

Research in Brief

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Costs of Patient Outflow and Public Perceptions of Regional National University Hospitals¹⁾

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With Korea's local healthcare in a state verging on crisis, concerns are growing about the insufficient capacity of national university-affiliated hospitals and the social costs arising from patients increasingly seeking care at Seoul-based tertiary care hospitals. The net cost of transportation and lodging alone, incurred by local patients using services at these Seoul-based institutions instead of their nearby national university-affiliated hospitals, is estimated at KRW421.1 million. With opportunity costs and differences in healthcare expenses taken account of, the total net cost may amount to as much as KRW4.627 trillion. The Survey of Local Residents' Perception of National University-Affiliated Hospitals found that as many as 81.2 percent of those surveyed were concerned (including 'very concerned') about healthcare disparities between the Capital Region and the other regions. For severe illnesses, respondents were more in favor of using tertiary-care general hospitals in the Capital Region than their local national university-affiliated hospitals; 80.9 percent supported government assistance for these general hospitals in non-Capital regions.

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The significance and limitations of local national university-affiliated hospitals

There are, in all, 17 national university-affiliated hospitals (NUAHs) in operation across all major regions in the country, established pursuant to the Act on the Establishment of National University-Affiliated Hospital (see Table 1). These NUAHs function, as defined in Article 7 of the Public Health and Medical Services Act, as “public health and medical institutions.” Out of these 17 hospitals, 11 are designated as regional base hospitals, each serving as a tertiary-care institution—the final point in the referral chain—where patients come to receive treatment of advanced and severe illness, severe emergency conditions, or rare and intractable diseases.

[Table 1] National university hospitals and their locations

Location	Name of hospital	Location	Name of hospital
Seoul	Seoul National University Hospital*	Gangwon	Kangwon National University Hospitals
Busan	Pusan National University Hospital*	Chungbuk	Chungbuk National University Hospital*
Daegu	Kyungpook National University Hospital*	Jeonju	Jeonbuk National University Hospital*
	Chilgok Kyungpook National University Hospital*	Jeonnam	Hwasun Chonnam National University Hospital*
Gwangju	Chonnam National University Hospital*	Jeju	Jeju National University Hospital
	Bitgoeul Chonman National University Hospital	Gyeongnam	Gyeongsang National University Hospital*
Daejeon	Chungnam National University Hospital*		Changwon Gyeongsang National University Hospital
Sejong	Sejong Chungnam National University Hospital		Yangsan Pusan National University Hospital*
Gyeonggi	Bundang Seoul National University Hospital*	* Designated as 5th-term tertiary-care general hospitals	

Source: Shin H et al.

The growing gaps in the provision of essential care and the widening regional disparities in healthcare have brought to prominence the importance of the roles assigned to NUAHs in medical practice, education, research, and public healthcare. In addition to providing general care for local patients, these hospitals are expected to serve as last-resort regional bases for efforts to comprehensively meet community needs for essential care, train and educate new healthcare professionals, and conduct medical research.

Several studies highlight the increasing concentration of patients in tertiary-care general hospitals (TCGHs) in the Capital Region, which they attribute to the declining public confidence in NUAHs in non-Capital regions, as a matter of concern (Shin H *et al.*). This preference for hospitals in the Capital Region has been viewed as rendering healthcare delivery out of balance with the needs of the situation, thereby increasing the overall burden on society (Kim S). Such trends and attendant shifts in regional healthcare needs can result in a decline in provider competence and a deterioration in the education and training of healthcare professions (Lim J, Cheon H.) One study has pointed out that as NUAHs increasingly adopt

practice patterns akin to those of large-scale non-public hospitals, they become less effective in fulfilling their distinct roles as regional base medical institutions (Lee *S et al.*)

However, little empirical research effort has been made to determine the extent to which the concentration of patients in TCGHs in the Capital Area imposes additional cost burdens on society. Thus, this study estimates the net cost arising from this trend and examines public attitudes toward local NUAHs, with a view to contributing to evidence-based implementation of policies for the promotion of these hospitals.

Estimating with precision the net cost of outflowing patients requires a variety of informational components that are often hard to come by. These include patients' area of residence (as well as that of their families and guardians), the reasons for seeking care from Seoul-based TCGHs rather than their respective local NUAHs, and the modes and routes of transportation used to reach Seoul-based healthcare facilities. As such, we base our estimation on several assumptions. The term 'outflowing patients' refers to individuals receiving healthcare services at Seoul-based TCGHs who reside outside the capital region. We also apply assumptions regarding opportunity costs, lodging expenses, the proportion of patients using private in-hospital caregiver, the percentage of outpatients accompanied by a guardian, and the rate of same-day return to work.

The net cost resulting from the outflow of local patients is calculated as the total cost of receiving services at Seoul-based TCGHs, less the total cost resulting had the same patients received services at their respective local NUAHs.

The total cost incurred by local patient outflow is defined here as the sum of healthcare expenses (National Health Insurance coverage and out-of-pocket payments), opportunity costs related to inpatient and outpatient care, transportation costs, lodging expenses, and spending on private caregivers. The corresponding costs for patients treated at their local NUAHs include the same cost elements, except for lodging expenses. This cost calculation can be expressed as follows.

$$Net\ Cost = \sum_{r \in R} \sum_{h \in H} \left(\sum_{i=1}^N TC_{r,h,i}^S - \sum_{j=1}^T TC_{r,h,j}^R \right)$$

where, r is 'region' (city or province)

h is 'type of care' (inpatient *in*, outpatient *out*)

i is 'Seoul-based tertiary-care general hospital' ($i = 1, \dots, N$)

j is 'local national university-affiliated hospital' ($j = 1, \dots, T$)

S is Seoul

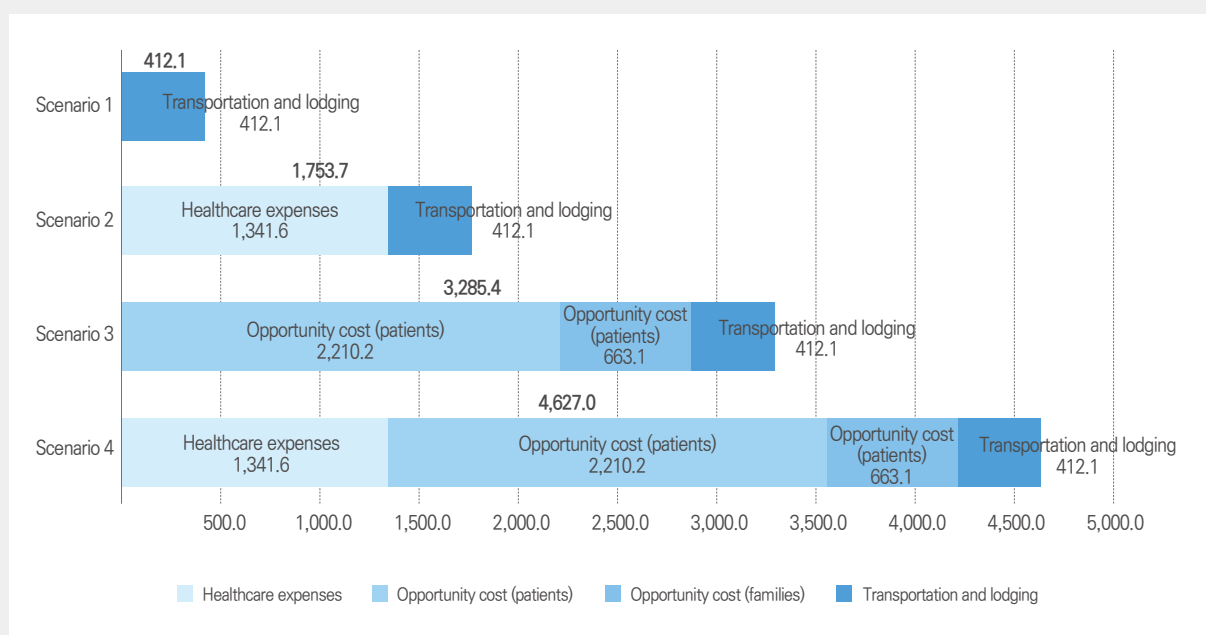
R is 'region other than Seoul'

[Table 2] Net cost of local patient outflow: components

Definition	Calculation method	Data source
Health Insurance benefit expenses	By region (r), type of service (h), and hospital (i, j)	– Health Insurance Review & Assessment Service; National Health Insurance Service
Out-of-pocket expenses	By region (r), type of service (h), and hospital (i, j)	
Total number of inpatient days	By region (r) and hospital (i, j)	
Total number of outpatient visits	By region (r) and hospital (i, j)	
Regional employment rate	Average employment rate in r	– Employment rate by city/province, Economically Active Population Survey, based on 2024 data
Regional wage	Average wage in r	– Ministry of Employment and Labor, Workplace Labor Survey (Monthly wage of regular workers converted to a daily wage, based on 2024 data)
Lodging cost	Average lodging cost in Seoul (KRW 52,016)	– Korea Consumer Agency, Local Accommodation Fee Statistics (Ministry of the Interior and Safety, Regional Price Information), annual average for 2024
Transportation cost for round trip between r and Seoul	$PVC = \text{Distance} \times \text{Fuel Efficiency} \times \text{Fuel Price} + \text{Toll Fee}$ Distance: Between city/provincial office in r and hospital (i, j) - Fuel efficiency (from map app) - Fuel price: average fuel cost (from map app) - Toll fee: Freeway tolls (if applicable, from map app)	– Web crawling using Naver Maps Top 5 shortest-travel-time data points collected and averaged (as of May 19, 2025, 9:00 AM) – Private Car Usage Rate (ρ) is calculated using ‘Transportation Sector Performance Report (Domestic & International Passenger Summary, 2000–2022)’
Caregiver utilization rate	Scenario variable	– Determined through internal discussion—50%
Rate of patients accompanied by a guardian	Scenario variable	– Determined through internal discussion—30%
Same-day return-to-work rate (after outpatient visits to local NUAH)	Scenario variable	– Determined through internal discussion—10 %
Caregiver cost	Daily caregiver cost rate (KRW 89,196.8)	– 2024 Healthcare Service Experience Survey, Ministry of Health and Welfare

The annual net cost incurred by the outflow of local patients to Seoul-based TCGHs was estimated at KRW421.1 billion, considering transportation and lodging expenses alone. With the difference in healthcare expenses between Seoul-based TCGHs and local NUAHs taken into account, the net cost increases to KRW1.7537 trillion. Furthermore, if local patients were to receive care at local NUAHs instead of Seoul-based TCGHs, and assuming that 10 percent could return to work the same day, the estimated net cost could rise to KRW4.6270 trillion when the regional difference in healthcare cost is included, or KRW3.2854 trillion if it is not.

[Figure 1] Net cost by scenario (in billion KRW)



The perceptions of local residents regarding national university-affiliated hospitals

We conducted a survey of public perceptions toward NUAHs in non-Capital regions, with the target population defined as men and women aged 19 to 69 living in all regions of Korea but the Capital Region, which includes Seoul, Incheon, and Gyeonggi Province. The sample populations were drawn from six regions—Gangwon, Chungcheong, Jeolla, North Gyeongsang, South Gyeongsang, and Jeju—using quota sampling based on age, sex, and residential location. As sampling proportional to actual population distributions would result in sample sizes for some regions too small to allow for interregional comparisons, each region was assigned a sample size of 200 individuals, with the exception of Jeju, which was assigned 50, bringing the total sample size to 1,050 participants.

The survey covered public perceptions of regional healthcare, regional residents' willingness to use and recommend national university-affiliated hospitals in their respective areas, and public demand for improvements to these hospitals.

Administered on commission by Hankook Research, the online survey was conducted upon obtaining approval from the Institutional Review Board (IRB) of the Korea Institute for Health and Social Affairs (IRB No. 2025-049).

In response to the question 'How would you rate the current state of healthcare equity between the Capital Region and non-Capital regions?', 27.3 percent of participants reported 'very poor' and 53.9 percent reported 'somewhat poor'. A total of 59.6 percent of respondents rated the overall quality of healthcare services in non-Capital regions as either 'very poor' (10.6 percent) or 'somewhat poor' (49.0 percent) compared to those available in the Capital Region. A significant majority—76.0 percent—viewed healthcare conditions in non-capital regions as subpar compared to in the Capital Region. Moreover, the question 'How would you rate the capacity and expertise of medical institutions in non-Capital regions?' was answered more often in the negative (38.1 percent) than in the affirmative (15.2 percent).

[Table 3] Public perception of issues about regional healthcare (in %)

	Very poor	Somewhat poor	Negative view	Average	Somewhat good	Very Good	Positive view
State of regional healthcare equity: How would you rate the current state of healthcare equity between the capital region and non-capital regions?	27.3	53.9	81.2	15.6	3.0	0.2	3.2
Quality of healthcare services in non-capital regions: How would you rate the quality of healthcare services in non-capital regions?	10.6	49.0	59.6	30.0	10.0	0.4	10.4
Overall regional healthcare environment: How would you describe the overall healthcare environment in non-capital regions compared to the capital regions?	19.2	56.8	76.0	17	6.8	0.3	7.1
Capacity and expertise of regional medical institutions: How would you rate the capacity and expertise of medical institutions in non-capital regions?	7.0	31.1	38.1	46.8	14.3	0.9	15.2

Concerned though respondents were about healthcare disparities between the Capital Region and non-Capital regions, their preference was more toward their local NUAHs for minor illnesses. However, for severe conditions, NUAHs were considered less of a priority. When asked if they would use their local NUAHs for mild illness, 54.1 percent answered in the affirmative—either ‘highly likely’ or ‘quite likely.’ When asked whether they would recommend a local NUAH for a mild illness to a family member or friend, 44.6 percent answered either ‘highly likely’ or ‘quite likely.’ For severe illnesses, meanwhile, only 43.5 percent were willing to use, and 33.7 percent were willing to recommend, a local NUAH—10.6 and 10.9 percentage points lower, respectively, than for mild illnesses.

Respondents’ willingness to use and recommend NUAH services also varied depending on the type of conditions. It was for conditions requiring emergency care, where adhering to the ‘golden hour’ principle is critically important, that respondents were at their most willing to use and recommend a local NUAH, with 69.4 percent responding with ‘yes’ and 8.9 percent with ‘no’. For conditions of unknown origin, the prevalence of willingness to seek treatment from or recommend a local NUAH was lower at 45.1 percent and 34.6 percent, respectively.

[Table 4] Willingness to use and recommend local national university-affiliated hospitals (in %)

		Highly unlikely	Quite unlikely	Negative	Neutral	Quite likely	Highly likely	Positive
Would you be willing to use local NUAHs in the event of __	Minor conditions	5.7	16.8	22.5	23.3	41.0	13.1	54.1
	Severe illness	6.6	21.8	28.4	28.1	33.9	9.6	43.5
	Emergency medical care needs	3.1	5.8	8.9	21.7	50.6	18.8	69.4
	Illness of unidentified cause	7.0	19.1	26.1	28.9	38.4	6.7	45.1
Would you be willing to recommend local NUAHs to your family or a friend in the event of __	Minor conditions	3.6	13.0	16.6	38.9	37.9	6.7	44.6
	Severe illness	7.7	23.2	30.9	35.3	28.2	5.5	33.7
	Emergency medical care needs	4.3	12.0	16.3	40.5	35.8	7.4	43.2
	Illness of unidentified cause	6.2	24.0	30.2	35.1	29.3	5.3	34.6

For severe diseases and unspecified conditions, the highest percentage of respondents selected TCGHs in the Capital Region as their first-choice provider. Specifically, 36.5 percent indicated that they would choose a TCGH in the Capital Region if facing a severe illness. Local NUAHs ranked second, with 22.0 percent choosing them—higher than the proportion for other types of local healthcare providers, including local general hospitals (13.1 percent). For conditions of unidentified cause, 36.6 percent chose TCGHs in the Capital Region, 24.2 percent local NUAHs, and 12.8 percent local general hospitals.

[Table 5] First-choice healthcare provider by type of condition (in %)

Which type of provider would you seek first in the event of...?	Capital Region-based TCGHs	Capital Region-based general hospitals	Capital Region-based primary and secondary care providers (smaller hospitals and clinics)	Local NUAHs	Local university-affiliated hospitals	Local general hospitals	Local primary and secondary care providers (smaller hospitals and clinics)	Don't know
Minor conditions	7.0	2.7	2.2	14.2	4.3	15.0	52.3	2.3
Severe conditions	36.5	12.3	3.0	22.0	8.6	13.1	2.4	2.1
Conditions of unidentified cause	36.6	8.0	2.7	24.2	7.9	12.8	5.1	2.7
Emergency conditions	18.8	5.7	1.8	37.0	10.2	21.5	2.1	2.9

[Table 6] Public perception of the need for improvement and government support for national university hospitals in non-capital regions (in %)

	Strongly disagree	Somewhat disagree	Disagree	Neutral	Somewhat agree	Strongly agree	Agree
Need for improvement Do you think the capabilities of local national university hospitals need to be improved?	1.0	2.5	3.5	16.2	53.5	26.8	80.3
Need for government support Do you think the government should actively support the strengthening of these hospitals' capabilities?	0.9	3.4	4.3	14.9	45.0	35.9	80.9

Most participants saw government support as necessary for strengthening the capabilities of local NUAHs. Key areas that participants viewed as most in need of government support include: ‘securing professional medical staff’ (81.0 percent), ‘enhancing capabilities for the treatment of emergency conditions’ (80.5 percent), ‘enhancing capabilities for the treatment of severe conditions’ (80.1 percent), all of which pertain to the medical and healthcare capabilities of NUAHs. These local NUAHs were also seen as requiring government support for ‘expanding and improving services in essential specialties’ (78.6 percent), ‘upgrading hospital facilities and equipment’ (76.5 percent), ‘strengthening research and educational functions’ (73.6 percent), ‘fostering a patient-oriented culture’ (71.3 percent), and ‘linking with other healthcare providers within the region’ (74.7 percent).

[Table 7] Public perception of areas needing improvement for national university hospitals in non-capital regions (in %)

Areas for improvement	Not needed at all	Not needed	No improvement needed	Neutral	Needed	Very needed	Improvement needed
Securing professional medical staff	1.3	3.8	5.1	13.9	44.9	36.1	81.0
Enhancing capabilities for treatment of emergency conditions	1.0	3.7	4.7	14.8	37.3	43.2	80.5
Enhancing capabilities for treatment of severe conditions	1.6	3.6	5.2	14.7	36.3	43.8	80.1
Expanding and improving services in essential specialties	1.4	4.6	6.0	15.4	45.2	33.3	78.6
Upgrading hospital facilities and equipment	1.1	4.8	5.9	17.6	42.9	33.6	76.5
Strengthening research and educational functions	1.0	3.7	4.7	21.6	41.9	31.7	73.6
Fostering a patient-oriented culture	1.0	4.7	5.7	23.0	41.4	29.9	71.3
Linking with other healthcare providers within the region	1.7	3.1	4.9	20.5	44.1	30.6	74.7

The findings indicate that while TCGHs in the Capital Region remain more preferred than NUAHs in non-Capital regions, the latter are perceived as crucial in key dimensions of healthcare, including emergency care, and as in need of building up competency as regional base healthcare institutions.

Concluding remarks

The costs incurred by local residents choosing to receive health services from TCGHs in Seoul instead of from their local NUAHs, estimated in this study to amount to a net total ranging from a low of KRW412.1 billion to a high of KRW4.627 trillion, represent a concern that warrants the government's attention and action.

If local patients continue seeking healthcare from hospitals in the Capital Region, not only would this trend increase healthcare costs for patients, but it would also lead to additional costs related to productivity loss among patients and their guardians, as well as transportation, lodging, and private caregiver arrangements. In this regard, it is important to note that complementing local healthcare by enhancing the competence of local NUAHs would be not only about ensuring individuals' right to choose healthcare but also about addressing the need to reduce societal loss due to inefficiency.

Koreans were found to prefer TCGHs in the Capital Region for severe illnesses and unidentified conditions, while for other conditions, their overall preference leaned toward using their local NUAHs. This study found broad public agreement in favor of official backing of regional NUAHs, which warrants government action to enable them to fulfill their roles as regional base medical institutions. Given the limited health resources in local regions, government support for NUAHs should focus not only on capacity building but also on establishing a regional network of healthcare resources, with each NUAH serving as the lead coordinator, to reduce service gaps and promote more collaborative treatment of severe cases.

Support for NUAHs and related policies must be carefully designed and implemented effectively. It has been pointed out that NUAHs, despite their designation under the current Act as “public health and medical institutions”, have failed to distinguish themselves from their non-public counterparts. The government will need to innovate the current system of Regional Lead Healthcare Institutions so that NUAHs can take the lead in efforts to improve the healthcare landscape in their respective regions. This is especially important in light of ongoing discussions on the need to transition healthcare delivery from the current model, where provider competition prevails, to one that fosters user-oriented cooperation and integrated services. There is also a need to amend the current governance framework, under which NUAHs fall under the jurisdiction of the Ministry of Education, and which thereby makes it difficult for the government to implement support for these hospitals in such a specialized way as to help them function as intended.

This study aimed to estimate how much cost could be saved had local patients going to Seoul-based TCGHs for care instead used services at their local NUAHs, assuming that the quality of care at the latter is comparable to that at the former. A key limitation of this approach is that it leaves unaccounted for potential differences in patient benefit resulting from quality disparities between local NUAHs and Seoul-based TCGHs. Another limitation is the restrictive range of scenario assumptions that this study, in estimating net costs with limited available data, applies to certain factors such as the proportion of outpatient visits accompanied by guardians and the percentage of inpatients employing a private caregiver during hospital stays. Based as they are in part on a narrow array of rather discretionary assumptions, the net costs presented in this study are by no means definitive—they could well have been significantly different if estimated under a scenario with a more extensive range of assumptions. These limitations suggest the need for follow-up research employing more detailed data and refined methodology.

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