

Dentist to population ratio and geographic distribution of dentists in Iran in 2019

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Original Article

Abstract

BACKGROUND AND AIM: In the current healthcare system of Iran, there is a great emphasis on improving the quality healthcare services and access of all people to these services, especially in the field of oral health. Achieving this goal requires the provision of services by dentists. In order to adopt the best policies in this regard, having up-to-date knowledge on the number and distribution of the workforce is crucial. Therefore, the aim of this study was to present a report on the status of dental resources in Iran in 2019 based on the number of dentists.

METHODS: In the present descriptive study, data was collected from several sources. The statistics of specialist dentists graduated in the country were collected through correspondence with all dentistry faculties of the country. In addition to presenting the statistics of available dentists and dentists employed in the country, the "dentist to population ratio" index was also used to examine the distribution of dentists across the country.

RESULTS: The number of general and specialist dentists across Iran in 2019 is calculated to be 30811 and 4593, respectively. Notably, the largest number of specialists was in the specialized field of endodontics (13.8%), and the lowest number belonged to oral and maxillofacial pathology (4.2%). In Iran, there are 43 dentists per 100000 people. The number of general and specialist dentists with office license and employed in the private sectors is 18287 and 2773, respectively. Moreover, overall, 36 state universities in 10 specialized fields offer courses with 1824 specialists as faculty members.

CONCLUSION: Although the number of general and specialist dentists in the country has increased considerably in recent years, the distribution of these individuals across different regions of Iran has been overlooked, and the dentist to 100000 population ratio differs in various provinces of the country.

KEYWORDS: Dentists; Supply and Distribution; Iran

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Although there are 1.6 million dentists worldwide, the distribution of dentists in the world is unbalanced, and accessibility to dentistry services differs among individuals in different continents. Specifically, 69% of dentists offer their services to only 27% of the world's population. Notably, in North

America, the dentist to population ratio is high.¹ Moreover, in Europe with a population of over 500 million, there are around 300000 dentists, but the dentist distribution is unbalanced.² In Australia, the distribution of dentists is also unbalanced due to the effect of economic, social, and geographical issues, such that there is little access to dentistry

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services in the areas outside the main cities.³ This unbalanced distribution in Australia has remained unresolved even after some years of investigation.⁴ In Africa, individual access to dentistry services is also sparse, and only 1% of all dentists in the world are working in Africa.¹

The European Union (EU) still has no plan for presenting dentistry services. Although countries in Northern Europe have adopted several controlling policies for the number of dentists, the number of dentists is growing in Southern Europe in the absence of controlling plans. In this regard, unemployment of dentists has been reported in the 4 EU countries of Greece, Finland, Germany, and Italy. In 2008, among EU countries, Greece, with 130 dentists per every 100000 population, had the largest dentist to population ratio. Moreover, the average for the EU was 71 dentists per 100000 people.² Furthermore, in England in 2014, 38934 dentists were documented, 4179 of which were specialists.⁵ Accordingly, the ratio of dentist per 100000 of the population is 55.⁵ In Australia, the dentist to population ratio varies from 1:40 to 1:27773. It has been estimated that the populations of 31.6% of Australian regions lack dentists.⁶ In 2016, the number of dentists employed in Saudi Arabia was reported as 16887, 70.26% of them being general dentists. Moreover, more than 80% of dentists in Saudi Arabia are working in Mecca, Riaz, and Western provinces, so the distribution is unbalanced in the country. Furthermore, 72.5% of specialist dentists in this country are non-Saudis; this issue has been examined as a concern.⁷ In South Africa, the current concern is the number and racial status of dentists. Within a 13-year period until 2018, although the number of dentists had grown from 4560 to 6125, the concurrent and relative growth of the population and dentists had caused failure in improving the dentist to population ratio. Notably, the number of specialist dentists throughout this country is 481 with a 1:118947 population ratio.⁸ In 2012, in Mexico, the number of

general and specialist dentists was found to be small, and prompt intervention was recommended. From 2000 to 2008, the dentist population of this country has increased by only around 20%. In this regard, unsuitable geographical distribution and the low population of specialists accounting for around 10% of all dentists were reported as other problems in this country.⁹

In Iran, in the 1970s, which led to the Iranian revolution, a large number of physicians moved to foreign countries to continue their education and many of them have never returned.¹⁰ Over 3 decades post revolution, the capacity of admission, and thus, the number of graduates in different fields of medical sciences have been associated with both quantitative and qualitative developments.¹¹ Although from 1970 to 2013, the number of medical faculties increased from 12 to 54 and the number of medical specialties from 18 to 28, the increase in the number of students admitted to universities throughout this period was far greater than the increase in the number of academic centers.^{10,12} In 1984, by merging the healthcare and medical educational sectors, a transformation occurred in medical education, such that, in 2007, Iran was ranked as the ninth country among 235 countries in terms of the number of medical schools. Correspondingly, this increase in the educational capacity caused an increase in the number of specialists and subspecialists, respectively, from 15410 and 600 in 1979 to 64700 and 4500 individuals in 2014, within a 35-year period. The specialist physician to 100000 population ratio in Iran increased by 110% and their absolute number grew by more than 300%.¹¹ Moreover, investigations showed a considerable increase in the medical workforce.¹²

In the current healthcare system of Iran, great emphasis is placed on improving the quality of healthcare services and the access of all people, especially the deprived stratum, to healthcare services.¹³ In addition, oral health plays very important roles in physical,

psychological, emotional, and even social health, and achieving oral health requires the provision of services by dentists.¹⁴ Although some developed countries have present several precise and up-to-date statistics on the status of their dental workforce and have publish them,¹⁻⁷ this investigation has been performed sporadically in developing countries by a number of researchers.⁷⁻⁹ In this regard, in 2009, Kiadaliri et al. presented a report of the number and distribution of dentists in Iran.¹⁵ Although training dentists in recent decades has faced various ups and downs, they reported an ascending trend in the number of dentists compared to previous years.¹⁵ In order to adopt the best human resources policies in dentistry, up-to-date knowledge on the current workforce of the country and their distribution is very important.¹⁶ In this regard, there are various sources of information in the country, as well as many scattered sources of information and reports, and they have been less combined and collected. However, by aggregating different sources, an acceptable description of the current situation of dentistry in the country can be obtained. Accordingly, the aim of the present study was to offer a report on the status of the dental workforce in Iran in 2019, in terms of dental specialist resources.

Methods

In this descriptive study, data were collected from several sources. The statistics of the general dentists of the country were obtained from the Medical Council of the Islamic Republic of Iran. This council is an independent professional organization covering medical employees. Moreover, this organization is the only official institute that registers physicians and dentists, and no dentist can provide services or perform clinical practice without registering his/her name in this organization after graduation. Thus, this organization has a powerful and up-to-date databank.

The statistics of specialist dentists graduated in the country were collected

through correspondence with all state and nongovernmental dentistry faculties of Iran who train residents. Since all specialists whether in Iran or abroad are required to take the specialist board exam in one of the medical sciences universities of the country, the collection of these data presents a complete databank on the graduates in all of the specialized fields of dentistry.

To perform census on general and specialist dentists employed in the private sector, the statistics of all dentists with office license across Iran were collected through correspondence with the Medical Council of the Islamic Republic of Iran. Notably, establishing a private office requires a medical license from the Medical Council of the Islamic Republic of Iran. Moreover, the specialist workforce employed in the governmental sector consists mostly of those employed in the Ministry of Health as faculty members. Based on the information of this ministry, a list of the recruited specialists including those on employment, contract, and service commitment was made. The sum of the specialist workforce practicing in the private and governmental sectors was also considered as the specialist dentists who provide services.

In this study, the number and distribution of resident admission in the specialized fields of dentistry across all medical sciences universities of the country were collected through correspondence with the Secretariat of the Dental and Specialized Education Council. This secretariat is responsible for admitting and training dentistry residents, and thus, provided the researchers with the statistics of these admitted residents. To investigate the population index, the information published by the Iranian Statistics Center was used in this study. This information is available to the public on the website of the Iranian Statistics Center. It is noteworthy that the entire Iranian population was reported to be 82084000 people in 2019.

Furthermore, in presenting the statistics of available dentists as well as the statistics of

dentists employed in the country, the dentist to 100000 population index was also used, which accurately represents the presence of dentists based on the population density; it is obtained through dividing the total number of dentist groups studied by the population of the country multiplied by 100000.

Results

The number of general and specialist dentists until 2019 was 30811 and 4593, respectively. The highest and lowest number of specialists reported were, respectively, endodontists (13.8%) and oral and maxillofacial pathologists (4.2%). Based on the statistics presented by the Medical Council of the Islamic Republic of Iran, the number of general and specialist dentists with a medical license is 18287 and 2773, respectively (Figure 1 and Table 1).

The total number of specialist dentists in the country is 4593, most of whom have graduated in 1981-2019. In addition, the trend of graduation from each specialized major was continually ascending until 2018, after which it showed a slight decrease (Figure 2).

In 2019, overall, 18287 general dentists practiced in the private sector; around two-thirds of them worked in capital cities of provinces, while the other one-third practiced in other cities. Notably, the maximum aggregation of general dentists was observed

in Tehran, Iran, (28.7%). In 2019, a total of 2773 specialist dentists practiced in the private sector in the country. Of this number, 85% of specialists worked in capital cities of provinces, while only 15% of them practiced in other cities. The maximum aggregation of specialist dentists was also observed in Tehran (Table 2 and Figure 3).

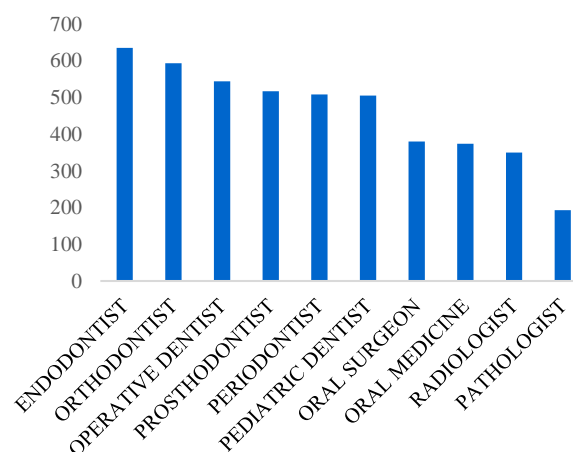


Figure 1. The frequency of specialist dentists in 10 specialized majors in Iran in 2019

In 2019, in 36 state universities, 1824 specialists were active as faculty members in 10 specialized courses. The number of faculty members in the country was more than 200 prosthodontists, endodontists, and operative dentists (Table 3).

Table 1. Description of the status of general and specialist dentists in 2019 in Iran

No. of those with office license	Graduates available in the country per 100000 population ratio	No. of graduates in the country	No. of faculties	Major
21060	43.1	35404	39	Total general dentist and specialist
18287	37.5	30811	39	General dentist
2773	5.6	4593	17	Specialist dentist
391	0.77	635 (13.8)	15	Endodontist
435	0.72	593 (12.9)	16	Orthodontist
314	0.66	544 (11.8)	15	Operative dentistry specialist
331	0.63	517 (11.3)	14	Prosthodontist
288	0.62	508 (11.0)	15	Periodontist
385	0.62	508 (11.0)	15	Pediatric dentist
250	0.34	380 (8.3)	15	Oral and maxillofacial surgeon
69	0.46	374 (8.1)	16	Oral medicine specialist
243	0.43	350 (7.6)	13	Oral and maxillofacial radiologist
67	0.24	193 (4.2)	11	Oral and maxillofacial pathologist

Table 2. General and special dentists with office license and employed in the private sector in the country in 2019 per the place of service

Province	General dentists				Specialist dentists			
	Employed in capitals of provinces	Employed in towns of provinces	Employed in all towns and capitals of provinces	Ratio of general dentist to 100000 population of province	Employed in capitals of provinces	Employed in towns of provinces	Employed in all towns and capitals of provinces	Ratio of specialist dentist to 100000 population of province
Eastern Azerbaijan	270	266	536	13.5	37	2	39	1.0
Western Azerbaijan	206	199	405	12.1	51	2	53	1.6
Ardabil	118	68	186	14.4	34	0	34	2.6
Isfahan	773	719	1492	28.5	172	41	213	4.1
Alborz	540	186	726	25.8	75	5	80	2.8
Ilam	66	37	103	17.4	30	0	30	5.1
Bushehr	84	102	186	15.4	19	0	19	1.6
Tehran	5254	788	6042	44.3	952	40	992	7.3
Chahar Mahal and Bakhtiari	83	62	145	15.0	18	1	19	2.0
Southern Khorasan	58	42	100	12.6	7	0	7	0.9
Razavi Khorasan	849	388	1237	18.6	175	31	206	3.1
Northern Khorasan	52	48	100	11.3	21	1	22	2.5
Khuzestan	377	437	814	16.8	86	24	110	2.3
Zanjan	94	37	131	12.1	25	3	28	2.6
Semnan	49	84	133	18.1	9	4	13	1.8
Sistan and Baluchistan	145	92	237	8.1	44	1	45	1.5
Fars	722	483	1205	24.3	120	33	153	3.1
Qazvin	146	75	221	16.9	40	2	42	3.2
Qom	205	0	205	15.2	26	2	28	2.1
Kurdistan	88	73	161	9.8	23	2	25	1.5
Kerman	227	321	548	16.8	65	17	82	2.5
Kermanshah	94	208	302	15.3	39	1	40	2.0
Kohgiluyeh and Boyerahmad	66	52	118	16.1	15	5	20	2.7
Golestan	128	143	271	14.1	39	8	47	2.4
Guilan	248	322	570	22.3	69	14	83	3.3
Lorestan	206	113	319	17.9	24	13	37	2.1
Mazandaran	149	623	772	23.1	51	75	126	3.9
Markazi	122	123	245	16.8	35	12	47	3.2
Hormozgan	112	112	224	12.0	33	7	40	2.1
Hamedan	169	77	246	14.0	48	2	50	2.8
Yazd	230	77	307	25.8	41	2	43	3.6
Total	11930	6357	18287	22.3	2423	350	2773	3.4

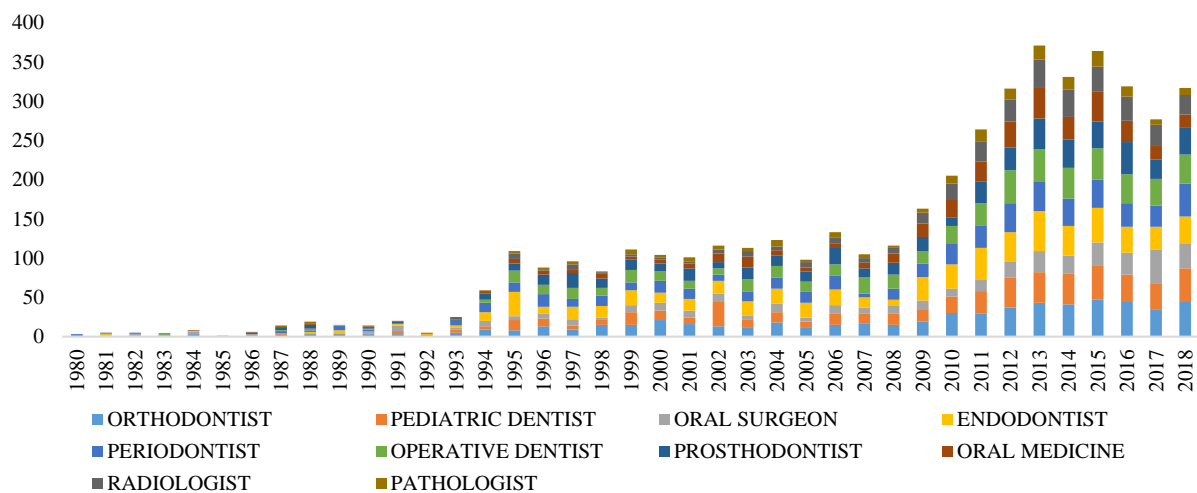


Figure 2. The number of graduates of 10 specialized majors of dentistry in Iran every year since 1980

From 2017 to 2019, 1112 specialized residents were admitted to universities of the country across various majors, and are concurrently doing their program. The frequency of admission of residents in the specialized fields of dentistry across the medical sciences universities of the country shows a stable trend during this period (Table 3).

Discussion

In the Islamic Republic of Iran, a document of future perspective has been presented for 2025, with the hope to fulfill the determined goals in the medical workforce sector by that year.¹⁷ In the present study, statement of the current status of the dental workforce is a guide for achieving those objectives in this

area. In addition, there are 36 state faculties and 3 private faculties of dentistry, and residents are trained in 10 specialized majors in 15 state and 2 private faculties of dentistry. The total number of dentists in the country is estimated to be 35404 individuals. Accordingly, this number represents the presence of 43 dentists per 100000 population. This ratio is 48.2, 55, 43.8, and 71 dentists per 100000 population in the USA, England, Australia, and the EU, respectively. Although this ratio is lower than that in some developed countries such as the US and EU countries, it is better that it to be compared to many developing countries.¹⁻¹⁰ Ten years ago, this ratio was reported as 28, suggesting that it has improved with a very good rate in recent years.¹⁵

Table 3. The frequency of faculty members in specialist dentistry majors across the medical sciences universities of the country as well as frequency of admission of residents over the last three years throughout the entire country

Major	No. of faculty members	No. of residents		
		2017	2018	2019
Endodontist	235	44	41	41
Orthodontist	194	38	38	35
Operative dentistry specialist	206	37	39	41
Prosthodontist	240	44	40	45
Periodontist	192	39	39	39
Pediatric dentist	198	38	35	35
Oral and maxillofacial surgeon	153	50	49	49
Oral medicine specialist	177	40	38	40
Oral and maxillofacial radiologist	131	28	25	25
Oral and maxillofacial pathologist	98	20	20	20
Total	1824	378	364	370

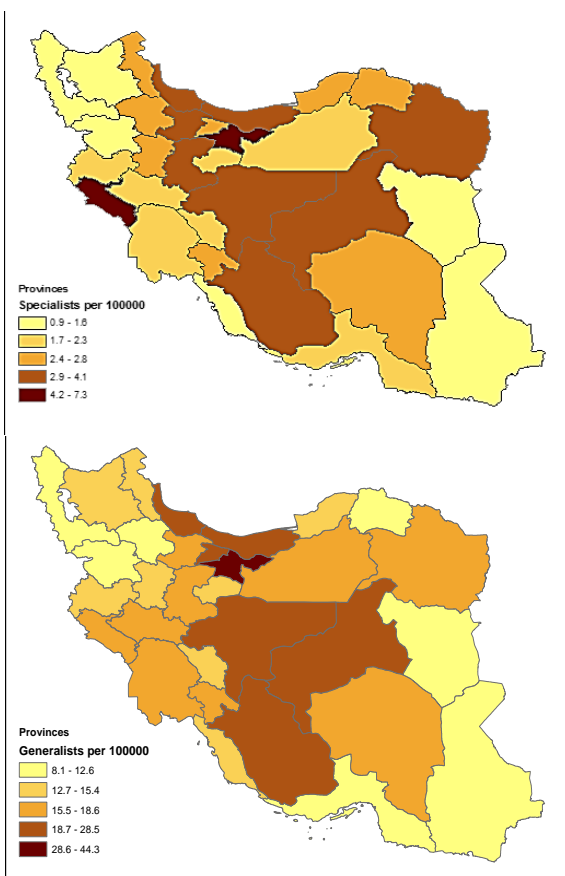


Figure 3. Distribution of general and specialist dentists with office license and employed in the private sector across provinces of the country in 2019, based on the dentist to 100000 population ratio

According to the estimation of this study, there are 30811 general dentists working in Iran. Comparison of this number with the 18287 general dentists with office license in the private sector indicates that 12524 dentists do not have a license for their practice. Possibly, this population includes the following groups: the graduates of the last 2 years who are going through their service commitment plan or military service, residents going through their specialty program, individuals with no medical license who may illegally practice dentistry in major cities in offices belonging to other licensed individuals, and some who do not perform dentistry and may be disabled or have migrated.

Investigation of the distribution of general dentists who have a medical license and are employed in the country indicated that 65%

of them are working in the capital of provinces. The maximum aggregation of general dentists with a dentist to 100000 population ratio of 44.3% is related to Tehran, which is followed by Isfahan, Yazd, Alborz, Fars, Mazandaran, and Guilan provinces with a ratio of about 20%. Figure 3 shows that the central provinces of the country receive more general dentistry services compared to border provinces. In 2009, Tehran, Isfahan, and Yazd provinces had the maximum ratio of general dentist to population, and are still the top provinces after 10 years.¹⁵

According to the estimation of this study, there are 4593 specialist dentists in Iran. Most of them have graduated since 1980s and after the Iranian revolution. There are no clear or coherent data on the number of specialist dentists who have quit the provision of dentistry services in Iran. Relying on the consensus of experts, the effects of reducing factors such as migration, disability, retirement, and mortality in different specialized courses have been assessed as negligible until now due to the young population of specialist dentists in the country. Comparing the presence of 4593 specialist dentists in the country with 2773 registered specialist dentists with offices indicated that around half of the specialists do not have an office. Moreover, a large number of them work as full-time faculty members at universities. These individuals provide healthcare services in clinics affiliated to universities, which require no office license.

Concerning the distribution of the provision of specialized dentistry services, Tehran and Ilam provinces have the highest ratio of specialized dentist to population (7.3 and 5.1, respectively). The reason for the large share of specialized dentists to the population in Tehran province is that this city is the capital of Iran with many welfare facilities. Thus, dentists are interested in living and working in this city. The reason for the large ratio of specialized dentist to population in Ilam province is the low population of this province as well as the presence of specialists

employed in the faculty of dentistry in this province. Comparison of the diagram of distribution of general and specialized dentists indicated that, in regions with a higher number of general dentists, there is also a higher number of specialized dentists. Regarding the specialized dentist to population ratio, Tehran and Ilam provinces are followed by Isfahan, Mazandaran, Yazd, Guilan, Markazi, Qazvin, Fars, and Khorasan Razavi (all above 3).

In Iran, the specialty with the highest number of graduates is endodontics. It is followed by orthodontist, restorative, and then, prosthesis fields. The number of oral and maxillofacial surgeons is very low. In most developed countries, the specialized course of orthodontics has the largest share among all the specialized majors. In addition, it is followed by pediatric dentistry and oral and maxillofacial surgery. In England, the highest number of specialists are orthodontists (1338 individuals), accounting for 30% of all specialists.⁵ In Australia, the highest number of specialists are also orthodontists.⁴ In South Africa, the largest number of specialists are oral and maxillofacial surgeons ($n = 144$) and orthodontists ($n = 142$), each one claiming 30% of the specialist population in this country.⁸ Comparison of the frequency of specialized majors of dentistry in Iran with developed countries indicated that, in terms of ranking in number, they do not match each other. Correspondingly, this can be due to the difference in needs for dental specialties between the countries. Moreover, another reason can be the treatment-based dentistry system, which cares less for preventive dentistry majors. Since the specialist proportion of most developing countries equal to Iran is also similar to developed countries, another hypothesis may be that this lack of similarity in the percentage of specialists may be due to the primary attempt for increasing the number of specialists as well as achieving the standards without caring for the type of majors. For example,

the presence of 350 oral and maxillofacial radiologists and 193 oral and maxillofacial pathologists has caused the largest ratio of the presence of these specialists to population among all countries. Thus, in future years, investigating the country's needs for various dental specialties and preparing a document of its estimation seem to be essential.

Investigation of the trend of graduation of specialist dentists showed 2 leaps in 1994 and 2000. Since most specialized majors have a 3-year academic program, an increase has occurred in the admission of residents in 1991 and 1997 based on the educational policies of medical sciences in Iran. Notably, the increasing trend of graduates has always existed; however, the only exception is a reduction in the 3 majors of radiology, pathology, and oral medicine in recent years. Possibly, considering the lower need for these 3 majors compared to other specialized fields of dentistry, the policy of reducing admission has been adopted.

The present study attempted to present a description of the current situation of dentistry in Iran. Although the preparation of the statistics of dentists was made through the Medical Council and health ministry of the Islamic Republic of Iran, dentistry associations unfortunately had no precise or up-to-date and presentable statistics on the workforce employed in the country. If the relevant guild associations actively enter this area, they can significantly help in outlining the current situation as well as the distribution and estimation of the country's demands. Moreover, a powerful and up-to-date databank is missing in the governmental management segments of dentistry in the country. With such databanks, researchers can gain access to statistics at a higher speed and accuracy. The next step after describing the current situation of the dentistry workforce in the country is estimating the country's demand for these human resources. It is suggested that researchers present the concrete demands of dentistry human resources through different

methods both now and in the future, and by considering the ascending trend as well as the distribution of the population. Another suggestion is the use of the coefficient of variation index to indicate the geographical and specialist distribution of dentists across the country. Through these needs assessments, the decision-makers and authorities can adopt the best policies for both admission and training of these workforces.

Conclusion

In Iran, there are 30811 general dentists and 4593 specialist dentists. These numbers illustrate the presence of 43 dentists per every 100000 people. Although the number of both general and specialist dentists in the country has considerably grown in recent years, the distribution of these individuals across

different regions of the country has remained understudied as yet, and the dentist to 100000 population ratio differs across various provinces of the country. The considerable increase in the number of specialists also requires investigating and balancing the training of specialized majors in line with the demands of the country.

Conflict of Interests

Authors have no conflict of interest.

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References

- Gallagher JE, Hutchinson L. Analysis of human resources for oral health globally: Inequitable distribution. *Int Dent J* 2018; 68(3): 183-9.
- Koletsis-Kounari H, Papaioannou W, Stefaniotis T. Greece's high dentist to population ratio: comparisons, causes, and effects. *J Dent Educ* 2011; 75(11): 1507-15.
- Jean G, Kruger E, Tennant M. The distribution of dentists in Australia Socio-economic profile as an indicator of access to services. *Community Dent Health* 2020; 37(1): 5-11.
- Australian Research Centre for Population Oral Health. Dental specialists in Australia. *Aust Dent J* 2010; 55(1): 96-100.
- Kravitz AS, Bulloc A, Cowpe J. EU Manual of Dental Practice 2015 [Online]. [cited 2015 Feb]; Available from: URL: <https://www.ond.pt/content/uploads/2017/12/ced-manual-2015-completo.pdf>
- Graham B, Tennant M, Shiikha Y, Kruger E. Distribution of Australian private dental practices: Contributing underlining sociodemographics in the maldistribution of the dental workforce. *Aust J Prim Health* 2019; 25(1): 54-9.
- AlBaker AA, Al-Ruthia YSH, AlShehri M, Alshuwairikh S. The characteristics and distribution of dentist workforce in Saudi Arabia: A descriptive cross-sectional study. *Saudi Pharm J* 2017; 25(8): 1208-16.
- Bhayat A, Chikte U. The changing demographic profile of dentists and dental specialists in South Africa: 2002-2015. *Int Dent J* 2018; 68(2): 91-6.
- Gonzalez-Robledo LM, Gonzalez-Robledo MC, Nigenda G. Dentist education and labour market in Mexico: Elements for policy definition. *Hum Resour Health* 2012; 10: 31.
- Tabatabai S, Simforoosh N, Mohsen Ziaee SA. Iran's postgraduate medical education achievements over last 35 years. *J Adv Med Med Res* 2015; 10(1):1-6.
- Azizi F. Medical education in the Islamic Republic of Iran: Three decades of success. *Iran J Public Health* 2009; 38(Supple 1): 19-26.
- Simforoosh N, Ziaee SA, Tabatabai SH. Growth trends in medical specialists education in Iran; 1. *Arch Iran Med* 2014; 17(11): 771-5.
- Lebaron SW, Schultz SH. Family medicine in Iran: The birth of a new specialty. *Fam Med* 2005; 37(7): 502-5.
- Northridge ME, Kumar A, Kaur R. Disparities in access to oral health care. *Annu Rev Public Health* 2020; 41: 513-35.
- Kiadaliri AA, Hosseinpour R, Haghparast-Bidgoli H, Gerdtham UG. Pure and social disparities in distribution of dentists: A cross-sectional province-based study in Iran. *Int J Environ Res Public Health* 2013; 10(5): 1882-94.
- Faraji Khiavi F, Maleki M, Djafarian K, Vatankhah S, Tabibi S. A model for policy making in human resources for health sector Iran. *Res J Biol Sci* 2010; 5: 380-8.
- Hashemi H, Haghdost AA, Haji-Aghajani M, Janbabaee G, Maher A, Noori HS, et al. A Successful implementation of an idea to a nationally approved plan: Analyzing Iran's National Health Roadmap using the Kingdon model of policymaking. *Med J Islam Repub Iran* 2018; 32: 46.