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Expansion of medical school admission quotas in Korea, is it really necessary?

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Abstract

Background In 2024, the Korean Ministry of Health and Welfare enforced a policy to increase the number of medical school students by 2,000 over the next 5 years, despite opposition from doctors. This study aims to predict the trend of excess or shortage of medical personnel in Korea due to the policy of increasing the number of medical school students by 2035.

Methods Data from multiple sources, including the Ministry of Health and Welfare, National Health Insurance Corporation, and the Korean Medical Association, were used to estimate supply and demand. The inflow-outflow method was used for supply estimation, and assumptions were made regarding national medical examination pass rates, clinical physician consultation rates, mortality rates, and overseas emigration rates. Per capita medical use by gender and age group in 2022 was calculated for demand estimation of future medical use, and the results of future population projections were applied. The numbers of working days examined were 265, 275, 285, and 289.5 days.

Results The Korean government's prediction that there will be a shortage of 10,000 doctors in 2035 can be confirmed by the underestimation of the number of working days (265 days). However, if the actual number of working days, 289.5 days, is applied, not only will there be no shortage of doctors in 2035, but there could also be an oversupply of 3,000 doctors. If the number of medical school students has increased for five years and the public's medical use behavior and the number of working days for doctors are maintained at the current level, there is a possibility that there will be an oversupply of as many as 11,000 doctors by 2035.

Conclusions Medical experts expressed concerns that the rapid increase in medical school enrollment would exacerbate the phenomenon of concentration, increase the cost of medical care, and collapse the medical system. In order to establish a reasonable plan for the supply and demand of medical personnel in the mid- to long-term, it is necessary to consider the future medical environment through discussions with medical providers and related organizations.

Keywords Physicians, Forecasting, Medical school

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Background

Maintaining an appropriate physician workforce, an indispensable fundamental element in providing healthcare services to the public, is essential for efficiently responding to the ever-increasing medical demand, and ultimately for establishing and implementing sustainable healthcare policies. A systematic and long-term national plan is necessary to ensure that the physician workforce acquires the necessary expertise to serve as human resources in the field [1]. Otherwise, the resulting harm is borne entirely by the citizens [2]. Therefore, many countries have included physician workforce planning in healthcare reforms. Establishing a physician workforce plan and implementing rational supply and demand policies are crucial for the efficient operation of the healthcare system [3]. The WHO emphasizes evidence-based decision-making for establishing national human resources and generally recommends including data such as the expansion of education and training for healthcare workers, reduction of workforce imbalances, enhancement of staff performance, improvement of staff retention, and short- and long-term goals and cost estimates for adapting to major healthcare-sector reforms [4].

The Korean government appears to believe that complex medical issues that have occurred recently in Korea, such as avoidance of emergency rooms and regional concentration phenomena, can be simply resolved through a trickle-down effect by increasing the number of physicians and expanding medical school admission quotas [5]. However, simply increasing medical school admission quotas does not produce the types of physicians desired by society in the short term. Many developed countries predict the appropriate number of physicians by considering social circumstances at the government level and establishing consistent supply and demand plans [6]. However, in Korea, policies for the physician workforce have been unplanned and promoted based on changes in administration.

Those who argue that there is a shortage of physicians primarily base their claims on the fact that the number of active physicians per 1,000 people is below the Organization for Economic Co-operation and Development (OECD) average. In 2024, the Korean Ministry of Health and Welfare enforced a policy to increase medical school admission quotas by 2,000 annually over the next 5 years, based on three-physician workforce projection studies, despite opposition from physicians. However, by 2025, the medical school quota is set to 1,509, reflecting the opinions of the Ministry of Education and Medical Schools [7].

This study aims to predict the trend of the future surplus or shortage of physicians in Korea until 2035 due to the government's policy of increasing medical school admission quotas.

Methods

Estimation model

In this study, we used the basic estimation method of the inflow-outflow approach to project the supply of physicians. This basic estimation assumes that the current workforce training system remains unchanged while projecting the future manpower. The inflow-outflow method estimates changes in the workforce by dividing the process into two components: inflow and outflow.

Medical demand refers to the total number of healthcare services that a population in a specific region needs and can purchase at a given time. The demand for medical personnel is determined by the population's demand for healthcare services and the productivity of medical personnel. In this study, we calculated the medical utilization for target years based on the per capita medical utilization by gender and five-year age groups as of 2022 and projected the number of physicians needed to provide healthcare services.

Assumptions for estimation

First, the annual active physician supply projection assumes two scenarios: (1) increasing the medical school admission quota by 2,000 students annually for 10 years starting from 2025, and (2) the admission quota remains unchanged. The pass rate was assumed to be 95.6%, by applying the average pass rate from 2020 to 2022 [8]. Second, to calculate the actual number of clinical practicing physicians, excluding non-clinical and retired physicians, we applied a clinical physician ratio of 92.07% from the 2020 Korean Physician Survey conducted by the Medical Policy Research Institute [9]. Third, because it is difficult to obtain accurate statistics related to the average life expectancy and number of deaths in the physician group, we assumed that the mortality rate was the same as the age-standardized mortality rate of the general Korean population (average 0.31% from 2020 to 2022) [10]. Fourth, the overseas emigration rate applied to Korea's average rate of 0.0047% from 2020 to 2022 [11].

The assumptions related to the required number of active physicians, that is, demand projection, are as follows: First, we assumed that the per capita medical utilization rate by gender and age remained unchanged. To project future medical utilization, we calculated the 2022 per capita medical utilization by sex and age group using the National Health Insurance Corporation's health insurance statistics data and applied the results of future population projections from the National Statistical Office to estimate medical utilization for the target years [12]. Second, considering the relative proportion of effort and time of medical personnel invested in outpatient and inpatient care, we applied a 3:1 ratio of inpatient to outpatient care based on the Enforcement Rules of the Medical Service Act. In Kwon Jung-hyun's study, there

is a limitation where inpatient and outpatient medical utilization were assumed to be the same unit. Studies by YH Oh (2014), Shin et al. (2020), and Hong et al. (2020) referenced conversion indices to apply inpatient medical utilization three times that of outpatient utilization [13–15]. Third, the base year for demand projection was set to 2023. Since previous studies by Hong (2020) and Shin (2020) used physician working days of 245, 255, and 265 days, which were criticized for not reflecting the realistic working days of physicians, we included the active physician working days of 289.5 days in our scenarios (gathered from the 2020 Korean Physician Survey by the Research Institute for Healthcare Policy; Lee, Park, Kim, 2020). In addition, we included 275 and 285 days, which fell between 265 and 289.5 days.

Results

This study projected the supply and demand differences in the physician workforce by estimating the annual active and required active physician supply using the increase in medical school admission quotas as the main scenario.

The annual active physician supply projections, without an increase in medical school admission quotas, are shown in Table 1. The projected numbers of active physicians are 119,318 in 2025, 133,117 in 2031, and 142,173 in 2035. In Scenario 1, using 265 working days, the number of required physicians was 129,338 in 2025, 142,449 in 2031, and 151,865 in 2035, resulting in physician workforce shortages of 10,020 in 2025, 9,332 in 2031, and 9,691 in 2035. In Scenario 2, using 275 working days, the required number of physicians was 124,635 in 2025, 137,269 in 2031, and 146,342 in 2035, resulting in shortages of 5,317 in 2025, 4,152 in 2031, and 4,169 in 2035. In Scenario 3, using 285 working days, the number of required physicians was 120,262 in 2025, 132,423 in 2031, and 141,207 in 2035, resulting in a shortage of 944 in 2025, a surplus of 665 in 2031, and a surplus of 966 in 2035. In Scenario 4, applying the actual working days of Korean physicians (289.5 days), the required number of physicians was 118,393 in 2025, 130,394 in 2031, and 139,012 in 2035, resulting in surpluses of 926 in 2025, 2,724 in 2031, and 3,161 in 2035.

The Korean government's policy is to increase medical school admission quotas by 2,000 students annually for 5 years, but for 2025, it announced an increase of 1,509. The annual active physician supply projections according to this policy are shown in Table 2. The projected numbers of active physicians are 119,318 in 2025, 134,446 in 2031, and 150,493 in 2035. In Scenario 1, with 265 working days, the required number of physicians was 129,338 in 2025, 142,449 in 2031, and 151,865 in 2035, resulting in shortages of 10,020 in 2025, 8,003 in 2031, and 1,371 in 2035. In Scenario 2, with 275 working days, the required number of physicians was 124,635 in 2025, 137,269 in 2031, and 146,342 in 2035, resulting in a shortage of 5,317 in 2025, 2,823 in 2031, and a surplus of 4,151 in 2035. In Scenario 3, with 285 working days, the number of physicians required was 120,262 in 2025, 132,423 in 2031, and 141,207 in 2035, resulting in a shortage of 944 in 2025 and surpluses of 1,993 in 2031 and 9,286 in 2035, respectively. In Scenario 4, applying the actual working days of Korean physicians (289.5 days), the required number of physicians was 118,393 in 2025, 130,394 in 2031, and 139,012 in 2035, resulting in surpluses of 926 in 2025, 4,052 in 2031, and 11,481 in 2035.

The physician workforce supply and demand projections, according to the medical school quota increase scenarios, are shown in Figs. 1, 2, 3 and 4.

Table 1 Estimated results of Physician Manpower in Case of maintaining Medical School Enrollment Capacity

year	Supply	Demand							
	Forecasting of practicing physicians (A)	Scenario 1[a]		Scenario 2[b]		Scenario 3[c]		Scenario 4[d]	
		Forecasting of practicing physicians (B)	(A)-(B)	Forecasting of practicing physicians (C)	(A)-(C)	Forecasting of practicing physicians (D)	(A)-(D)	Forecasting of practicing physicians (E)	(A)-(E)
2025	119,318	129,338	-10,020	124,635	-5,317	120,262	-944	118,393	926
2026	121,636	131,323	-9,687	126,548	-4,911	122,107	-471	120,209	1,427
2027	123,947	133,585	-9,638	128,727	-4,780	124,210	-263	122,280	1,667
2028	126,250	135,908	-9,658	130,966	-4,716	126,371	-120	124,406	1,844
2029	128,547	138,024	-9,477	133,005	-4,458	128,338	209	126,343	2,203
2030	130,836	140,367	-9,532	135,263	-4,428	130,517	318	128,488	2,347
2031	133,117	142,449	-9,332	137,269	-4,152	132,453	665	130,394	2,724
2032	135,392	144,786	-9,394	139,521	-4,129	134,625	767	132,533	2,859
2033	137,660	147,148	-9,488	141,797	-4,137	136,822	838	134,695	2,965
2034	139,920	149,399	-9,479	143,966	-4,046	138,915	1,005	136,755	3,165
2035	142,173	151,865	-9,691	146,342	-4,169	141,207	966	139,012	3,161

[a] Number of working days, 265. [b] Number of working days, 275

[c] Number of working days, 285. [d] Number of working days, 289.5

Table 2 Estimated results of Physician Manpower in Case of increasing Medical School Enrollment Capacity

year	Supply	Demand							
	Forecasting of practicing physicians (A)	Scenario 1[a)]		Scenario 2[b)]		Scenario 3[c)]		Scenario 4[d)]	
		Forecasting of practicing physicians (B)	(A)-(B)	Forecasting of practicing physicians (C)	(A)-(C)	Forecasting of practicing physicians (D)	(A)-(D)	Forecasting of practicing physicians (E)	(A)-(E)
2025	119,318	129,338	-10,020	124,635	-5,317	120,262	-944	118,393	926
2026	121,636	131,323	-9,687	126,548	-4,911	122,107	-471	120,209	1,427
2027	123,947	133,585	-9,638	128,727	-4,780	124,210	-263	122,280	1,667
2028	126,250	135,908	-9,658	130,966	-4,716	126,371	-120	124,406	1,844
2029	128,547	138,024	-9,477	133,005	-4,458	128,338	209	126,343	2,203
2030	130,836	140,367	-9,532	135,263	-4,428	130,517	318	128,488	2,347
2031	134,446	142,449	-8,003	137,269	-2,823	132,453	1,993	130,394	4,052
2032	138,476	144,786	-6,309	139,521	-1,044	134,625	3,851	132,533	5,944
2033	142,495	147,148	-4,653	141,797	698	136,822	5,673	134,695	7,800
2034	146,500	149,399	-2,898	143,966	2,534	138,915	7,586	136,755	9,745
2035	150,493	151,865	-1,371	146,342	4,151	141,207	9,286	139,012	11,481

[a)] Number of working days, 265. [b)] Number of working days, 275

[c)] Number of working days, 285. [d)] Number of working days, 289.5

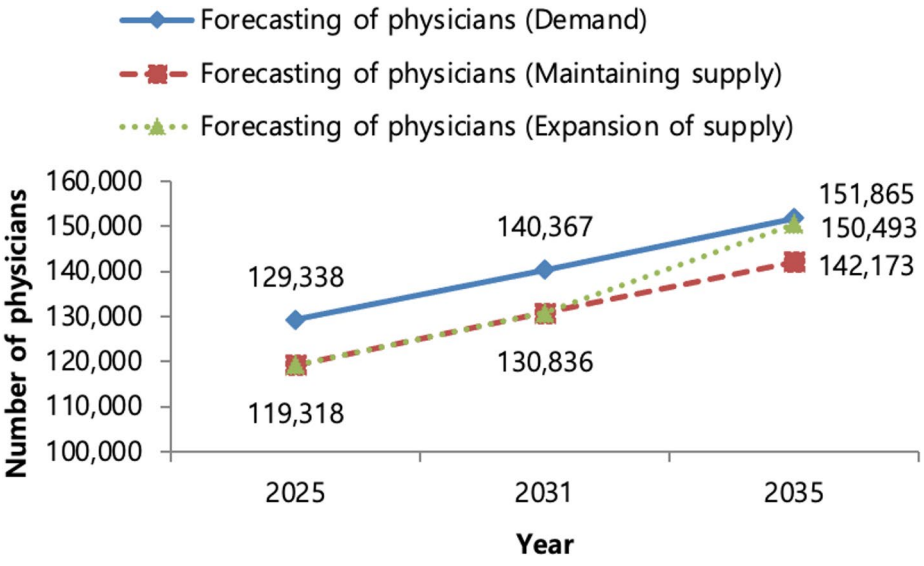

Fig. 1 Working days scenario 1: Estimated supply and demand for physicians

Figure 1 shows how the physician workforce supply and demand projections changed according to the implementation of the medical school admission quota policy in working day scenario 1 (265 days). In 2025, a shortage of 10,020 physicians is expected, in 2031, a shortage of 8,003–9,332 physicians is expected, and in 2035, a shortage of 1,371–9,691 physicians is anticipated.

Figure 2 shows the physician workforce supply and demand projections according to the implementation of the medical school admission quota policy in working day scenario 2 (275 days). In 2025, a shortage of 5,317 physicians is expected, in 2031, a shortage of 2,823 to 4,152 physicians is expected, and in 2035, a shortage of 4,169 to a surplus of 4,151 physicians is anticipated.

Figure 3 shows the physician workforce supply and demand projections according to the implementation of the medical school admission quota policy in working day scenario 3 (285 days). In 2025, a shortage of 944 physicians is expected; in 2031, a surplus of 665–1,993 physicians is expected; and in 2035, a surplus of 966–9,286 physicians is anticipated.

Figure 4 shows the physician workforce supply and demand projections according to the implementation of the medical school admission quota policy in working day scenario 4 (289.5 days). In 2025, a surplus of 926 physicians is expected, in 2031, a surplus of 2,724–4,052 physicians is expected, and in 2035, a surplus of 3,161–11,481 physicians is anticipated.

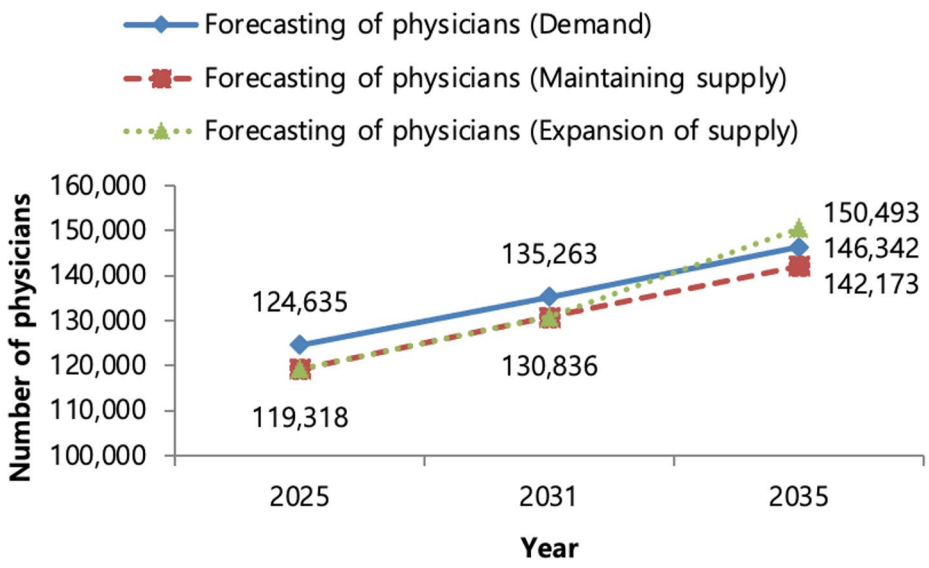

Fig. 2 Working days scenario 2: Estimated supply and demand for physicians

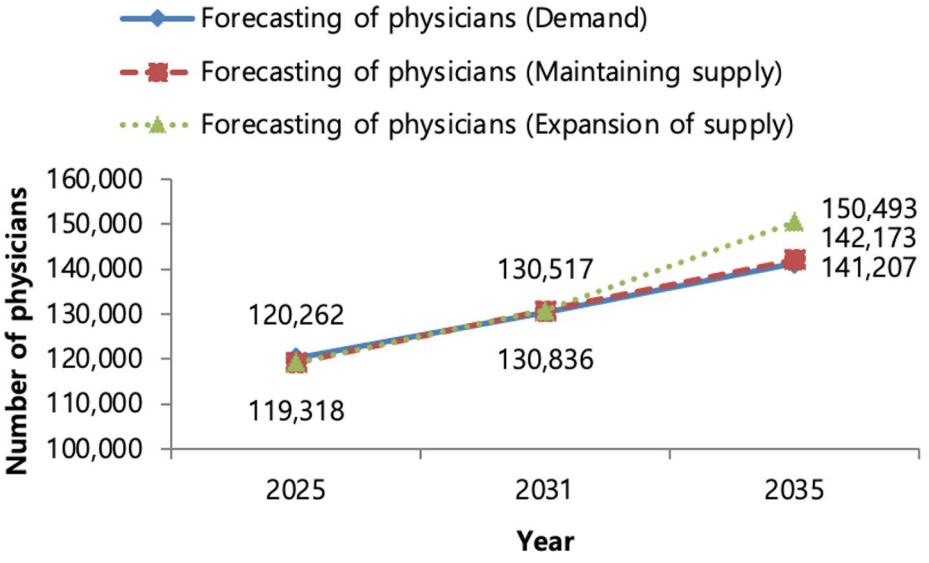

Fig. 3 Working days scenario 3: Estimated supply and demand for physicians

Discussion

Despite opposition from physicians, the Korean Ministry of Health and Welfare has pursued a policy to increase medical school admission quotas by 2,000 students annually over the next five years, based on three physician workforce projection studies [7]. Therefore, this study examines how differences in annual physician workforce supply and demand occur, using the implementation of the medical school quota policy as the main scenario.

The authors of three research reports that were used by the Korean government to inform the policy of increasing medical school admission quotas expressed opposition to the annual increase of 2,000 students over 5 years [16]. None of the three studies directly state that an annual increase of 2,000 students is necessary; rather, they include opinions such as the need to devise incentive measures for medical specialties experiencing difficulties in securing manpower and that urgent improvements are needed not only in physician supply and demand but also in medical utilization behaviors and the healthcare delivery system [17].

Shin et al. (2020) analyzed medical utilization data from 2010 to 2018 to predict the required medical demands for 2025, 2030, and 2035. They assessed future physician surpluses or shortages by projecting the physician supply using medical personnel data from the same period. Physician supply projections calculated the available personnel for the target years using the inflow-outflow method and time series Autoregressive Integrated

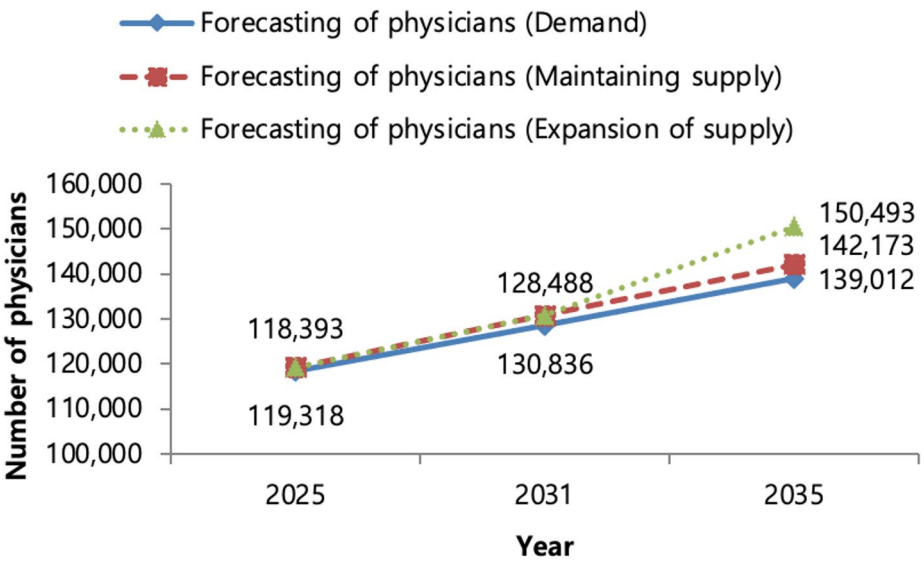

Fig. 4 Working days scenario 4: Estimated supply and demand for physicians

Moving Average (ARIMA) models. To forecast future medical demand, they applied average growth rates, curve estimation regression models such as logistic and logarithmic functions, and time-series analysis using the ARIMA model. Scenarios were constructed with 240, 255, and 265 working days. The ARIMA model analysis predicted shortages of 879–2,294 physicians by 2025, 4,094–7,168 by 2030, and 9,654–14,631 by 2035 [14].

This study has the advantage of incorporating factors such as medical benefits and veterans' medical support, which previous physician supply and demand studies did not reflect. However, it does not apply gender weights to medical utilization weights. Additionally, setting the number of physician working days to 240, 255, and 265 failed to reflect the reality of the actual medical field.

Hong et al. (2020). used the inflow-outflow method for physician supply and applied a demand-based approach to medical demand. For supply projection, the authors algorithmized supply volume according to medical school admission quotas. On the demand side, they used 2018 medical utilization data from the Health Insurance Statistical Yearbook and Special Future Population Projections (2017–2067) of Statistics Korea. This study assumed that physician supply and demand in 2018 were appropriate and that physician productivity would increase by 0.5% annually. The results indicated that a shortage in physician supply could occur by 2067, emphasizing that regional imbalances in physician supply and demand are more urgent issues than a mere shortage in numbers [15].

This study assumed that physician productivity increases by 0.5% annually; however, this was found to be the researcher's subjective opinion without supporting evidence. This study also constructed scenarios with 240, 255, and 265 physician working days, which failed to reflect the reality of the medical field.

Kwon (2023) projected changes in medical service demand under the assumption that the 2019 level of medical service utilization did not change in subsequent years and estimated the size of active physicians under the assumption that institutional and labor market attrition remains constant. Despite a decrease in population size, he found that medical service utilization would increase until 2040 owing to the rise in the older population. He expected the workforce size of active physicians to peak in 2044, and then shift toward a declining trend. Considering the increase in medical service demand owing to population aging and improvements in health status related to educational level, he anticipated that approximately 8,500 additional physicians would be required by 2050. He suggested that increasing medical school admission quotas by 5–7% annually from 2024 to 2030 would be the closest approach to meeting the required physician workforce size. However, he raised concerns that if medical service demand decreases owing to population decline after 2050, an oversupply of physicians could occur [18].

Generally, inpatient and outpatient care consume different amounts of resources, such as personnel, time, and equipment; therefore, conversion indices are applied for inpatient and outpatient services rather than considering them as the same unit of medical utilization [13–15]. Therefore, this study has the limitation of assuming that inpatient and outpatient care were in the same unit.

However, some studies argue that Korea does not have a shortage of physicians, but rather an oversupply. Oh (2020) evaluated a reasonable number of physicians in Korea using the inflow-outflow method for physician

supply and projected supply and demand through the total amount of healthcare services and productivity for physician demand. Assuming a 5% improvement in physician productivity compared to 2018 and 265 working days per year, it was estimated that Korea would have an oversupply of up to 14,646 physicians by 2035 [1]. Scheffler and Arnold (2019) predicted physician demand in OECD countries based on factors such as per capita income, out-of-pocket health expenditures, and population aging. While most countries are predicted to have a physician shortage, Korea is expected to have an oversupply of 3,821 physicians by 2030 [19].

The present study included 265 working days commonly used in previous studies and the actual working days of physicians (289.5 days) to reflect realistic working conditions in the medical field, as well as 275 and 285 days. The Korean government's claim that there will be a shortage of 10,000 physicians by 2035 was similar when using the underestimated working days of 265. When applying the actual number of physician working days of 289.5, it was found that not only would there be no shortage of physicians by 2035 but there could also be an oversupply of 3,000 physicians. If we assume that public medical utilization behavior and physicians' working days remain at current levels while medical school quotas increase over 5 years, there is a possibility of an oversupply of as many as 11,000 physicians by 2035. A study on the determinants of healthcare expenditure in Korea found that a 1% increase in the number of physicians per 1,000 people led to a 22% increase in healthcare expenditure per capita [20]. This finding suggests that an oversupply of physicians could result in a sharp increase in healthcare costs, which warrants careful consideration.

In general, estimating medical demand is more complex than estimating medical supply, and this study has several limitations. First, this study did not consider differences in physician productivity by type of medical institution or specialty. Physician productivity can vary significantly depending on disease type and severity. However, due to data constraints, the study did not distinguish productivity by institution type or specialty and instead considered overall physician productivity.

Second, the demand-based method used to estimate the need for physicians does not determine whether current or future medical utilization rates are appropriate, nor does it specify what an appropriate level of utilization might be. Consequently, it remains unclear whether the physician demand estimated by the model accurately reflects the healthcare system. Furthermore, delegation or support among medical professionals, such as physicians and nurses may lead to overestimation or underestimation of the demand for medical personnel [21].

Lastly, with regard to estimating medical demand, this study did not consider the impact of various healthcare policy changes on the medical demand underlying physician demand. Although the WHO recommends including expansions in education and training, reduction of workforce imbalances, enhancement of staff performance, improvement of staff retention, and short- and long-term goals and cost estimates for adapting to major healthcare-sector reforms [4], there is lack of foundational research on short- and long-term goals for healthcare reforms, cost estimates associated with changes in medical fees and payment systems, and the influence of various non-economic factors on medical demand, making it difficult to incorporate these aspects into this study. In estimating medical demand, this study applied medical utilization rates weighted by sex and age. This approach is used when it is difficult to reflect the numerous factors influencing medical demand due to data constraints, allowing all such factors to be collectively considered in medical utilization [22, 23].

Various medical experts have warned that side effects may occur because of medical school quota policies. They are concerned that this may collapse the medical system, exacerbate regional and specialty imbalances, and anticipate an explosive increase in paid medical expenses [24]. Early economic theories proposed that increasing the number of physicians could lead to higher healthcare costs through the phenomenon of "physician-induced demand" [25]. In a paper focusing on geographic accessibility and availability of qualified personnel, the reduction of regional disparities was attributed to the intervention of other policies rather than to an increased supply of physicians [26]. In the United States, regions with higher physician density have been observed to incur higher medical costs [27]. Moreover, factors such as the shift toward chronic-disease monitoring, an overcrowded competitive medical environment, and patients' greater access to information have led to predictions that non-physician clinicians will take over primary care, raising concerns about the potential collapse of primary care [28].

From the perspective of medical education, there is significant concern about the decline in educational quality. Medical education deals with life and must foster actual competencies through practical training in addition to classroom education [29]. The process of experiencing patients through hospital practice is crucial, and it is evident that the training environment is deteriorating because of the overwhelming number of trainees. In the United Kingdom, a study of 10,873 university students divided into five groups according to class size showed that larger class sizes had a negative effect on academic achievement [30]. Additionally, between 1996 and 2008, a survey of 48 professors and 1,928 courses at a university in the eastern United States found that simultaneously teaching a large number of students reduced teaching

effectiveness. Large classes and large student numbers induced professors to alter courses in ways that were not beneficial to students, resulting in negative effects on academic performance and satisfaction [31]. In 2006, a survey of 110 clinical faculty members at U.S. medical schools indicated that increasing medical school admissions quotas could lead to shortages of space, training hospitals, and resources; limited patient exposure; insufficient mentoring; and difficulties in faculty recruitment [32].

There were cases in which medical school quotas were increased, but later reduced because problems such as specialty and regional imbalances were not resolved. Japan's Ministry of Health, Labor and Welfare has increased medical school quotas since 2009 due to regional and specialty imbalances. However, problems such as low birth rates, physician oversupply, and soaring medical expenses have arisen, leading to considerations to reduce medical school admission quotas starting from 2023. In this process, Japan formed a consultative body centered on medical experts to establish supply and demand plans through sufficient communication and cooperation, promoting policies such as resolving imbalances and adjusting physician training processes [33]. This demonstrates that the medical workforce issues cannot be solved simply by increasing the number of workers.

According to OECD Health data, Korea has 2.3 physicians per 1,000 people, which is lower than the OECD average of 3.6. However, the annual number of outpatient visits per capita, which indicates medical accessibility, is 15.7—more than twice the OECD average, making it the highest globally. Additionally, health indicators such as life expectancy, mortality rates for major diseases, and infant mortality rates show that Korea has significantly better outcomes than other OECD countries [34]. This is because in Korea, primary care is largely provided by specialists, and these highly trained professionals deliver outpatient care very efficiently. Korea maintains top-tier health indicators, with fewer physicians and lower costs. These indicators counter the claim that Korea lacks physicians. There is no relationship between avoidable mortality and numbers of general practitioners and family physicians per capita, specialists per capita, nurses per capita, doctors and nurses per capita, or health expenditures per capita. These findings should move us to recognize that a larger number of available doctors will not necessarily translate into better healthcare outcomes [35].

Future advancements in artificial intelligence technology (AI) could significantly enhance physician productivity. AI can improve work efficiency by reducing the time spent on unnecessary medical record entries and administrative tasks, thereby allowing physicians to focus more on patient care [36, 37]. Up to 36% of existing workloads can be automated through this method [36]. Such productivity improvements can offset the projected shortage of 3.5 million healthcare professionals by 2030 across all OECD member countries [38]. Additionally, studies suggest that AI can assist in the analysis of imaging tests and diagnostic processes, thereby increasing physicians' clinical efficiency and reducing consultation times [39]. This can greatly alleviate concerns about future shortage of physicians.

Government-led unilateral physician supply and demand plans are unlikely to be successful. Continuous discussions with healthcare providers and related organizations are necessary to agree on mid- to long-term supply and-demand projection models and methods that consider Korea's medical environment. Therefore, long-term physician workforce policies should be established by using periodic supply and demand projections [2]. It is reasonable to assume that Korea has an imbalance in the regional and specialty distribution of physicians, rather than an absolute shortage in numbers [1]. Therefore, the government should move beyond the simplistic idea of solving the problem by increasing the number of physicians and seeking ways to alleviate their concentration. In addition, legal safeguards should be provided to enable physicians to practice confidently in essential medical fields with a high risk of medical accidents.

Conclusions

We examined how differences in physician workforce supply and demand would occur with the implementation of unilateral medical school quota policies in Korea. Depending on the workday scenario, the medical school quota policy is projected to result in a shortage of 1,300 physicians and an oversupply of 11,000 physicians by 2035. Medical experts have expressed concerns that radical increases in medical school quotas may exacerbate the concentration phenomenon, increase paid medical expenses, and potentially collapse the medical system. To establish a reasonable physician supply and demand plan in the mid-to-long-term, it is necessary to consider the future medical environment through discussions with healthcare providers and related organizations.

Abbreviations

AI	Artificial Intelligence
ARIMA	Autoregressive Integrated Moving Average
OECD	Organization for Economic Co-operation and Development

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None.

Author contributions

Jeong Hun Park and Yo Han Shin participated in the design, data collection, analysis, and writing of the manuscript. Jungchan Lee and Kye-Hyun Kim participated in the data collection and analysis. Seog-Kyun Mun participated

in the design, investigation, and evaluation of the study and contributed to critical revision.

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Data availability
The data generated during and analyzed during this study are available from the corresponding request upon a reasonable request.

Declarations

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Not Applicable.

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Competing interests
The authors declare no competing interests.

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