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Saudi dental postgraduate education (2013–2023): demographic shifts and potential employment challenges

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Abstract

Background Dentistry is essential for oral health, focusing on the diagnosis, prevention, and treatment of oral diseases. In recent decades, Saudi Arabia has expanded its dental education system, adding new dental schools and postgraduate programs to meet the growing demand for professionals. This study provided a detailed analysis of the trends and demographic characteristics of dental postgraduate programs in Saudi Arabia between 2013 and 2023.

Methods This retrospective study collected data on dental postgraduate programs from the Saudi Commission for Health Specialties (SCFHS) for the period from January 2013 to December 2023. Data were gathered on program types, gender, nationality, and geographic distribution. Descriptive statistics were used to analyze trends and distributions. Key variables included the number of postgraduate dental specialty programs, enrolled students, and training levels (board, fellowship). Institutional Review Board (IRB) approval was obtained, and the data was processed using Microsoft Excel 2016.

Results The study revealed a total of 1,520 dental postgraduates, with a near-equal gender distribution (51.4% males and 48.6% females). Saudi nationals represented 94.8% of board residency graduates, while 2.4% were non-Saudis. Riyadh had the highest concentration of postgraduates, followed by Makkah. A significant increase in postgraduate enrollment was observed, peaking at 398 in 2023.

Conclusions The findings indicate significant growth in Saudi dental postgraduate programs, with regional disparities and increasing numbers of graduates. However, this growth raises concerns about potential unemployment among dental postgraduates, as the number of available positions may not match the surge in graduates. Policymakers must evaluate the expanding programs and their potential impact on the Saudi dental workforce.

Keywords Dental Workforce, Postgraduate Dental Education, Residency Programs, Saudi Arabia, SCFHS, Unemployment

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Introduction

The World Health Organization (WHO) defines a dentist as a healthcare professional specializing in the diagnosis, prevention, and treatment of diseases and conditions affecting the oral cavity, including the teeth, gums, and related structures [1]. According to the American Dental Association, the scope of dental practice includes *the evaluation, diagnosis, prevention and treatment of diseases and disorders of the oral cavity, maxillofacial area and the associated within the dentist's education, training, and experience, in accordance with the professional ethics and applicable law* [2].

General dentistry plays a critical role in delivering basic dental care, identifying oral health concerns, and collaborating with specialists to provide comprehensive care for patients with complex dental needs [3]. Graduate dentists often seek postgraduate programs to specialize, advance professionally, enhance their expertise, pursue personal interests, and improve patient care [4]. A survey conducted among students at the Harvard School of Dental Medicine found that the intellectual content and unique skills required by certain specialties were the primary factors influencing students' specialty choices, while family influence was considered the least important factor [5].

Saudi Arabia has seen rapid growth in dental education, with 25 dental schools established, including 18 public and seven private institutions reported by The Saudi Commission for Health Specialties (SCFHS) [6]. This expansion reflects the country's strong commitment to advancing dentistry. Over time, the dentist-to-patient ratio has significantly improved, from 1:8906 in 1978 to 1:1288.16 by 2020, due to the increasing number of dental graduates each year [7, 8]. The number of registered dentists in Saudi Arabia was 16,887, which increased to 27,181 by 2020 [7, 8]. These figures include all registered dentists working in both public and private sectors. Specifically, in 2020, 33.9% of registered dentists were employed in the public sector, while 66.1% worked in private practices [8, 9].

A study on postgraduate dental education among Saudi dentists revealed that 90% expressed a desire for advanced training [10]. Research on female graduates from King Saud University's College of Dentistry between 1984 and 2006 showed that 54% pursued postgraduate education, with 11% planning further studies [11]. Similarly, a study on male graduates from 1982 to 2004 found that 77% had completed postgraduate education, with 4% intending to pursue further studies [12]. These findings highlight the strong interest among dental graduates in continuing their education.

SCFHS oversees the regulation and accreditation of healthcare specialties, including dentistry, in Saudi Arabia. The SCFHS offers 21 specialized dental programs for postgraduate education, with Prosthodontics and Endodontics being the most popular [8]. Several factors influence the decision to pursue a particular dental specialty, with family involvement in the profession often cited as the most influential [13]. Financial considerations, such as potential income and future living costs, also play a key role [14, 15]. In Pakistan, many dental residents choose their specialty based on the types of cases they encounter in practice [16]. Personal enjoyment, previous dental school experience, and faculty influence are also important determinants in selecting a specialty [4, 17].

To the best of our knowledge, no prior study has evaluated dental postgraduate programs in Saudi Arabia. This research aims to fill that gap by analyzing their demographics and assisting graduate dental students in making informed decisions regarding their educational paths. Additionally, it provides policymakers with essential data to assess the current state of postgraduate dental education and identify areas for improvement. Thus, this study aims to comprehensively examine the demographic characteristics of Saudi dental postgraduate programs.

Materials and methods

Dataset and study cohort

This retrospective study design obtained data on Saudi dental postgraduate programs from SCFHS for the period of January 2013 to December 2023, through email communication, utilizing purposive sampling. On August 2024 King Abdullah International Medical Research Center Institutional Review Board approved this study, as it did not involve human subjects (IRB# NRR24/088/8). Data processing and analysis were conducted using Microsoft Office Excel 2016 software (Microsoft Corporation, Redmond, WA, USA).

Key variables

The key variables in this study included the number of postgraduate dental specialty programs, graduated and enrolled students, gender, nationality, and training level (Board, fellowship), analyzed over multiple years. Currently, the SCFHS offers nine dental residency programs: endodontics, family dentistry, oral and maxillofacial surgery, oral medicine and pathology, orthodontics and dentofacial orthopedics, pediatric dentistry, periodontics, prosthodontics, and restorative dentistry. Additionally, there are six dental specialties providing master's programs available in the following areas: endodontics, orthodontics and dentofacial orthopedics, pediatric dentistry, periodontics, prosthodontics, and restorative dentistry.

The geographic distribution of these programs was analyzed across all 13 regions of Saudi Arabia: Al-Bahah, Al-Jawf, Al-Madinah, Al-Qassim, Asir, Eastern Province, Hail, Jizan, Makkah, Najran, Northern Borders, Riyadh,

Table 1 Distribution of dental postgraduates by gender and nationality across board and fellowship programs

Nationality	Program type	Female *N* (row %)	Male *N* (row %)	Total *N* (column %)
Saudi	Board	710 (49.3)	731 (50.7)	1441 (94.8)
	Fellowship	7 (16.3)	36 (83.7)	43 (2.8)
Non-Saudi*	Board	22 (61.1)	14 (38.9)	36 (2.4)
Total		739 (48.6)	781 (51.4)	1520 (100)

* There are no fellowship programs for non-Saudi nationals

and Tabuk. An "Unknown region" category was also included for those who did not specify their practicing location.

Results

Descriptive statistics

The data reveals 1,520 dental postgraduates categorized by gender and nationality (Table 1). Among Saudi postgraduates in board residency programs, males and females were almost equally distributed, with 731 males (50.7%) and 710 females (49.3%), representing 1,441 (94.8%) of the total dental postgraduates. In the fellowship category, the numbers were significantly lower, with only 7 females (16.3%) and 36 males (83.7%), totaling 43 (2.8%) of the total dental postgraduates. In the non-Saudi category, there were 22 females (61.1%) and 14 males (38.9%), accounting for 36 (2.4%) of the total dental postgraduates, with none in the fellowship programs. Overall, the total number of dental postgraduates included 739 (48.6%) females and 781 (51.4%) males.

Trends in Dental postgraduates in Saudi Arabia (2013–2023)

The data illustrates a marked increase in the number of all postgraduates from Saudi dental programs, including board and fellowship training programs, over the past decade (Fig. 1). Starting from a modest 41 graduates in 2013, there was a steady rise in numbers, reaching 54 in 2014 and climbing to 112 by 2019. A significant surge occurred in 2020, with postgraduates peaking at 243. Although there was a slight decline to 144 postgraduates in 2021, the trend resumed its upward trajectory in 2022, with 203 postgraduates. The highest recorded number was in 2023, with 398 postgraduates (Fig. 1).

Geographic distribution of dental postgraduates of board residency programs

Of the 1,477 Board Residency Program postgraduates, 1441 (97.6%) were Saudi nationals, while 36 (2.4%) were non-Saudis. The distribution of Saudi dental postgraduates from Board Residency Programs across Saudi Arabia varies (Fig. 2). Riyadh had the highest number, with 739 postgraduates (51.3%), followed by Makkah with 369 (25.6%). Additionally, 130 postgraduates (9.0%) were categorized under "Unknown." In Riyadh, males accounted for 401 (54.3%) males and females 338 (45.7%). Makkah had a more balanced distribution, with 215 females (58.3%) and 154 males (41.7%). In contrast, other regions, such as Al-Bahah, Al-Jawf, Al-Qassim, Hail, Jizan, Najran, Northern Borders, and Tabuk, reported significantly fewer postgraduates, each with fewer than 10 during the period from 2013 to 2023.

Regarding the fellowship programs, there were a total of 43 Saudi graduates, consisting of 36 (83.7%) and 7 females (16.3%). Geographically, most fellows were located in Riyadh, with 22 graduates (51.2%), followed by Makkah with 21 graduates (48.8%). The peak year was 2020, with 10 graduates (23.3%), followed by a decrease to 3 graduates (7.0%) in 2021. Fellowship data are presented in (Additional F1).

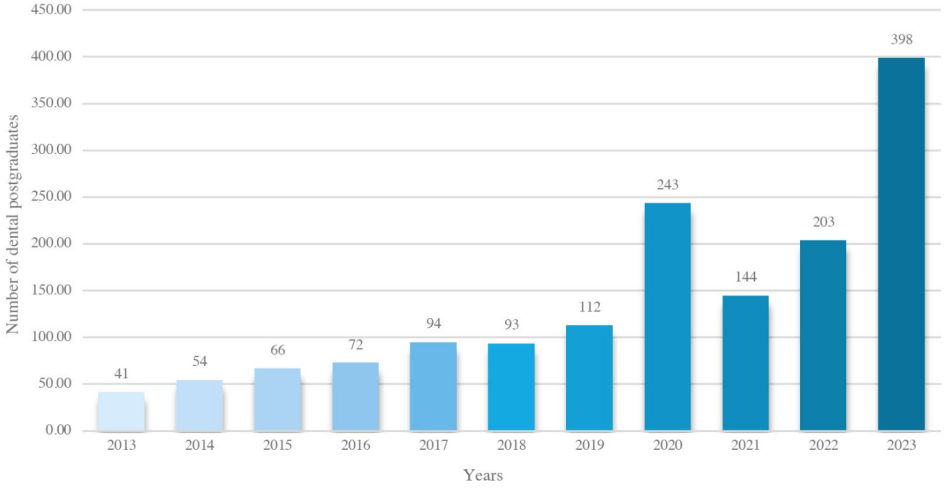

Fig. 1 Trends in the total number of dental postgraduates from 2013 to 2023

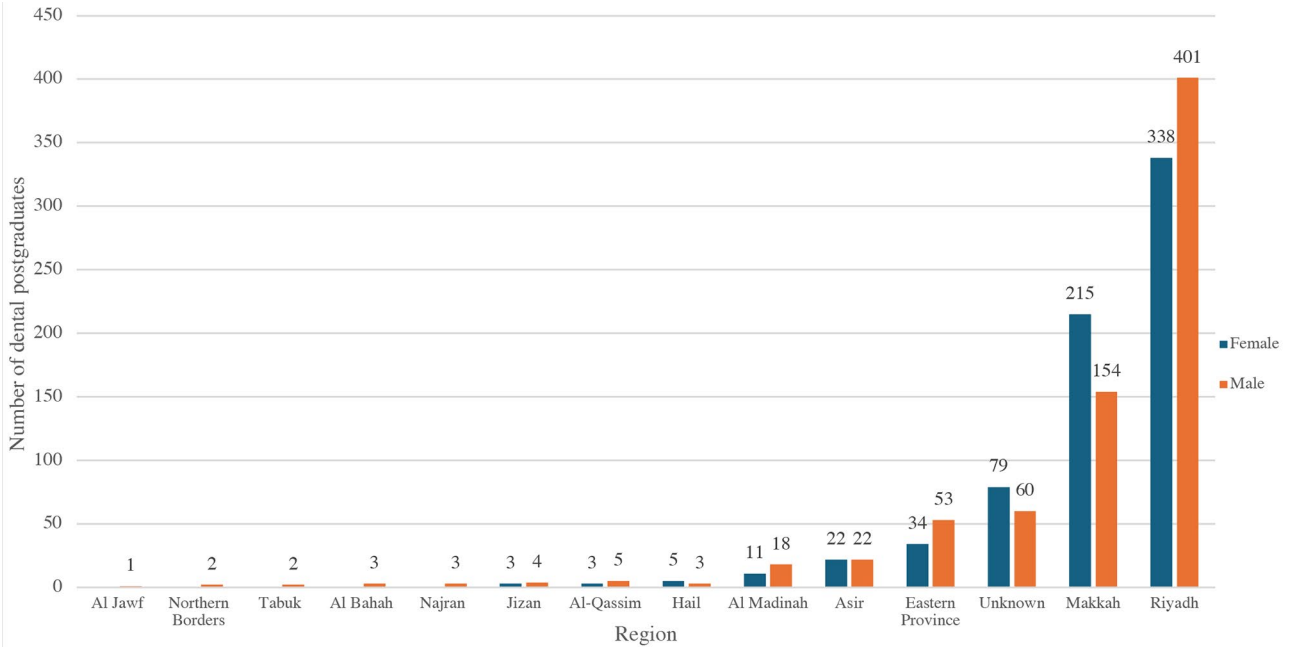

Fig. 2 Gender and regional distribution of saudi dental postgraduates in board residency programs

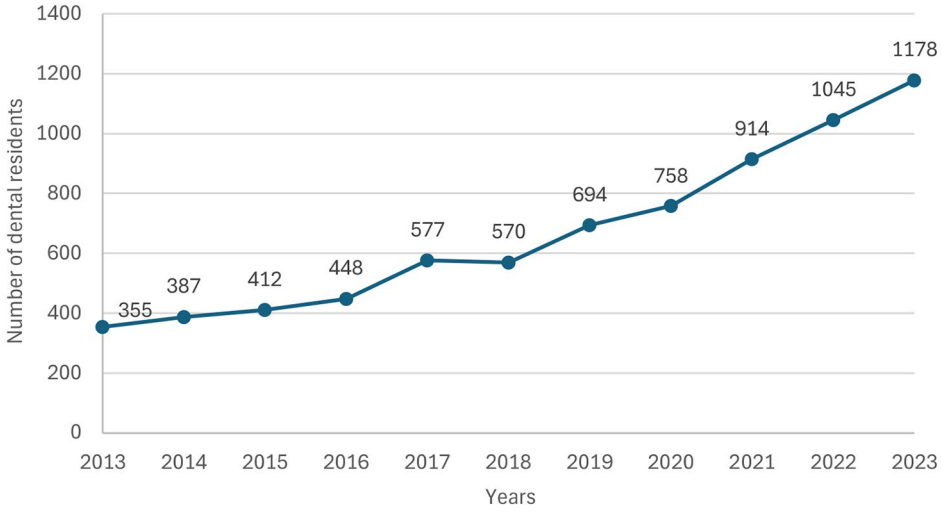

Fig. 3 Growth in the total number of dental residents over the period of 2013–2023

Changes in the total number of dental residents (2013–2023)

A significant upward trend in the total number of dental residents from 2013 to 2023 was noticed (Fig. 3). Starting with 355 residents in 2013, there was a gradual increase over the years, with fluctuations observed in 2017 and 2018, where the numbers were 577 and 570, respectively. The count continued to rise steadily, reaching 694 in 2019 and 758 in 2020. Notably, there was a sharp increase in 2022, with the total reaching 1,045 residents, and this growth persisted into 2023, culminating in 1,178 residents.

Trends in resident distribution across dental specialties (2013–2023)

Postgraduate dental board residency programs were available in seven specialties: endodontics, oral and maxillofacial surgery, orthodontics and dentofacial orthopedics, pediatric dentistry, periodontics, prosthodontics, and restorative dentistry in 2013, with a consistent number of residents per program over the years. Starting in 2016, there was a significant increase in the number of residents in all specialties, with a steady rise, except for a drop in 2018 (Fig. 4). Family dentistry and oral medicine and pathology were introduced in 2017 and 2019,

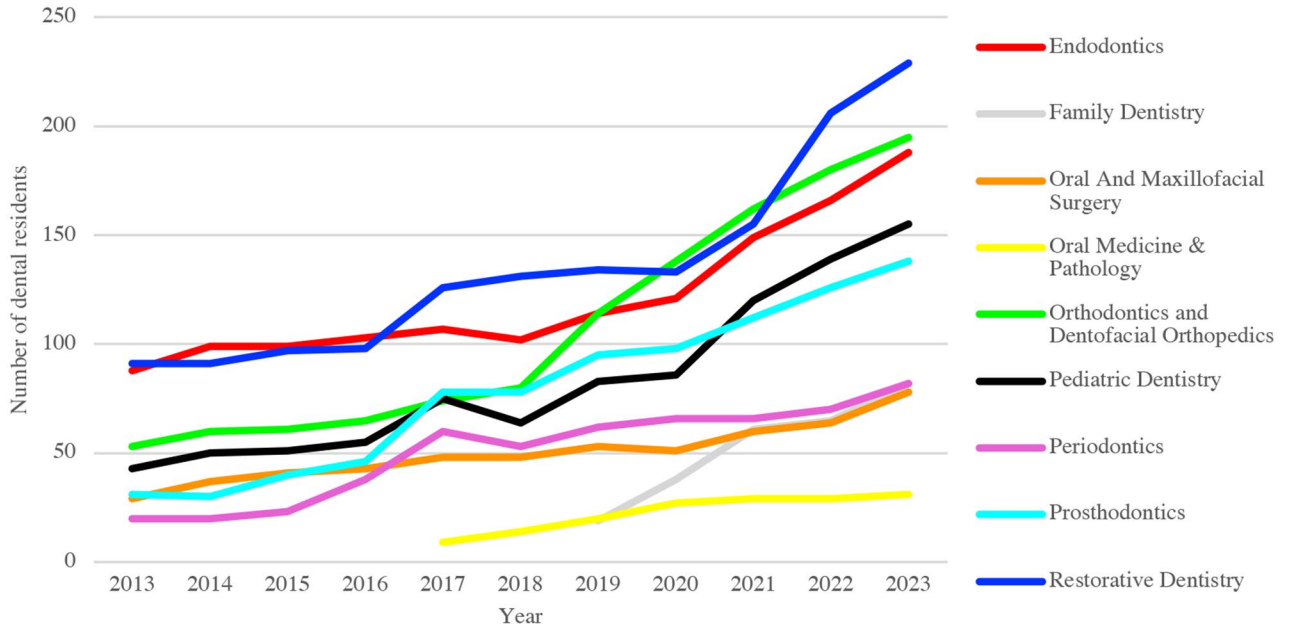

Fig. 4 Distribution of residents across dental postgraduate board residency programs by specialty from 2013 to 2023

respectively, following a similar pattern of increasing resident numbers. By 2023, there were 1178 residents across nine dental specialty programs (Fig. 3). In 2023, restorative dentistry had the highest number of residents, followed closely by orthodontics and dentofacial orthopedics, and endodontics. Six dental specialties provided master's programs, which began in 2022; however, a decline in the number of students enrolled in the master's program in each specialty was evident from 2022 to 2023 except in orthodontics and prosthodontics (Additional F2).

Discussion

In this study, we examined the demographic characteristics and growth of postgraduate dental programs in Saudi Arabia from 2013 to 2023. The results show a significant increase in the number of dental postgraduates, with particularly high growth after 2016, reaching its peak in 2023 across nine dental specialties. These findings highlight the Kingdom's expanding efforts to address the growing demand for dental professionals. Therefore, SCFHS has increased postgraduate training opportunities to strengthen the current Saudi dental workforce.

The data highlights a near gender balance among dental postgraduates from Board Residency Programs. Additionally, the majority of dental postgraduate graduates from Board Residency Programs were Saudi nationals, likely due to financial support from their institutions, such as governmental hospitals. Another factor could be that most non-Saudi nationals tend to practice as general dentists. A study by Al Baker et al. in 2016 revealed that Saudi-licensed dentists made up only 22.09% of the total dental workforce in Saudi Arabia, with a larger proportion being non-Saudi general dentists [9]. However, Saudi specialists and consultants held a relatively higher percentage [8, 18], making the dominance of Saudi nationals among dental postgraduate graduates expected.

The geographical distribution of dental postgraduates from Board Residency Programs shows that the majority are concentrated in Riyadh and Makkah. However, more than half of the regions reported fewer than ten dental postgraduates during the period from 2013 to 2023. This can be partially explained by the long-standing presence of these programs in Riyadh and Makkah. Although other regions began offering postgraduate dental programs starting in 2015, regional discrepancies in the number of dental postgraduates were anticipated.

Our study shed light on the fellowship and master's programs provided by the SCFHS. Fellowship programs consisted exclusively of Saudi nationals, with males comprising the majority. Geographically, fellowship graduates were concentrated in the Riyadh and Makkah regions. This concentration can be partially explained by the low number of dental postgraduates from board residency programs pursuing these fellowships, resulting in fewer programs available, primarily in Riyadh and Makkah. Regarding the master's programs, our data indicated that six specialties began offering master's programs in 2022. This analysis is based on secondary data reported in the supplementary materials, due to the limited available data to draw a conclusion.

Our study also examined the number of dental residents from 2013 to 2023 across all specialties in Saudi Arabia. Interestingly, most dental specialties have at least doubled the number of available seats for postgraduate dental training during this period, with prosthodontics increasing by 4.5 times, periodontics by fourfold, orthodontics by 3.6 times, and pediatric dentistry by 3.5 times. As of 2023, restorative dentistry had the highest number of residents, increasing from 80 to 230 over the past decade. This aligns with a prior study that indicated aesthetic and restorative dentistry was the most preferred specialty among senior students [13]. Additionally, orthodontics and dentofacial orthopedics, along with endodontics, followed in the availability of training seats. However, this could be misleading, as it may reflect student interest rather than an increased availability of training positions in recent years. This increase can be attributed to the significant rise in the number of dental colleges in Saudi Arabia over the last 15 years, resulting in a higher number of graduates. Consequently, SCFHS has expanded postgraduate training opportunities.

Our findings raise concerns about potential unemployment among dental postgraduates. While specific data on the demand for specialists and consultants in Saudi Arabia is lacking, the steady increase in the number of graduates highlights this issue. The rapid growth in dental postgraduate programs risks exceeding the demand for specialists, creating challenges for workforce sustainability. Policymakers should consider expanding postgraduate training programs in underserved regions to address geographic disparities in Saudi Arabia. Furthermore, conducting workforce demand assessments can help align postgraduate training opportunities with actual healthcare needs, preventing oversaturation in certain regions and ensuring sustainable employment opportunities.

Our study holds several significant findings. First, the data provided by the SCFHS allows for a long-term analysis over a decade (2013–2023) of the current demographic characteristics of dental postgraduate programs, making it the first of its kind in Saudi Arabia. Second, our study offers valuable insights to dental students and graduates on the current demographics of these programs and changes over time, which can help them determine their futures. Third, our study is of high interest to stakeholders and policymakers, as it highlights the urgent need for evaluation of the current status of these programs and their graduates. Fourth, our paper is crucial for Saudi dental workforce planning and resource allocation within the healthcare system, given that Riyadh and Makkah contain the majority of dental postgraduates.

Our study has several limitations that must be acknowledged. First, it relies primarily on data provided by the SCFHS; however, their data collection methods and reporting standards were not clear and may introduce biases in how data is acquired and reported. Therefore, further studies with validated data may yield more accurate results. Second, while the study highlights the regional distribution of dental postgraduates, its emphasis on major cities such as Riyadh and Makkah may not accurately reflect the situation in more remote or less populated regions. Future studies that account for factors related to regional distribution, such as population size and the need for dental services, may provide more satisfying results. Third, no prior studies specifically analyzing the demographic characteristics and trends of dental postgraduate programs in Saudi Arabia were available for comparison. This lack of comparable data limits the ability to benchmark our findings against similar research and highlights a gap in the existing literature. Fourth, these findings are primarily based on data from Saudi Arabia and may not be directly applicable to other countries or regions with different healthcare systems. As a result, caution should be exercised when attempting to generalize the study's conclusions beyond the Saudi context. fifth, although the study spans a decade (2013–2023), allowing for the identification of trends over time, it might not adequately represent any recent changes in dental schools and residency programs; therefore, further studies are warranted. Finally, there is an underrepresentation of non-Saudi nationals in residency programs, as noted in the study.

Conclusion

This comprehensive analysis of dental postgraduate programs in Saudi Arabia over the past decade indicates a noteworthy increase in the number of dental postgraduates and training positions. However, the findings also highlight a potential imbalance between the increasing number of postgraduates and the demand for specialists, raising concerns about future dental postgraduate unemployment. Therefore, future studies are needed to assist policymakers and researchers in addressing these issues.

Abbreviations

SCFHS Saudi Commission for Health Specialties

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-06663-4.

Supplementary Material 1

Supplementary Material 2

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Not applicable.

Author contributions
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Data availability
The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study approved by the institutional review board (IRB) of KAIMRC (King Abdullah International Medical Research Center), as it did not involve human subjects, and the institutional review board (IRB) number was (IRB# NRR24/088/8). The data used in this study is available at Saudi Commission for Health Specialties (SCFHS).

Consent for publication
Not Applicable.

Competing interests
The authors declare no competing interests.

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