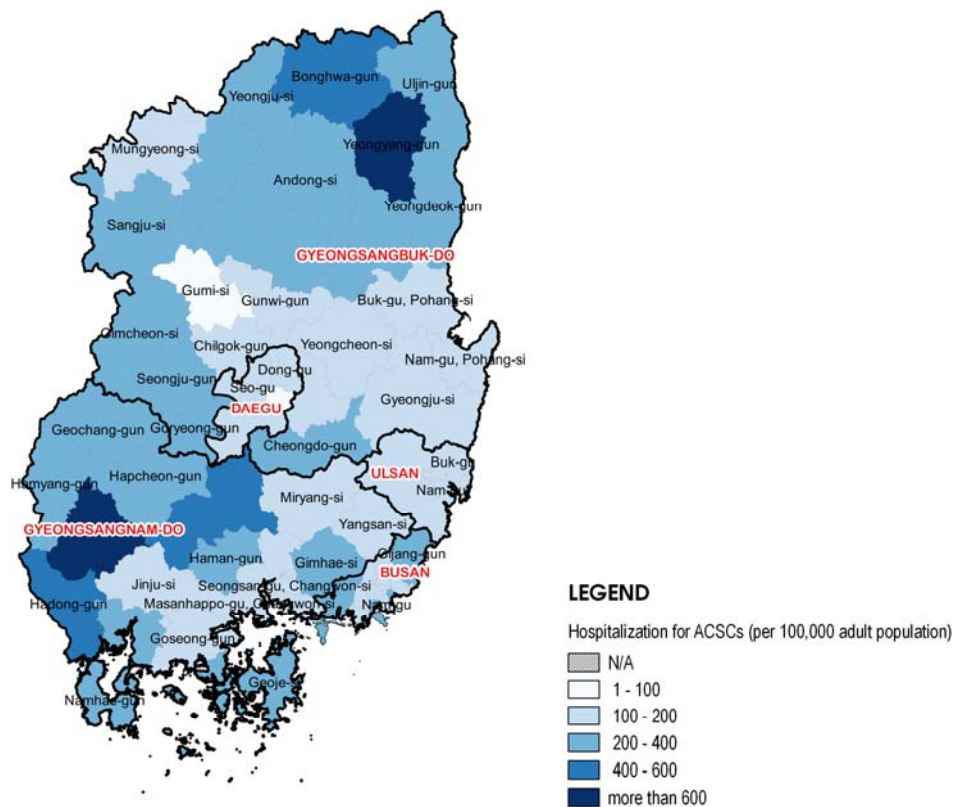
(1) Seoul, Incheon, Gyeonggi-do, and Gangwon-do



(2) Daejeon, Sejong-si, Chungcheongnam-do, and Chungcheongbuk-do



(3) Busan, Daegu, Ulsan, Gyeongsangnam-do, and Gyeongsangbuk-do



(4) Gwangju, Jellanam-do, Jeollabuk-do, and Jeju-do

