Original Article / Özgün Araştırma

Meandros Med Dent J
doi:10.4274/meandros.galenos.2022.67689
Meandros Med Dent J 2024;25(1):1-6

Determination of Health Workforce Need Based on Workload: A Study of Dentist in Turkey

İş Yüküne Dayalı Sağlık İnsan gücü İhtiyacının Belirlenmesi: Türkiye'de Diş Hekimleri Üzerine Bir Araştırma

Fatih Durur[1], Gamze Kutlu[2], Yasemin Akbulut[3]

[1]Çankırı Karatekin University Faculty of Health Sciences, Department of Healthcare Management, Çankırı, Turkey
[2]Yozgat Bozok University, Faculty of Economics and Administrative Sciences, Department of Healthcare Management, Yozgat, Turkey
[3]Ankara University Faculty of Health Sciences, Department of Healthcare Management, Ankara, Turkey

Abstract

Objective: This study aimed to determine the need for dentists for oral and dental health services according to the workload indicators of staffing need (WISN) method developed by the World Health Organization.

Materials and Methods: The data were analyzed using WISN's methodology and formulas. Two different sources were used in collecting the data: the number of dentists and the number of services produced were retrieved from the report published by the Ministry of Health, and the activities generating workload and the average duration of such activities were obtained from the interviews with the specialists. Oral and dental institutions affiliated with the MoH in Turkey were selected for this study.

Results: The WISN ratio was calculated as 0.978 in oral and dental health centers, 0.945 in oral and dental health hospitals, 1,250 in public hospitals (PHs), and 1,014 for all institution. These results revealed that the total number of dentists was greater than the actual workload-based staffing need (n=122), but the dentists were not evenly distributed among the three institutions. It was found that there was a surplus of dentist staff in PHs where the workload was low (n=344).

Conclusion: Instead of staffing a standard number of dentists in health institutions, workload-based planning methods should be used, to staff dentists in institutions with high workload, and to strengthen evaluation and monitoring activities. The findings of this research can be used to plan the number of students to be enrolled in the faculties of dentistry.

Keywords: Dentist, health policy, oral health, planning

Öz

Amaç: Bu çalışmada, Dünya Sağlık Örgütü'nün geliştirdiği iş yüküne dayalı personel gereksinimi belirleme (WISN) yöntemine göre, ağız ve diş sağlığı hizmetleri için diş hekimi ihtiyacının belirlemesi amaçlanmıştır.

Gereç ve Yöntemler: Verilerin analizinde WISN'de yer alan metodoloji ve formüller kullanılmıştır. Verilerin toplanmasında iki farklı kaynaktan yararlanılmıştır. Diş hekimi ve üretilen hizmet sayıları Sağlık Bakanlığı (SB) tarafından yayımlanan rapordan; iş yükünü oluşturan faaliyetler ve bu faaliyetlerin ortalama süreleri uzmanlar ile yapılan görüşmelerden elde edilmiştir. Araştırmada, Türkiye'de SB'ye bağlı olarak hizmet veren ağız ve diş sağlığı kurumları seçilmiştir.

Bulgular: WISN oranı, ağız ve diş sağlığı merkezlerinde 0,978, ağız ve diş sağlığı hastanelerinde 0,945, devlet hastanelerinde (DH) 1.250 ve tüm kurumlar için 1.014 olarak hesaplanmıştır. Bu sonuçlar toplam diş hekimi sayısının iş yüküne dayalı ihtiyaçtan fazla olduğunu (n=122) ancak diş hekimi sayısının üç kurum arasında dengeli dağılmadığını ortaya koymuştur. İş yükünün az olduğu DH'lerde diş hekimi sayısının fazla olduğu (n=344) saptanmıştır.

Sonuç: Sağlık kurumlarına standart sayıda diş hekimi planlaması yerine, iş yüküne dayalı planlama yöntemi kullanılması, diş hekimlerinin iş yükünün fazla olduğu kurumlara tahsis edilmesi, değerlendirme ve izlemenin güçlendirilmesi sağlanmalıdır. Diş hekimliği fakültelerinin öğrenci sayılarının planlanmasında bu araştırmanın bulgularından yararlanılabilir.

Anahtar Kelimeler: Diş hekimi, sağlık politikası, ağız sağlığı, planlama

Address for Correspondence/Yazışma Adresi: Fatih Durur, Asst., Çankırı Karatekin University Faculty of Health Sciences, Department of Health Care Management, Çankırı, Turkey
Phone: +90 376 218 95 87 **E-mail:** fatihdurur@karatekin.edu.tr
ORCID ID: orcid.org/0000-0001-9682-0019

Received/Geliş Tarihi: 02.02.2022
Accepted/Kabul Tarihi: 14.10.2022

Introduction

Oral and dental diseases are proven to be one of the most common health problems in the world (1). These diseases causing significant losses in quality of life are also associated with many health problems such as human immunodeficiency virus/acquired immunodeficiency syndrome, diabetes, cardiovascular diseases, growth and developmental retardation, and preterm birth (2). Despite their importance to health, there are several barriers to accessing oral and dental health services worldwide. Lack of funding, ignorance, poverty and a shortage of qualified staff are some of these barriers (3).

Oral and dental health services are provided by public and private health institutions in Turkey. The services accessible within the Ministry of Health (MoH) are provided by the units located in oral and dental health hospitals (ODHHs), oral and dental health centers (ODHCs), and public hospitals (PHs) (4). There are 22 ODHHs, 132 ODHCs and 510 PHs providing oral and dental health services (5). These services are also provided by private dentists in their clinics (n=10,775) (6). There are total of 27,889 dentists, of whom 35% serve in institutions affiliated to the MoH, 9% serve in faculties of dentistry, and 56% serve in the private sector (7). While Turkey has an average of 35 dentists per 100,000 people, OECD countries have 73 (8). For this reason, government policy aims to increase the number of dentists in Turkey.

Dental workforce planning is particularly important in the development of policies for oral and dental health programs and dental education (9). However, considering the importance and impact of oral and dental health, studies on workforce planning are not sufficient (10). In planning, different methods are used in addition to the dentist/population ratio, which is the first basic indicator of World Health Organization (WHO) (11). One of these methods is the workload indicators of staffing need (WISN) developed by the WHO (12). While there are studies in the literature that calculate the number of different health professionals using the WISN method (13-15), there is a limited number of studies in dentistry (16). On the basis of this preliminary study, the aim was to determine the number of dentists needed for the oral and dental health services provided by the institutions affiliated to the MoH in Turkey.

Materials and Methods

Study Design

The WISN method developed by the WHO was used to calculate the dentist needs (12). The method covers the steps presented below.

- Identifying the health institutions and types of these institutions,
- Identifying the actual working time,
- Identifying the workload components,
- Determining the service standards,
- Healthcare services,
- Support services,
- Determining the standard workloads,
- Identifying workload-based staffing need.

Data Sources

Two different sources provided the datasets used in the research (1). The data regarding the activities generating workload and the operation time required to perform these activities in ODHCs, ODHHs, and PHs affiliated to the MoH were identified by obtaining expert opinion. Activity times can be determined through electronic records, surveys or interviews. In data collected through interviews, focus groups and expert groups are frequently used (15). In this study, interviews were conducted with 7 experts for average activity times. Face-to-face interviews were held with seven voluntary dentists from different specialties, three of whom were professors. During the interviews, semi-structured interview forms were used. The dentists were asked about services generating workload (oral and dental health services and support services) in public institutions, the average duration of these services, and the actual working time (2). The numbers of dentists and services produced were obtained from the "Oral and Dental Health Indicators, 2017" latest report published by the Public Health Institution (PHI) (5). The study does not require patient consent. Our research was conducted in full accordance with the World Medical Association Declaration of Helsinki. Ethics was granted by the Ankara University Faculty of Dentistry Ethics Committee (decision no: 05/01, date: 03.06.2020).

Statistical Analysis

The parameters used in the method and the formulas used in the calculations are presented below (12).

Actual working time: (365 days - the number of off-days) = Actual working time

Standard workload: (Annual total working time/activity standard) = Standard workload

Staffing need: (The number of annual operations/workload) = Staffing need

Adjustment factor*:* 1 / [1-(Total category factors/100)] = Adjustment factor

Workload-based staffing need*:* (Total staffing need category adjustment factor) + individual adjustment factor = workload-based staffing need)

WISN Ratio: (The current number of staff /workload-based staffing need)

Ratio =1 means the current number of staff equals the number of staff needed.

Ratio <1 means the number of staff is insufficient.

Ratio >1 means there is a surplus staffing.

Results

ODHCs (n=132), ODHHs (n=22) and PHs (n=510) were selected for dental workforce planning. The total number of dentists working in these facilities is 8,685. The number of non-working days per year is 144, the active working time is 221 days and the dentists work 8 hours per day (Table 1). The actual working time is therefore calculated as 106,080 minutes. The workload components of dentists were then identified. In terms of oral and dental health services, fillings (n=13.2 million) and exodontics (n=7.9 million) ranked first, while orthodontics (n=104.7 thousand) and implants (n=17.7 thousand) ranked last. In addition, activities other than dental care that created extra workload were identified as support services, training/conferences, meetings, private and other work.

According to the activity standards determined by expert opinions, implants and operations take the most time at 45 minutes, while referrals and local fluoride applications take the least time at 10 minutes. Five days per year are allocated for training and congresses, 1 hour per month for meetings, private and other work. After, workload and staffing needs were calculated for each health institution. The workload-based staffing need was then determined for all services provided, using the category adjustment factor to calculate the adjustment factor for services not included in the service statistics. The category adjustment factors were determined based on the activities and their durations, excluding routine services. To calculate the impact of these activities on the total workload, the total category factor was found to be 3.08, and the adjustment factor was calculated as 1.031 (Table 2).

The individual adjustment factor was not calculated in this study as there was no difference between occupations. To calculate the workload-based staff requirement of health institutions providing oral and dental health services, the number of dentists needed was multiplied by the adjustment factor (Table 3). According to the findings, the workload-based dentist staffing was needed the most for filling treatment (1611.65) in ODHCs and the least for implant treatment (0.31) in PHs. In all institutions, the workload-based dentist was needed the most for filling treatment and fixed denture operations and the least for implant and referral services.

Finally, WISN ratios were calculated by comparing the current situation and workload-based staffing needs in the three institutions (Table 4). The results show that WISN ratios are lower than 1 in ODHMs and ODHHs, while this ratio is higher than 1 in PHs. ODHMs (n=107) and ODHHs (n=115) have a need for dentists, while PHs (n=344) have a surplus of dentists. The WISN ratio shows that the total number of dentists is at a level that can meet the number needed based on the workload. However, there is an uneven distribution of dentists among public institutions.

Table 1. Identifying the actual working time

Reason for not working	Mean time (days/year)
Annual leave	25
Official holiday	10
Illness/casual leave	5
Weekends	104
Total	144

Discussion

The workforce is a crucial resource, particularly for labour-intensive sectors such as healthcare. Health workforce planning aims to train individuals with the necessary knowledge and skills at a reasonable cost, and to deploy them in the appropriate location at the appropriate time, taking into account the healthcare needs of society (17). This study aimed to determine the workload-based staffing needs of three PHI and compare them with the actual number of dentists. The results showed that while the total number of dentists was sufficient, they were not evenly distributed among the institutions. Specifically, there were more dentists in PHs with a low workload and fewer in ODHCs and ODHHs with a high workload. Due to inadequate facilities and limited treatment options, patients may perceive this situation as less desirable. A study conducted in a Turkish province using the WISN method found that dentists had a workload of 0.94, indicating a need for a 6% increase (16). Similarly, studies on nurses and pathologists have also revealed an unequal distribution of workload among institutions (13,15). The study's findings have important implications for dental education, the employment of dentists, and the quality of patient care in Turkey. The MoH is responsible for distributing the health workforce among PHI (14).

Table 2. Calculation of adjustment factor

Activities	Mean time	Category adjustment standard
Training/congresses	5 days/year	2.26
Meetings	1 hour/month	0.41
Private and other works	1 hour/month	0.41
Total category factor		3.08
Adjustment factor		1.031

Table 3. Findings based on WISN by oral and dental health institutions

Activities	Health institutions	The number of annual operations	Activity standard (min)	Workload	Staffing need	Adjustment factor	Workload-based staffing need
Exodontia	ODHHs	4,373,582	15	7072	618.43	1,031	637.6
	ODHCs	1,700,538			240.46		247.91
	PHs	1,903,819			269.2		277.55
Root canal operation	ODHHs	2,081,783	30	3536	588.73	1,031	606.99
	ODHCs	923,332			261.12		269.21
	PHs	443,435			125.4		129.29
Filling treatment	ODHHs	8,291,209	20	5304	1563.19	1,031	1611.65
	ODHCs	3,285,196			619.38		638.58
	PHs	1,722,930			324.83		334.9
Surgical intervention	ODHHs	533,284	30	3536	150.81	1,031	155.49
	ODHCs	258,104			72.99		75.25
	PHs	122,008			34.5		35.57
Fixed denture operations	ODHHs	4,113,793	30	3536	1163.4	1,031	1199.46
	ODHCs	1,795,533			507.78		523.52
	PHs	1,188,018			335.97		346.39
Mobile denture operations	ODHHs	699,783	20	5304	131.93	1,031	136.02
	ODHCs	265,413			50.04		51.59
	PHs	291,549			54.96		56.67
Scaling	ODHHs	942,385	15	7072	133.25	1,031	137.38
	ODHCs	323,735			45.77		47.19
	PHs	332,545			47.02		48.48
Curettage	ODHHs	280,102	30	3536	79.21	1,031	81.67
	ODHCs	116,129			32.84		33.86
	PHs	97,236			27.49		28.35
Orthodontic treatment	ODHHs	35,655	30	3536	10.08	1,031	10.39
	ODHCs	53,811			15.21		15.68
	PHs	15,260			4.31		4.44
Fissure sealants	ODHHs	2,286,272	15	7072	323.28	1,031	333.3
	ODHCs	864,954			122.3		126.09
	PHs	558,917			79.03		81.48
Local fluorine	ODHHs	286,315	10	10608	26.99	1,031	27.82
	ODHCs	134,928			12.71		13.11
	PHs	136,103			12.83		13.22
Implant	ODHHs	13,230	45	2357.3	5.61	1,031	5.78
	ODHCs	3,807			1.61		1.66
	PHs	733			0.31		0.32
Operation	ODHHs	244,560	45	2357.3	103.74	1,031	106.96
	ODHCs	188,244			79.85		82.33
	PHs	25,530			10.83		11.16
Referral	ODHHs	131,508	10	10608	12.39	1,031	12.78
	ODHCs	24,455			2.3		2.37
	PHs	51,387			4.84		4.99

WISN: Workload indicators of staffing need, ODHHs: Oral and dental health hospitals, ODHCs: Oral and dental health centers, PHs: Public hospitals

Table 4. Comparison of the WISN ratios in oral and dental health institutions

Health institutions	Total number of dentists	Number of dentists needed based on workload	Difference	WISN ratio
ODHHs	4,956	5,063	-107	0.978
ODHCs	2,013	2,128	-115	0.945
PHs	1,716	1,372	344	1,250
Total	8,685	8,563	122	1,014

WISN: Workload indicators of staffing need, ODHHs: Oral and dental health hospitals, ODHCs: Oral and dental health centers, PHs: Public hospitals

Poor planning and unbalanced distribution can result from a lack of consideration of factors such as demand and workload. As a result, the number of dental faculties and student quotas have recently increased (18). The number of dental faculties increased from 15 in 2005 to 63 in 2008 (7). The USA has 62 faculties of dentistry, despite having a population almost four times larger than Turkey. Germany, which has similar demographic characteristics to Turkey, has 31 dental faculties (19).

The Turkish Dental Association (TDA) has suggested that reducing the current student quotas of faculties of dentistry is necessary to avoid future unemployment, as the number of dentists required for staffing will be reached within 5 years (6). The study's findings also support this suggestion. Studies conducted in other countries have reported that the unplanned increase in the number of dentistry faculties has a negative impact on the employment of dentists. In India, the sudden increase in the number of dentistry faculties has led to employment problems for dentists (19-21). It is predicted that 100,000 dentists will be unemployed in India by 2020 unless action is taken (20). Similar issues have been observed in Saudi Arabia and Lebanon (22,23). However, there is no evidence that the increasing number of dentists in these countries has a positive impact on oral/dental health care and the quality of services (21). It is also suggested that the rapid increase in the number of universities will cause a shortage of qualified staff and adversely affect the quality of education (24). According to the TDA, the cause of issues related to oral and dental healthcare is not due to a shortage of dentists, but rather the infrequency of seeking oral and dental health services, which is significantly lower compared to developed countries (6). It is reported that the average number of applications to a dentist per year is 5 in developed countries; this number is reported as 0.65 in Turkey (7). It should be noted the future success of dental schools, the quality of their graduates and the oral healthcare they will provide are closely linked to the talent and commitment of dental school staff. Individuals in leadership roles in dental faculties must succeed in the recruitment and retention of talented individuals (25).

In dental planning studies, inequality and unbalanced distribution have been scrutinised (9,19). Gallagher and Hutchinson (10) found that the majority of the world's 1.6 million dentists are in Europe and the USA, with 69% serving only 27% of the world's population. Africa has only 1% of the global workforce. In Turkey, there are 40-50 dentists per hundred thousand people in some regions, while in others, the number is only 20-30 (8). Regional distribution imbalances are also observed in other countries, indicating that people prefer to live in urban areas with better opportunities.

The study has some limitations. The time taken to be treated by a well-trained dentist in Turkey was taken into account in determining activity standards, and it was assumed that there were no differences between dentists working in all three group facilities. Furthermore, the variable nature of hospital conditions was not taken into account. Due to the lack of data from the private sector, this study is limited to dentists working in the three public group institutions affiliated to the MoH. Studies that include dentists working in the private sector can provide a broader perspective on the planning and distribution of dentists throughout the country.

Conclusion

This study will contribute to the development of evidence-based policies for dental education, employment and quality of patient care. There is a clear need to determine evidence-based dentist staffing needs in all countries using the WISN method. In addition, this method should be used instead of planning a standard number of dentists for each health facility. It should ensure that dentists are placed in facilities with high workloads and that evaluation and monitoring activities are strengthened. The results of this research can also be used to plan the number of students in dental faculties.

Ethics

Ethics Committee Approval: Ethics was granted by the Ankara University Faculty of Dentistry Ethics Committee (decision no: 05/01, date: 03.06.2020).

Informed Consent: The study does not require patient consent.

Authorship Contributions

Concept: F.D., G.K., Y.A., Design: F.D., G.K., Y.A., Data Collection or Processing: F.D., G.K., Y.A., Analysis or Interpretation: F.D., G.K., Y.A., Literature Search: F.D., G.K., Y.A., Writing: F.D., G.K., Y.A.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. da Silva OM, Glick M. FDI Vision 2020: a blueprint for the profession. Int Dent J 2012; 62: 277.
2. Williams DM, Mossey PA, Mathur MR. Leadership in global oral health. J Dent 2019; 87: 49-54.
3. Nash D, Ruotoistenmäki J, Argentieri A, Barna S, Behbehani J, Berthold P, et al. Profile of the oral healthcare team in countries with emerging economies. Eur J Dent Educ 2008; 12(Suppl 1): 111-9.
4. Tatar M, Mollahaliloğlu S, Sahin B, Aydin S, Maresso A, Hernández-Quevedo C. Turkey. Health system review. Health Syst Transit 2011; 13: 1-186.
5. General Directorate of Public Hospitals. Oral and Dental Health Service Indicators; 2018. Available from: https://dosyamerkez.saglik.gov.tr/Eklenti/23497,2017-yili-agiz-ve-dis-sagligi-hizmet-bilgileri2pdf.pdf?0.
6. Turkish Dental Association. Manpower Planning Today to Avoid a Crisis in 2025; 2016. Available from: http://www.tdb.org.tr/tdb/v2/ekler/InsanGucuPlanlamasi2017_ (GUNCEL)11.10.2016.pdf.
7. Ministry of Health (MoH), General Directorate of Health Information Systems. Health Statistics Yearbook; 2018.
8. OECD Health Statistics; 2018. Available from: https://stats.oecd.org/index.aspx? DataSetCode=HEALTH_STAT.
9. Goodman HS, Weyant RJ. Dental health personnel planning: a review of the literature. J Public Health Dent 1990; 50: 48-63.
10. Gallagher JE, Hutchinson L. Analysis of human resources for oral health globally: inequitable distribution. Int Dent J 2018; 68: 183-9.
11. FDI World Dental Federation. Oral health workforce planning for developed countries. Int Dent J 2005; 55: 42-4.
12. Work load Indicators of Staffing Need: Users Manuel. Geneva: World Health Organization; 2010.
13. McQuide PA, Kolehmainen-Aitken RL, Forster N. Applying the workload indicators of staffing need (WISN) method in Namibia: challenges and implications for human resources for health policy. Hum Resour Health 2013; 11: 64.
14. Özkan Ş, Saygılı M, Aba G. Workforce Planning Based on an Analysis of Workload for Midwiveswithin Delivery Rooms. Acıbadem Univ Sağlık Bilim Derg 2019; 3: 413-21.
15. Üner S, Usubütün A. A Study of Need Recognition with Workload Based Staffing Need Estimation Method: Efficcacy and Distribution of Pathologists in Turkey. Turkiye Klinikleri J Med Sci 2012; 32: 715-25.
16. Özkan S, Yıldırım T. General dentists staffing requirement based on workload in the public dental health centers in Turkey. Int J Healthc Manag 2022; 15: 277-86.
17. Birch S, Kephart G, Murphy GT, O'Brien-Pallas L, Alder R, MacKenzie A. Human Resources Planning and the Production of Health: A Needs-Based Analytical Framework. Can Public Policy 2007; 33: 1-16.
18. Özkan S, Uydacı M. Turkiye'de Saglik Sektöründe İnsan Kaynakları Sisteminin İncelenmesi. Marmara Üniversitesi Öneri Dergisi 2015; 11: 221-38.
19. Yamalik N, Ensaldo-Carrasco E, Cavalle E, Kell K. Oral health workforce planning part 2: figures, determinants and trends in a sample of World Dental Federation member countries. Int Dent J 2014; 64: 117-26.
20. Vundavalli S. Dental manpower planning in India: current scenario and future projections for the year 2020. Int Dent J 2014; 64: 62-7.
21. Dagli N, Dagli R. Increasing Unemployment among Indian Dental Graduates - High Time to Control Dental Manpower. J Int Oral Health 2015; 7: 1-2.
22. Doughan B, Kassak K, Bourgeois D. Planning dental manpower in Lebanon: scenarios for the year 2015. East Mediterr Health J 2005; 11: 943-51.
23. 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: 1208-16.
24. Boit JM, Kipkoech LC. Liberalization of higher education in Kenya: Challenges and prospects. IJARPED. 2012; 1: 44-53.
25. Wilson NHF, Verma M, Nanda A. Leadership in recruiting and retaining talent in academic dentistry. J Dent 2019; 87: 32-5.