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Original Article

Thoracic Surgeon Density in Türkiye in the Global Context: Implications for Workforce Planning

Necati Çıtak

Clinic of Thoracic Surgery, University of Health Sciences Türkiye, İzmir Dr. Suat Seren Chest Diseases and Thoracic Surgery Training and Research Hospital, İzmir, Türkiye

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ABSTRACT

OBJECTIVE: Ten years ago, evidence demonstrated that the number of thoracic surgeons in Türkiye was excessive. In the intervening period, health policies have continued to significantly increase the number of thoracic surgeons. It is estimated that this number will almost double within the next ten years. This study aims to investigate, using scientific data, the ideal number of thoracic surgeons required in Türkiye.

MATERIAL AND METHODS: Thoracic surgery workforce requirements were estimated using national data on annual outpatient visits and hospitalization rates; data from the Turkish Statistical Institute; specialist physician growth rates; and international data from Europe, the Americas, and global sources, according to service targets, population growth, high human development index countries, and global benchmarks.

RESULTS: According to Ministry of Health data, 693 licensed thoracic surgeons are currently registered as active physicians in Türkiye. In addition, 353 residents are undergoing specialist training in thoracic surgery. Based on annual outpatient visits (1,100,000) and hospitalization rate (5%), the required number of thoracic surgeons was calculated as 589. Based on specialist physician growth and population growth over the past decade, the required numbers were estimated as 586 and 589, respectively. According to European, American, and global benchmarks, the required numbers were 267, 351, and 102, respectively. Overall, calculations using all methods indicate a workforce excess ranging from 15% to 81.9%.

CONCLUSION: The number of thoracic surgeons in Türkiye is substantially higher than the estimated requirements and is expected to increase further due to ongoing residency training. National workforce planning based on objective criteria is needed to ensure alignment between training capacity and healthcare needs.

KEYWORDS: Thoracic surgery, workforce planning, human resources for health, specialist physician density, health policy

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INTRODUCTION

Safe and timely access to surgical care has been recognized as a fundamental component of universal health coverage.[1] Despite this recognition, the Lancet Commission's Global Surgery 2030 report concluded that approximately 5 billion people worldwide lack access to surgical care, particularly in low- and middle-income countries (LMICs), including for oncological indications.[2] Cancer surgery remains critically under-resourced in LMICs. In 2015, Sullivan et al.,[3] in the Lancet Oncology Commission's Global Cancer Surgery report, estimated that approximately 80% of new cancer cases would require surgical intervention. Lung cancer, as the leading cause of cancer-related mortality worldwide, represents a major component of this surgical burden.

Thoracic surgeon workforce capacity is a key determinant of access to surgical care for lung cancer. However, accurate data regarding the number and density of active thoracic surgeons remain limited due to heterogeneous certification

Corresponding author: Assoc. Prof. Necati Çıtak, MD, e-mail: necomomus@gmail.com

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systems and the absence of a harmonized global registry.[4] Recent international data presented at the International Association for the Study of Lung Cancer (IASLC) 2025 meeting demonstrated substantial disparities in thoracic surgeon density between high-income countries (HICs), MICs, and low-income countries, while projecting workforce declines in several HICs by 2035.[5]

A decade ago, our workforce analysis in Türkiye, utilizing data up to 2013, concluded that the country already had a 28.4% surplus of thoracic surgeons (n = 542 compared with a calculated need of 388) and warned that failure to regulate this increase could lead to underemployment and specialists seeking alternative career paths.[6] Given recent global data and updated national figures, this study aims to re-evaluate thoracic surgeon workforce trends in Türkiye over a 10-year period and contextualize the country within the global thoracic surgical workforce landscape.

MATERIAL AND METHODS

Study Design

This study was designed as a longitudinal, descriptive analysis of the thoracic surgery workforce in Türkiye. The study period spans 2005–2024, with the primary analytical focus on the 2015–2025 period and projections extending to 2028. The methodological framework was based on the workforce planning approach previously described in our 2015 national study and was updated using current national and international data sources.[6]

The analysis aimed to reassess the adequacy of the thoracic surgeon workforce using multiple independent calculation models and comparisons with international benchmarks.

No patient-level data were used. All data were obtained from publicly available national and international sources; therefore, ethics committee approval was not required.

Data Sources

National and International Data

National workforce modeling was performed using the following parameters: the annual number of thoracic surgery outpatient visits reported by the Ministry of Health, the outpatient-to-hospitalization rate, the bed occupancy rate, and the mean length of hospital stay in Ministry of Health hospitals.

In addition, the annual increase rates of specialist physicians and thoracic surgeons, population data obtained from the Turkish Statistical Institute (TÜİK), and the annual number of active thoracic surgeons were included in the analysis.

The 2015 population (78.7 million) was used as the reference year for the population growth model, as it represents the most recent complete dataset available when the original workforce projection was published. The number of individuals per thoracic surgeon was calculated by equating population growth to the increase in the number of thoracic surgeons.

Furthermore, data published in Europe and the United States (U.S.) were considered to determine the population-to-thoracic surgeon ratio in these regions and to adapt them to the national context. International thoracic surgeon density data were obtained from global mapping studies presented at international scientific meetings and published sources.[7-10] Density values were extracted for the global average, the European and American continents, and other World Health Organization regions. All density values were standardized per population unit to ensure comparability.

Workforce Estimation Models

The Service-target-based Model estimates workforce requirements based on parameters of healthcare service delivery. The calculation incorporated annual outpatient visit volume, the proportion of patients requiring hospitalization (5%), and the daily number of outpatient visits (≥25). Because branch-specific annual outpatient visit data published by the Ministry of Health were only available up to 2017,[11] the estimated thoracic surgery outpatient volume for 2025 was extrapolated by adjusting the 2017 value according to the proportional increase in total annual hospital admissions between 2017 and 2025. Annual inpatient workload and required specialist capacity were estimated using these variables, according to service targets defined by national health planning criteria.

Specialist Growth Rate Model: Workforce need was estimated by proportionally adjusting the number of thoracic surgeons according to the national growth rate of specialist physicians during the study period. The annual specialist growth rate was calculated using the methodology for demographic population growth rates. The net annual change in the number of specialists was divided by the mid-year specialist stock and then multiplied by 100 to obtain the annual percentage growth rate.

To integrate both the magnitude and velocity of expansion, a workforce composite growth index (CGI) was constructed as the ratio of the cumulative increase in specialists to the annual growth rate. This approach enabled the evaluation of dynamic expansion patterns rather than static proportional change alone. The CGI was calculated as follows: CGI = cumulative growth ratio (%) / annual growth rate.

Population Growth Model: Thoracic surgeon requirements were recalculated by maintaining the historical thoracic surgeon-to-population ratio and adjusting it according to national

Main Points

- According to multiple independent workforce models, the number of thoracic surgeons in Türkiye exceeds the estimated national requirement by 15% to 81%, indicating a substantial surplus.
- If the current growth trajectory continues, the number of active thoracic surgeons is projected to double within the next decade, potentially exacerbating the mismatch between workforce supply and healthcare demand.
- In international comparisons, Türkiye has nearly seven times the global average for thoracic surgeon density, underscoring the need for evidence-based and structurally informed workforce planning rather than continued numerical expansion of the workforce.

population growth. The 2015 population (78.7 million) was used as the reference year for the population growth model, as it represents the most recent complete dataset available when the original workforce projection was published.

Continental Benchmark Models: Required thoracic surgeon numbers were recalculated by applying thoracic surgeon density values observed in Europe and the Americas to the Turkish population, allowing benchmarking against high-income continental standards.

Global Benchmark Model: Global average thoracic surgeon density was applied to the Turkish population to estimate workforce need using worldwide benchmarks. Using continental and global benchmark models, thoracic surgeon density was standardized per 100,000 population and per 10 million population to enable direct comparisons between Türkiye and global regions.

Weighted Multi-model Estimation: To reduce model-specific bias, an aggregate estimate was generated by averaging the outputs of all independent models.

RESULTS

The number of thoracic surgeons in Türkiye was 256 in 2005 and increased to 380 in 2007, 433 in 2009, 524 in 2011, 542 by the end of 2013, and 693 by the end of 2023. At the beginning of 2024, 353 physicians were undergoing specialist training in thoracic surgery (residents). Accordingly, by 2028, excluding deaths, retirements of specialists, or discontinuations of training among residents, the number of specialist thoracic surgeons is projected to reach at least 1,046.

Service-target-based Model

According to data from the Ministry of Health, the estimated annual number of thoracic surgery outpatient visits in 2025 is approximately 1,100,000. Assuming that outpatient services can provide 5,000 consultations annually over 200 working days (200 working days×25 outpatient visits/day), 220 specialist physicians are required for outpatient services alone (1,100,000 outpatient visits/5,000 annual consultations per physician).

Given that at least 20 outpatient visits are required for each hospitalization (based on a targeted hospitalization rate of 5%), the annual number of inpatients is estimated at 55,000. Assuming a thoracic surgeon manages one inpatient per day, including all interventional procedures, a single surgeon would manage 200 inpatients per year (200 working days×1 patient/day), indicating a need for 275 specialists (55,000 patients/200 patients per physician).

Therefore, a total of 495 thoracic surgeons (220 for outpatient services and 275 for inpatient care) would be sufficient for Ministry of Health institutions. Given that the Ministry of Health manages 84% of the total workload, approximately 589 specialists would be required across all institutions to meet service targets.

Specialist Growth Rate Model

Thoracic surgeons accounted for 0.54% of all specialist physicians in 2005, increasing to 0.70% by 2024. Over the past decade (2013–2023), the number of specialist physicians in clinical and surgical departments in Türkiye increased by 29%, corresponding to an annual growth rate of 2.3%. Based on these results, the CGI was calculated as 12.6% (29/2.3). According to the CGI, the required number of thoracic surgeons was estimated at 586.

Population Growth Model

Over the past 20 years, the national population increased by 27.3%, while the number of thoracic surgeons increased by 170%. According to the TÜİK's Address-Based Population Registration System, the population was 78.7 million at the end of 2015. In the same year, there was one thoracic surgeon per 145,000 individuals (n = 542). Adjusting this ratio for the 2024 population of 85.6 million indicates that the required number of thoracic surgeons would be 589.

Continental and Global Benchmark Models

Thoracic surgeon density per 10 million population is 31.4 in Europe and 41.2 in the Americas, whereas the global average is 12 per 10 million population. In Türkiye, at the end of 2024, thoracic surgeon density was 80.9 per 10 million population. Based on these benchmark values, the required number of thoracic surgeons in Türkiye by the end of 2024 would be 267, 351, and 102, respectively.

Weighted Multi-model Estimation

The required number of thoracic surgeons in Türkiye, estimated as the average of the estimates from all models, was 414. Accordingly, the current workforce exceeds the estimated requirements by 40.2% (n = 279) (Table 1). Because no prior evidence exists to determine the superiority of any single model, equal weighting was applied; however, results are presented individually to allow independent interpretation.

DISCUSSION

A decade ago, our analysis using data up to 2013 demonstrated that Türkiye had a 28.4% surplus of thoracic surgeons (n = 542 compared with a calculated need of 388) and cautioned that failure to regulate the increasing workforce could result in underemployment and specialists seeking alternative career pathways.[6] Notably, this trend has continued unabated. Data presented at the 12th National Thoracic Surgery Congress indicate that the number of board-certified thoracic surgeons in Türkiye reached 693 by 2023, representing a 42% increase over the past decade.[12] Projections suggest that this number may rise to 1,045 by 2028, corresponding to a further 56% increase from 2023 levels. If the rate of increase in the number of thoracic surgeons observed recently continues, the number of active thoracic surgeons will double within 10 years. As shown in Table 1, the current number of thoracic surgeons in Türkiye exceeds the estimated national requirement by between 15% and 81%, depending on the methodology applied.

Table 1. The required number of thoracic surgery specialists, calculated based on specific variables, and its comparison with the current number (n = 693)

	Calculated	Difference from the current situation	Surplus from current workforce (%)
According to targets*	589	104	15.0
According to the growth rate of specialist physicians	586	107	15.4
According to the population growth rate	589	104	15.0
According to the European continent	267	426	61.4
According to the American continent	351	346	49.9
According to global data	102	568	81.9
Weighted average	414	279	40.2

*According to the Ministry of Health hospital data, the number of thoracic surgeons needed for our country is calculated based on the annual number of outpatient visits to thoracic surgery (1,100,000) and hospitalization rate (5%). "Surplus from current workforce (%)" represents the proportion of the current workforce that exceeds the calculated need

This national surplus should be interpreted within a broader global context, as highlighted in a recent presentation at the IASLC 2025 World Conference.[5] While many LMICs face a critical shortage of thoracic surgeons and several HICs anticipate a future workforce decline (e.g., a projected 29% reduction in the U.S. cardiothoracic workforce by 2035), Türkiye appears anomalous, characterized by a substantial oversupply. Recent global data report an average thoracic surgeon density of 12.0 per 10 million population worldwide and 31.4 per 10 million population in Europe. In contrast, the corresponding density in Türkiye is approximately 81 per 10 million population—nearly seven times the global average and 2.6 times the European average.

However, Europe should not be considered a homogeneous entity with respect to healthcare systems, economic development, or workforce distribution. Thoracic surgeon density varies considerably among European countries, with higher densities observed in Southern and Eastern Europe and lower densities in some Western and Northern regions. Consequently, although continental averages provide a useful macro-level benchmark, they may obscure substantial intra-continental heterogeneity. For this reason, the present study incorporated multiple independent estimation models rather than relying solely on European density values.

In contrast, workforce distribution in related specialties demonstrates a markedly different pattern. Whereas the European average density of adult pulmonologists is approximately 4.4 per 100,000 population, the corresponding figure in Türkiye is reported to be nearly half of this value.[13] This discrepancy suggests a potential imbalance in specialty-specific workforce planning within the national healthcare system.

The consequences of this oversupply are becoming increasingly tangible. Performance-based payment data from 2022–2023 indicate that thoracic surgeons' average performance scores rank among the lowest across surgical specialties, directly affecting remuneration.[14] The long-cited aphorism that "being a thoracic surgeon means being labeled as surplus" is, unfortunately, becoming a financial reality for many practitioners.

Concurrently, the Medical Specialty Examination score required for entry into thoracic surgery residency has declined by approximately 20%, and a substantial proportion of residency positions remain unfilled (up to 58.3% in certain chest disease hospitals), indicating waning interest in the specialty despite the continued increase in specialist numbers.[12] A cross-sectional study published in 2023 further reported that none of the surveyed sixth-year medical students in Türkiye expressed an intention to pursue a career in thoracic surgery.[15] This paradox underscores a critical systemic challenge in workforce planning.

Meanwhile, the number of institutions providing thoracic surgery residency training in Türkiye increased by 157%, from 26 in 2012 to 67 in 2022.[16,17] During the same period, the number of thoracic surgery training centers increased by 46% in Spain.[18] In Brazil, a country with approximately three times the population of Türkiye, the number of institutions offering thoracic surgery training is nearly half that of Türkiye (n = 35).[19] In France, which has a similar population size, only 25 thoracic surgery residency positions are offered annually-approximately one-eighth of the number available in Türkiye.[20] These findings underscore the need to reassess national workforce planning policies to ensure alignment between training capacity and projected healthcare demand.

Workforce planning in thoracic surgery should not be limited to determining the required number of specialists based solely on quantitative indicators. In addition to service volume, bed capacity, and population growth, essential factors such as specialist qualifications, job descriptions, healthcare system structure, and governance mechanisms must be considered. Medical science—particularly within academic institutions—extends beyond procedural volume to include research productivity, training quality, and the long-term sustainability of the specialty. Although the present study primarily focuses on quantitative workforce indicators, it aims to stimulate a broader discussion on comprehensive, structurally informed workforce planning.

Study Limitations

A further limitation of this study is the inability to apply the World Health Organization-recommended Workload Indicators of Staffing Need (WISN) methodology because of a lack of up-to-date, publicly available national workload data.

Potentially influential workforce variables such as maternity leave, mortality, retirement, migration abroad, and non-clinical employment patterns could not be evaluated. These factors may substantially affect the active thoracic surgery workforce and should be considered in future workforce planning models. Nevertheless, the use of multiple independent estimation models and international benchmarks provided a pragmatic assessment of thoracic surgery workforce adequacy in Türkiye. Future studies using standardized WISN-based approaches may enable more precise workforce planning.

CONCLUSION

Data from the past decade validate the concerns raised in our original report. The continued expansion of the thoracic surgery workforce in Türkiye has not been aligned with projected healthcare demand, resulting in a substantial surplus of thoracic surgeons, with measurable professional and economic implications for those surgeons. Addressing this imbalance will require a paradigm shift in workforce planning that moves beyond numerical estimations toward a more holistic framework encompassing service characteristics, defined job roles, and the structural features of the healthcare system. Responsible, evidence-based, and centralized planning—developed collaboratively by professional organizations, practicing physicians in the field, and experienced academic experts—will be essential to align training capacity with national needs and to ensure the long-term sustainability, professional satisfaction, and quality of care within the specialty.

Ethics

Ethics Committee Approval: All data were obtained from publicly available national and international sources; therefore, ethics committee approval was not required.

Informed Consent: No patient-level data were used. All data were obtained from publicly available national and international sources. Therefore informed consent was not used for this study.

Footnotes

Conflict of Interest: Necati Çıtak, MD, is an editor of Thoracic Research and Practice. He was not involved in the peer review of this article and had no access to information regarding its peer review.

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