Thailand Renal Replacement Therapy Registry 2023 Annual Data Report: Dialysis Center Providers in Thailand

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Abstract

End-stage kidney disease (ESKD) has emerged as a significant public health issue in Thailand, with the number of patients requiring renal replacement therapy steadily increasing over the past decade. This trend reflects a broader regional and global rise in the prevalence of chronic kidney disease and ESKD, driven by factors such as improved survival rates, demographic changes, and increased access to RRT. In response, Thailand has implemented an updated hemodialysis policy under the Universal Coverage Scheme to offer more patient-centered care. This study analyzes data from the Thailand Renal Replacement Therapy (TRT) Registry, exploring the growth of hemodialysis and peritoneal dialysis centers, the expansion of dialysis machine availability, and the rise in specialized healthcare professionals. The insights derived from this analysis are essential in understanding current challenges and shaping future healthcare strategies to meet the growing demand for dialysis services in Thailand.

Keywords: HD; PD; ESRD; renal failure; statistics; CKD

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รายงานประจำปีการลงทะเบียนบำบัดทดแทนไตของประเทศไทยปี 2566 ถึงผู้ให้บริการศูนย์ฟอกไตในประเทศไทย

บัญชา สถิระพจน์, พิชญ ตันติยวรงค์, อนันต์ เชื้อสุวรรณ, อดิสรณ์ ลำเพาพงศ์, กวี ลิ่มบุตร, ไกรวิพร เกียรติสุนทร, คณิน ธรรมาวรานุคุปต์, ณัฏฐา ล้ำเลิศกุล, ปรมัตถ์ ธิมาไชย, พรพิมล เรียนถาวร, วัทธิกร พิชิตพร, วิจิตรา โชติมงคล, สุขฤทัย เลขยานนท์, สุวิกรานต์ วงศ์ประไพโรจน์, ชญาภา วรพิทยาภรณ์, นฤนาถ คีรีวรรณ์, นันทนา ชปิลเลส, นิภา อัยยสานนท์, ปวีณา สิงห์ทิศ, ปิยาภรณ์ โทวันนัง, มณภิญญา ฉัตรทอง หอมจัน, สร้อยสะอาง สร้างสมวงษ์, สุนทรี เพิ่มพูลสวัสดิ์, อรอุมา เพ่งพินิจ, เถลิงศักดิ์ กาญจนบุษย์, วุฒิเดช โอภาศเจริญสุข

คณะอนุกรรมการการลงทะเบียนบำบัดทดแทนไต สมาคมโรคไตแห่งประเทศไทย

บทคัดย่อ

โรคไตวายระยะสุดท้ายได้กลายเป็นปัญหาสาธารณสุขที่สำคัญในประเทศไทย โดยจำนวนผู้ป่วยที่ต้องการการบำบัดทดแทนไตมีแนวโน้มเพิ่มขึ้นอย่างต่อเนื่องในช่วงทศวรรษที่ผ่านมา แนวโน้มนี้สะท้อนถึงการเพิ่มขึ้นของความชุกของโรคไตเรื้อรัง และโรคไตวายระยะสุดท้ายทั้งในระดับภูมิภาคและระดับโลก ซึ่งเกิดจากปัจจัยต่าง ๆ เช่น อัตราการรอดชีวิตที่ดีขึ้น การเปลี่ยนแปลงโครงสร้างประชากร และการเข้าถึงการบำบัดทดแทนไตที่เพิ่มขึ้น เพื่อตอบสนองต่อสถานการณ์ดังกล่าว ประเทศไทยได้ดำเนินการปรับปรุงนโยบายฟอกเลือดด้วยเครื่องไตเทียมภายใต้โครงการประกันสุขภาพถ้วนหน้าเพื่อมุ่งเน้นการดูแลผู้ป่วยอย่างมีประสิทธิภาพมากขึ้น งานวิจัยนี้วิเคราะห์ข้อมูลจากฐานข้อมูลการบำบัดทดแทนไตของประเทศไทย โดยศึกษาเกี่ยวกับการเติบโตของศูนย์ฟอกเลือดด้วยเครื่องไตเทียมและการล้างไตทางช่องท้อง การขยายตัวของจำนวนเครื่องฟอกไต และการเพิ่มจำนวนบุคลากรทางการแพทย์เฉพาะทาง ข้อมูลเชิงลึกจากการวิเคราะห์นี้มีความสำคัญต่อการเข้าใจความท้าทายในปัจจุบัน และช่วยกำหนดกลยุทธ์ด้านสุขภาพในอนาคตเพื่อตอบสนองความต้องการบริการฟอกไตที่เพิ่มขึ้นในประเทศไทย

คำสำคัญ: ไตวาย; ไตเสื่อม; ฟอกเลือด; ล้างไต; โรคไตเรื้อรัง

Introduction

End-stage kidney disease (ESKD) has become a significant public health concern in Thailand, with a rising number of patients requiring renal replacement therapy (RRT) over the past decade.[1] This trend is also evident across Southeast Asia, driven by factors such as improved survival rates, demographic changes, increased prevalence of risk factors like diabetes and hypertension, and better access to RRT in emerging economies.[2,3] This increase in chronic kidney disease (CKD) prevalence has led to a

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corresponding rise in the number of patients requiring dialysis, with over 20,000 individuals needing treatment annually.[4] This growing burden on healthcare systems demands a proactive response.

Dialysis care in Asia is defined by government support, patient-centered policies, and a focus on enhancing access to high-quality kidney care services. Despite this progress, disparities persist between affluent nations and lower-income countries in the region, where economic limitations and challenges in healthcare infrastructure often constrain access to adequate renal care.[5-9] In Thailand, the major challenge under the peritoneal dialysis (PD) first policy is the transfer of patients from peritoneal dialysis to hemodialysis, with the risks of transfer changing over time.[10] In Thailand, the landscape of RRT has experienced a significant shift with the introduction of an updated hemodialysis policy under the Universal Coverage Scheme (UCS), effective February 1, 2022. This policy empowers patients with ESKD to choose their preferred treatment modality—either hemodialysis or peritoneal dialysis—thereby fostering a more patient-centered approach to care.[11] This shift mirrors global trends toward personalized healthcare, allowing individuals to make informed choices based on their unique health needs and preferences.[12]

Despite these advancements, there are growing concerns regarding the healthcare system's capacity to accommodate the anticipated surge in demand for RRT services. Experts predict that approximately 15,000 additional patients may opt for hemodialysis within the first year of this policy's implementation, raising questions about the adequacy of existing infrastructure and resources to meet this increased need. The National Health Security Office (NHSO) acknowledges these challenges and emphasizes the necessity for strategic planning and resource allocation to ensure that all patients receive timely and effective care.

A pivotal tool in addressing these challenges is the Thailand Renal Replacement Therapy (TRT) Registry. This comprehensive database is crucial in tracking patient demographics, treatment modalities, and clinical outcomes across various hemodialysis centers nationwide. By systematically collecting and analyzing this data, the TRT Registry provides valuable insights into current practices, identifies trends over time, and highlights areas requiring improvement. Such information is essential for guiding policy decisions and optimizing RRT delivery nationwide.

This report presents an analysis of data from the TRT Registry, offering a comprehensive review of dialysis center providers in Thailand. The study was approved by the Institutional Review Board of the Royal Thai Army Medical Department (Approval number IRBRTA 1445/2567), Bangkok, Thailand. The findings from this analysis aim to enhance RRT services nationwide, ensuring that all patients with ESKD receive high-quality care tailored to their individual needs.

Methods

We conducted a comprehensive review of national registry data collected by the TRT program. This dataset provided detailed information on dialysis services and resources in Thailand between 2018 and 2023. Specifically, we analyzed data on demographic factors, including age, gender, and other relevant characteristics of dialysis patients; the distribution of dialysis centers, focusing on the geographic locations of hemodialysis and peritoneal dialysis centers across Thailand, categorized by region; and dialysis equipment and resources, including the number of hemodialysis machines and the availability of human resources (e.g., trained personnel) across all 77 provinces in Thailand. Ethical approval for this study was obtained from the Institutional Review Board of the Royal Thai Army Medical Department (Approval number: IRBRTA 1445/2567), Bangkok, Thailand.

Descriptive statistics were used to summarize the data, with continuous variables (e.g., number of dialysis machines) reported as mean ± standard deviation (SD) for normally distributed data and as interquartile range (IQR) for non-normally distributed data, while categorical variables (e.g., the number of dialysis centers in each region) were presented as frequencies (absolute numbers) and percentages. This approach

allowed for a detailed analysis of dialysis care infrastructure and resources, offering insights into regional distributions and identifying areas for potential improvement.

Results and Discussion

Number of Hemodialysis Centers in Thailand

The number of hemodialysis centers in Thailand has steadily increased from 2007 to 2023, reflecting the rising burden of ESKD in the country, as shown in **Figure 1.** By 2023, a total of 1,106 hemodialysis centers had been established across Thailand, highlighting both the growing demand for dialysis services and efforts to expand access to renal care. This expansion underscores the increasing prevalence of CKD and ESKD, as well as the healthcare system's response to meet the growing need for dialysis treatment.

Number of Peritoneal Dialysis Centers in Thailand

The prevalence of peritoneal dialysis centers in Thailand has shown a consistent, though slight, increase from 2007 to 2023, as shown in **Figure 2.** Notably, between 2017 and 2018, the number of peritoneal dialysis centers increased from 145 to 193, reflecting a period of significant growth in the availability of this treatment modality. However, from 2018 to 2023, the establishment of new peritoneal dialysis centers stabilized, with the total number rising modestly from 193 to 203 centers across Thailand. This suggests that while there has been a steady expansion of peritoneal dialysis services, the rate of growth has slowed in recent years, likely due to factors such as capacity limitations, regional healthcare needs, and the shifting landscape of renal care.

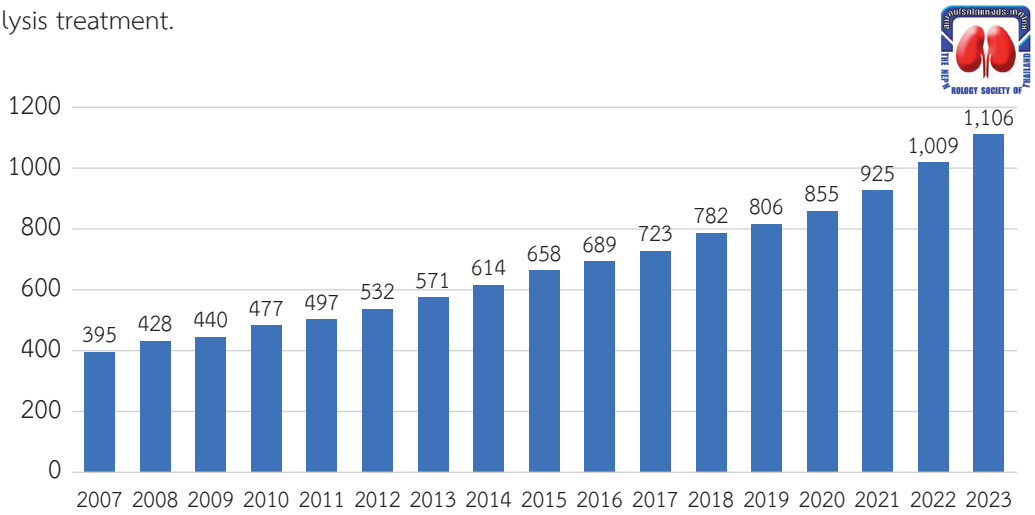

Figure 1 Number of Hemodialysis Centers from 2007 to 2023

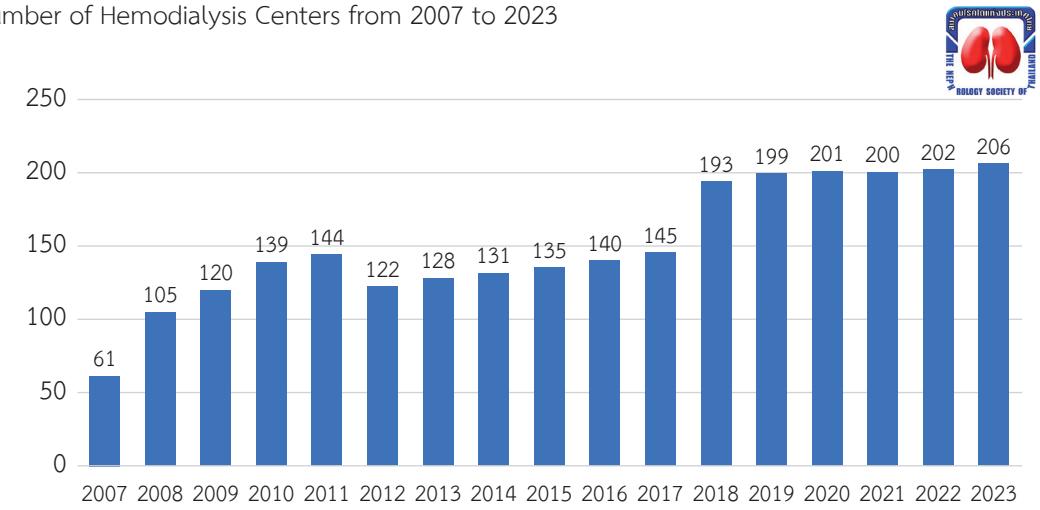

Figure 2 Number of Peritoneal dialysis Centers from 2007 to 2023

Distribution of Hemodialysis Centers Across Regions in Thailand

The distribution of hemodialysis centers across regions in Thailand has remained relatively consistent over the years, as shown in **Table 1.** However, data from 2023 indicates that the majority of hemodialysis centers are concentrated in two key regions: Bangkok and its vicinity, which account for 31.1% of the total hemodialysis centers, and the Northeastern region, which houses 27.3% of the centers. This distribution reflects the centralization of healthcare services in urban areas, particularly in Bangkok, while the Northeastern region also plays a significant role in providing dialysis care. The remaining centers are spread across the Southern, Northern, and Central regions, contributing to the nationwide availability of hemodialysis services.

Table 1 Distribution of hemodialysis centers across regions

Region	2018	2019	2020	2021	2022	2023
Bangkok and Vicinity	256 (32.7%)	270 (33.5%)	288 (33.7%)	314 (34.0%)	324 (32.1%)	344 (31.1%)
Central Part	88 (11.3%)	83 (10.3%)	86 (10.1%)	93 (10.1%)	110 (10.9%)	110 (9.9%)
Western Part	35 (4.5%)	37 (4.6%)	36 (4.2%)	37 (4.0%)	44 (4.4%)	45 (4.1%)
Eastern Part	62 (7.9%)	64 (7.9%)	70 (8.2%)	76 (8.2%)	85 (8.4%)	96 (8.7%)
Northeastern Part	199 (25.4%)	199 (24.7%)	214 (25.0%)	235 (25.2%)	258 (25.6%)	302 (27.3%)
Northern Part	67 (8.6%)	80 (9.9%)	81 (9.4%)	81 (8.8%)	94 (9.3%)	105 (9.5%)
Southern Part	75 (9.6%)	73 (9.1%)	80 (9.5%)	89 (9.6%)	94 (9.3%)	104 (9.4%)
Total	782 (100%)	806 (100%)	855 (100%)	925 (100%)	1,009 (100%)	1,106 (100%)

Distribution of Peritoneal Dialysis Centers Across Regions in Thailand

The distribution of peritoneal dialysis centers across regions in Thailand has remained relatively proportional over the years, as shown in **Table 2.** However, data from 2023 indicates that the majority of peritoneal dialysis centers are concentrated in two key regions. The Northeastern region hosts the largest proportion, with 30.6% of the total peritoneal dialysis centers, reflecting the region's significant need for renal care. Bangkok and its vicinity follow, accounting for 18% of the total peritoneal dialysis centers, highlighting the centralization of healthcare services in the capital and surrounding areas. The remaining centers are distributed across the Southern, Northern, and Central regions, contributing to broader access to peritoneal dialysis treatment nationwide.

Number of Hemodialysis Machines

The number of hemodialysis machines in Thailand has consistently increased from 2012 to 2023, reflecting the growing burden of ESKD and the corresponding demand for dialysis services, as shown in **Table 3.** By 2023, a total of 12,353 hemodialysis machines had been installed across the country, demonstrating the healthcare system's efforts to expand capacity in response to the rising prevalence of ESKD. This increase in hemodialysis machines highlights the country's focus on enhancing renal care infrastructure, ensuring more

machines are available to meet the increasing demand for dialysis treatments. The expansion underscores the significant healthcare challenges posed by ESKD and the continued need for resources to manage this chronic condition.

Table 2 Distribution of Peritoneal Dialysis Centers Across Regions

Region	2018	2019	2020	2021	2022	2023
Bangkok and Vicinity	39 (20.2%)	39 (19.6%)	38 (18.9%)	37 (18.5%)	37 (18.3%)	37 (18.0%)
Central Part	29 (15.0%)	29 (14.6%)	29 (14.4%)	29 (14.5%)	28 (13.9%)	28 (13.6%)
Western Part	9 (4.7%)	10 (5.0%)	10 (5.0%)	10 (5.0%)	10 (5.0%)	11 (5.3%)
Eastern Part	13 (6.7%)	16 (8.0%)	17 (8.5%)	18 (9.0%)	18 (8.9%)	20 (9.7%)
Northeastern Part	58 (30.1%)	59 (29.6%)	60 (29.9%)	60 (30.0%)	62 (30.7%)	63 (30.6%)
Northern Part	20 (10.4%)	22 (11.1%)	22 (10.9%)	21 (10.5%)	22 (10.9%)	22 (10.7%)
Southern Part	25 (13.0%)	24 (12.1%)	25 (12.4%)	25 (12.5%)	25 (12.4%)	25 (12.1%)
Total	193 (100%)	199 (100%)	201 (100%)	200 (100%)	202 (100%)	206 (100%)

Table 3 Growth in the Number of Hemodialysis Machines in Thailand (2012–2023)

Year	Number of Hemodialysis Machines
2012	5,271
2013	5,598
2014	5,359
2015	6,638
2016	7,423
2017	7,830
2018	8,196
2019	8,804
2020	10,512
2021	11,045
2022	11,613
2023	12,353

Human Resources of Dialysis Centers

The number of full-time qualified physicians, dialysis nurse specialists, and trained nurses who completed 4- or 6-month short courses in hemodialysis and peritoneal dialysis in Thailand has consistently increased from 2018 to 2023, reflecting the rising burden of ESKD and the growing need for specialized renal care professionals, as shown in **Table 4.** By 2023, the data indicated the following totals for healthcare professionals:

- 931 full-time qualified physicians
- 2,048 dialysis nurse specialists
- 1,932 nurses trained in hemodialysis through 4- or 6-month short courses
- 282 nurses trained in peritoneal dialysis through 4- or 6-month short courses

This steady increase in the number of qualified professionals highlights the healthcare system's efforts to expand the workforce to meet the growing demand for dialysis treatments. The data also underscores the

importance of specialized training programs to equip healthcare workers with the necessary skills to manage the complexities of dialysis care, ultimately supporting improved outcomes for ESKD patients.

Table 4 Human Resources in Dialysis Centers Across Thailand

Category	2018	2019	2020	2021	2022	2023
Full-time qualified physicians	482	782	716	722	799	931
Full-time dialysis nurse specialists	918	1,464	1,479	1,393	1,541	2,048
4/6 months short course hemodialysis trained nurses	1,089	1,767	1,724	1,930	1,913	1,932
4/6 months short course peritoneal dialysis trained nurses	132	229	181	157	165	282

Sharing Dialysis Center by Provider

The establishment of hemodialysis centers in Thailand has been predominantly within private and government centers, with a consistent increase in the number of centers from 2019 to 2023, as shown in **Table 5.** By 2023, data indicated that a total of 623 hemodialysis centers had been established in the private sector, while 467 centers were set up in the government sector across the country. This steady growth reflects ongoing efforts to expand dialysis services in both the private and government sectors to address the increasing demand for ESKD care. The higher number of private centers suggests a growing role for the private sector in providing dialysis services, while government centers continue to play a critical role in serving the broader population, particularly in rural and underserved areas.

Table 5 Growth in the Number of Dialysis Centers by Provider

Year	Government (HD)	Government (PD)	Private (HD)	Private (PD)	Non-Governmental Organizations (HD)	Non-Governmental Organizations (PD)
2019	378	197	416	-	12	2
2020	389	198	449	-	17	3
2021	413	197	494	-	18	3
2022	440	199	553	-	16	3
2023	467	203	623	-	16	3

HD, hemodialysis; PD, peritoneal dialysis

However, peritoneal dialysis centers in Thailand have been exclusively established within government hospitals, with a consistent but slow increase in the number of centers from 2019 to 2023. This gradual rise in the number of peritoneal dialysis centers reflects the government's efforts to expand renal care services, particularly in response to the growing burden of ESKD. The slower pace of expansion, compared to hemodialysis centers, may be due to various factors such as infrastructure requirements, patient population, and the need for specialized training and equipment for peritoneal dialysis.

Status of Dialysis Center

The establishment of hemodialysis centers in Thailand has primarily occurred within in-hospital dialysis centers, though there has been a dramatic

increase in the number of out-hospital dialysis centers from 2019 to 2023, as shown in **Table 6.** By 2023, data indicated that a total of 780 hemodialysis centers were set up within in-hospital dialysis facilities, while 326 centers were established in out-hospital dialysis centers across the country. This shift highlights the growing trend of providing dialysis services outside traditional hospital settings, likely driven by the demand for more accessible treatment options and the expansion of outpatient services.

Table 6 Growth in the Number of Dialysis Centers by Type

Year	In-Hospitalized Dialysis Centers (HD)	In-Hospitalized Dialysis Centers (PD)	Out-Hospitalized Dialysis Centers (HD)	Out-Hospitalized Dialysis Centers (PD)
2019	640	199	166	-
2020	674	201	181	-
2021	718	200	207	-
2022	738	202	271	-
2023	780	206	326	-

HD, hemodialysis; PD, peritoneal dialysis

In contrast, Thailand's peritoneal dialysis centers have been established exclusively within in-hospital settings, with a consistent, though slow, increase in the number of centers from 2019 to 2023. This gradual growth underscores the importance of hospital-based infrastructure for peritoneal dialysis, which requires specialized monitoring and support services. The limited expansion in the outpatient sector for peritoneal dialysis reflects the unique requirements for the modality, including patient selection, training, and care coordination.

Operation Type of Dialysis Center

The establishment of hemodialysis centers in Thailand has predominantly relied on in-house dialysis facilities. However, between 2019 and 2023, there was a significant increase in the number of centers offering outsourced dialysis services and private standalone clinics, as shown in **Table 7.** By 2023, data revealed that 587 hemodialysis centers were operated directly by in-house dialysis facilities, while 208 centers and 311 centers provided outsourced dialysis services and private standalone clinics, respectively, across the country.

Table 7 Growth in the Number of Hemodialysis Centers by Service Type

Year	In-house Government Hospital Centers	Outsourced Government Hospital Centers	In-house Private Hospital Centers	Outsourced Private Hospital Centers	Private Standalone Clinics	In-house Non-Governmental Organizations
2019	318	60	208	52	156	12
2020	321	68	215	62	172	17
2021	326	87	221	70	203	18
2022	328	112	228	74	251	16
2023	338	129	233	79	311	16

This notable growth in outsourced services highlights efforts to expand access to dialysis treatment, particularly in regions where establishing and managing in-house facilities is logistically or economically challenging. Furthermore, the number of private standalone clinics also increased substantially during this period.

Outsourced dialysis services and private standalone clinics have become essential strategies to address the rising care demand among ESKD patients. These approaches are crucial for improving access to life-saving dialysis treatments for patients in both urban and rural areas, ensuring that the growing need for ESKD care is met more effectively. This report has several notable strengths and limitations. One major strength lies in its comprehensive scope, as it leverages the TRT Registry, a national database, to provide a thorough analysis of dialysis services, resources, and infrastructure across the country. Additionally, the longitudinal nature of the data, spanning from 2018 to 2023, offers valuable insights into trends over time, enabling the identification of areas of growth and persistent challenges. The dataset is also highly detailed, encompassing demographic factors, regional distributions, equipment availability, and workforce metrics, collectively providing a holistic view of dialysis care in Thailand.

Limitations of the study

However, the study has certain limitations. It primarily relies on descriptive statistics, which restricts its ability to infer causal relationships or evaluate the effectiveness of specific interventions. While regional disparities in dialysis care are highlighted, the study does not deeply explore their underlying causes or propose targeted solutions for underserved areas. The analysis is also limited in its inclusion of patient-level data, lacking insights into critical outcomes such as quality of life or long-term clinical results. Moreover, while the study

emphasizes dialysis infrastructure and workforce metrics, it does not address broader factors affecting dialysis access, such as socioeconomic barriers or patient adherence. Another notable limitation is the exclusion of private-sector dynamics in peritoneal dialysis. However, the role of private providers in expanding hemodialysis services is acknowledged, and the reasons behind the exclusivity of government-operated peritoneal dialysis centers remain unexplored. Lastly, the data only extends to 2023, potentially missing the full impact of the 2022 policy changes, as these effects may take more time to materialize.

Conclusion

The rising prevalence of ESKD in Thailand highlights the increasing demand for renal replacement therapies, which has led to the expansion of hemodialysis and peritoneal dialysis centers across the country. With a steady increase in the number of dialysis machines, trained healthcare professionals, and healthcare facilities offering both in-house and outsourced dialysis services, Thailand's healthcare system is making significant strides to address the growing burden of ESKD. However, challenges remain, particularly concerning the capacity of the healthcare infrastructure to accommodate the projected rise in patient numbers. The implementation of the updated hemodialysis policy and the continued expansion of healthcare resources will be crucial in ensuring equitable and timely access to dialysis care for all patients. Continued monitoring through the TRT Registry and strategic planning are essential to optimize renal care delivery and meet the evolving needs of ESKD patients.

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon request.

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