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Perspective

Distribution of the Taiwanese dentists graduating from foreign dental schools in the 22 foreign countries surveyed until January 2023

Feng-Chou Cheng ^{a,b,c}, Shiang-Yao Liu ^{b,d,**},
Chun-Pin Chiang ^{e,f,g,h*}

^a Chia-Te Dental Clinic, New Taipei City, Taiwan

^b School of Life Science, National Taiwan Normal University, Taipei, Taiwan

^c Science Education Center, National Taiwan Normal University, Taipei, Taiwan

^d Graduate Institute of Science Education, College of Science, National Taiwan Normal University, Taipei, Taiwan

^e Department of Dentistry, National Taiwan University Hospital, College of Medicine, National Taiwan University, Taipei, Taiwan

^f Graduate Institute of Clinical Dentistry, School of Dentistry, National Taiwan University, Taipei, Taiwan

^g Graduate Institute of Oral Biology, School of Dentistry, National Taiwan University, Taipei, Taiwan

^h Department of Dentistry, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien, Taiwan

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* Corresponding author. Department of Dentistry, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, No. 707, Section 3, Chung-Yang Road, Hualien, 970, Taiwan.

** Corresponding author. Graduate Institute of Science Education, College of Science, National Taiwan Normal University, No. 88, Sec. 4, Ting-Chou Road, Taipei, 11677, Taiwan.

E-mail addresses: liusy@ntnu.edu.tw (S.-Y. Liu), cpchiang@ntu.edu.tw (C.-P. Chiang).

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Although a modern medical system including dentistry was introduced to Taiwan during the Japanese colonial period (1895–1945), no dental school was established throughout the Japanese colonial period. Therefore, if Taiwanese people at that time wanted to study dentistry, they had to study abroad (mainly in Japan and Korea), forming an early model for studying dentistry abroad.^{1,2} According to the Official Gazette of Taiwan Government, a Taiwanese dentist graduating from the Osaka Dental College opened his dental clinic in Kaohsiung in 1921 (Taisho 10), which may be the earliest practice record of Taiwanese dentist. For a hundred years, studying medicine or dentistry to become a physician or a dentist has been favored by Taiwanese people. It is also an important way to change classes in Taiwanese society. Especially since the implementation of National Health Insurance (NHI) in 1995, the career of dentists has been greatly favored by our social value system, resulting in fierce competition for the limited admission quotas in our domestic dental schools.^{3,4} Therefore, students from wealthy families choose to study dentistry in foreign dental schools, when they cannot obtain admission to domestic dental schools. As a large number of graduates from foreign dental schools returned to Taiwan and participated in the national dentist license examination (NDLE), it eventually sparked controversy regarding the surplus of dental manpower. In this article, we mainly explored the current distribution of Taiwanese dentists graduating from foreign dental schools in the 22 foreign countries surveyed until January 2023.

In this analysis, the open information from the nationwide dental professional guild (Taiwan Dental Association, TWDA) was used to filter the data related to the distribution of Taiwanese dentists graduating from foreign dental schools in the 22 foreign countries surveyed until January 2023. In addition, we also searched for the number of dentists per 10,000 people, the gross domestic product (GDP) per capita, and the distance from Taiwan to these 22 foreign countries through the related websites. The results and their comparisons are shown in Table 1. Totally, there were 846 Taiwanese dentists graduating from foreign dental schools, accounting for 5.12% of the total number of dentists (16,534) in Taiwan in January 2023. The country with the largest number of Taiwanese dentists graduating from foreign dental schools was Poland (237, 28.01%), followed by the Philippines (136, 16.08%), United States (94, 11.11%), Spain (79, 9.34%), Japan (41, 4.85%), and Australia (32, 3.78%), while the continent with the largest number of Taiwanese dentists graduating from foreign dental schools was Europe (352, 41.61%), followed by Asia (199, 23.52%), North America (100, 11.82%), and Oceania (46, 5.44%). Among the 22 foreign countries, the numbers of dentists per 10,000 people varied greatly from 0.72 (Myanmar) to 14.81 (Chile), while that of Taiwan was 6.73. There were 13 foreign countries where the number of dentists per 10,000 people was lower than that of Taiwan, while there were 557 (65.84%) Taiwanese dentists graduating from dental schools in these 13 foreign countries. However, there were 9 foreign countries where the number of dentists per 10,000 people was higher than that of Taiwan, while there were 165 (19.50%) Taiwanese dentists graduating from the dental schools in these 9 foreign countries. In addition, the GDP

per capita in these 22 foreign countries also varied greatly from 1.18 thousand US dollars (Myanmar) to 80.03 thousand US dollars (United States), while that of Taiwan was 33.91 thousand US dollars. There were 15 foreign countries where the GDP per capita was lower than that of Taiwan, while there were 531 (62.77%) Taiwanese dentists graduating from dental schools in these 15 foreign countries. However, there were 7 foreign countries where the GDP per capita was higher than that of Taiwan, while there were 191 (22.58%) Taiwanese dentists graduating from the dental schools in these 7 foreign countries. Furthermore, among the 22 foreign countries, the Philippines and China were the closest countries to Taiwan, while Argentina, Brazil and Chile were the three farthest foreign countries (Table 1).

According to Taiwan's medical-related laws and regulations, for people graduating from foreign dental schools in nine countries or regions such as the United States, Canada, Europe, South Africa, Australia, New Zealand, Japan, Singapore, or Hong Kong, their academic certificates can be recognized by way of exemption from examination. This has become a shortcut to study dentistry in these nine countries or regions for people from wealthy families in Taiwan. According to the statistics of the Ministry of Examination, a total of 513 examinees graduating from foreign dental schools participated in the first phase of NDLE in 2022. However, this number has far exceeded the annual 371 dental admission quotas of Taiwan for the quantity control mechanism.⁴ Based on the distribution of foreign countries where these 513 examinees completed their dental education, the foreign country with the largest number of Taiwanese dental graduates was Poland (201, 39.18%), followed by Spain (198, 38.60%) and Japan (48, 9.36%). Greek scholars discovered that students who fail to gain admission permission in the dental and medical schools of Greece often go abroad to study dentistry or medicine. A large number of these students choose to study in Eastern European countries where dental school admission permission is relatively easy to obtain, but unfortunately the educational rigor of the curricula is questionable. Upon completion of their studies and graduation, almost all of these graduates return to Greece for practice. This has created a chaotic situation that Greece has had an over-supply of dentists in recent decades.⁵ There are a large number of Taiwanese dentists graduating from dental schools in the majority of those foreign countries that the number of dentists per 10,000 people or the GDP per capita is lower than those in Taiwan. This implies that the same problem of the surplus of dental manpower as Greece may be occurring in Taiwan. Therefore, it is worthy of in-depth research to explore the social and cultural factors, historical background, and possible sequelae of studying dentistry abroad.

Fortunately, in 2017, Taiwan had a constitutional interpretation by the grand justices stating that the clinical practice training (or clinical internship course) in foreign dental schools cannot replace the internship course of sixth year-grade in domestic dental schools due to the language, medical culture, and disease types that are different from those in Taiwan.⁶ Therefore, it can be a final quantity control mechanism that graduates of foreign dental schools still need to complete a one-year internship course in a

Table 1 Distribution of the Taiwanese dentists graduating from foreign dental schools, the dentist to population ratios, and the gross domestic product (GDP) per capita in the 22 foreign countries surveyed until January 2023.

Country (n = 22)	Ranking	Taiwanese dentists graduating from foreign dental schools ^d		Number of dentists per 10,000 people ^a		GDP per capita ^b	Distance from Taiwan ^c
		Number	Proportion (%)	Number	Time		
Asia (n = 6)	—	199	23.52	—	—	—	—
1. Philippines	2	136	16.08	2.49	2021	3.91	1.15
2. Japan	5	41	4.85	8.32	2020	35.39	2.08
3. Myanmar	11	10	1.18	0.72	2019	1.18	2.78
4. China	13	8	0.95	4.52	2017	13.72	1.73
5. Thailand	15	3	0.35	2.55	2019	8.18	2.53
6. Malaysia	19	1	0.12	3	2018	13.38	3.20
Oceania (n = 2)	—	46	5.44	—	—	—	—
7. Australia	6	32	3.78	6.29	2020	64.96	7.31
8. New Zealand	8	14	1.65	5.15	2021	48.83	9.17
Europe (n = 8)	—	352	41.61	—	—	—	—
9. Poland	1	237	28.01	3.46	2017	19.91	8.51
10. Spain	4	79	9.34	8.4	2020	31.22	10.80
11. Hungary	7	17	2.01	6.75	2020	19.39	8.86
12. Czechia	9	13	1.54	7.52	2020	31.37	9.03
13. Germany	16	2	0.24	8.53	2020	51.38	8.95
14. United Kingdom	16	2	0.24	5.15	2021	46.37	9.79
15. Romania	19	1	0.12	7.95	2017	18.53	8.50
16. Slovakia	19	1	0.12	7.09	2021	23.46	8.95
North America (n = 2)	—	100	11.82	—	—	—	—
17. United States	3	94	11.11	5.99	2021	80.03	12.65
18. Canada	14	6	0.71	6.57	2020	52.72	11.99
South America (n = 3)	—	13	1.54	—	—	—	—
19. Argentina	11	10	1.18	7.9	2020	13.71	18.95
20. Brazil	16	2	0.24	6.68	2021	9.67	18.51
21. Chile	19	1	0.12	14.81	2021	17.83	18.51
Africa (n = 1)	—	12	1.42	—	—	—	—
22. South Africa	10	12	1.42	1.11	2021	6.49	11.49
Uncertainty ^e	—	124	14.66	—	—	—	—
Total	—	846	100 (5.12) ^f	—	—	—	—
Number of dentists per 10,000 population							
Lower than Taiwan (n = 13)		557	65.84	—	—	—	—
Higher than Taiwan (n = 9)		165	19.50	—	—	—	—
GDP per capita							
Lower than Taiwan (n = 15)		531	62.77	—	—	—	—
Higher than Taiwan (n = 7)		191	22.58	—	—	—	—
		Taiwanese dentists graduating from local dental schools		Number of dentists per 10,000 people		GDP per capita	
		Number	Proportion (%)	Number	Time		
Taiwan		15,688	100 (94.88) ^f	6.73	2021	33.91	

^a The data were taken from the World Health Organization (WHO) website. This number referred to the number of dentists available per 10,000 inhabitants in a population at a given year for a given country.

^b The data were taken from the International Monetary Fund (IMF) website. These data appearing in the World Economic Outlook (WEO) were compiled by the IMF staff in the April 2023 Edition of the WEO exercises. The gross domestic product (GDP) per capita referred to current prices (thousand US dollars per capita).

^c This referred to the distance from Taipei to the capitals of each country (thousand kilometers) calculated by the Google Maps.

^d Some dentists originally graduating from local dental schools went abroad to study dentistry and returned to Taiwan to practice. If they provided their foreign dental educational background only, they would be classified as dentists graduating from foreign dental schools.

^e Due to the incomplete information of some dentists, their dental educational background information was uncertain in the calculation of the number of Taiwanese dentists graduating from foreign dental schools.

^f The numbers in brackets referred to the ratio of the number of Taiwanese dentists graduating from foreign or local dental schools to the total number of Taiwanese dentists (16,534) in January 2023.

teaching hospital in Taiwan before they can take the second phase of NDLE. Furthermore, as a country with a democratic legal system, studying abroad is a basic right of people guaranteed by the Constitution of Taiwan. Based on the policy of quantity control of medical personnel for the assurance of medical standards, it is necessary to control the number of foreign dental school graduates to enter into the one-year internship course within a certain percentage of local dental admission quotas to maintain the sustainable development of Taiwan's dental profession. In addition, referring to the case of Greece,⁵ domestic dental professionals may consider establishing quality control standards to evaluate the educational rigor of those foreign dental schools recommended by the agencies in Taiwan.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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