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DETERMINATION OF HEALTH WORKFORCE NEED BASED ON WORKLOAD: A STUDY ON DENTIST IN TURKEY

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ABSTRACT

Objective: This study aims to determine the need for dentists staffing 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 methodology and formulas in the WISN were used to analyze the data. Two different sources were utilized in collecting the data: the number of dentists and the number of services produced were retrieved from the report published by the MoH, and the activities generating workload and the average duration of such activities were obtained from the interviews with the specialists. The oral and dental institutions serving as affiliated to the MoH in Turkey were selected in the 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, and 1.014 for all institutions, respectively. These results revealed that the total number of dentists was more 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 staffing in public hospitals where the workload was low (n=344).
Conclusion: Instead of staffing a standard number of dentists in health institutions, it should be ensured to use workload-based planning methods, to staff dentists in institutions with high workload, and to strengthen evaluation and monitoring activities. The findings of this research can be used in planning the number of students to be enrolled in the faculties of dentistry.

Keywords: Dentist, health policy, oral health, planning.

ÖZET

Amaç: Bu çalışmada, Dünya Sağlık Örgütü'nün geliştirdiği iş yüküne dayalı sağlık insan gücü ihtiyacı belirleme (WISN) yöntemine göre, ağız ve diş sağlığı hizmetleri için diş hekimi ihtiyacının belirlemesi amaçlanmıştır.
Materyal ve Metot: Verilerin analizinde WISN de yer alan metodoloji ve formüller kullanılmıştır. Verilerin toplanmasında iki farklı kaynaktan yararlanılmıştır. Diş hekimi ve üretilen hizmet sayıları Sağlık Bakanlığı tarafından yayımlanan rapordan; iş yükünü oluşturan faaliyetler ve bu faaliyetlerin ortalama süreleri uzmanlar ile yapılan görüşmelerden elde edilmiştir. Araştırmada, Türkiye'de Sağlık Bakanlığı'na bağlı olarak hizmet veren ağız ve diş sağlığı kurumları seçilmiştir.
Bulgu: WISN oranı, ağız ve diş sağlığı merkezlerinde 0.978, ağız ve diş sağlığı hastanelerinde 0.945, devlet hastanelerinde 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 devlet hastanelerinde 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.

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Anahtar Kelimeler: Ağız sağlığı, diş hekimi, planlama, sağlık politikası.

INTRODUCTION

Oral and dental diseases are proven to be among the most common health problems in the world (1). Oral and dental diseases causing significant losses in quality of life are also associated with many health problems such as HIV/AIDS, diabetes, cardiovascular diseases, growth and developmental retardation, and preterm birth (1-3). Although they are of great importance for health, there are various barriers to accessing oral and dental health services all over the world. Lack of financial resources, ignorance, poverty, and lack of an adequate number of qualified staff are some of these barriers (4,5). Oral and dental health services are provided by both public and private health institutions in Turkey. The services accessible within the MoH are provided by the units located in oral and dental health hospitals (ODHHs), oral and dental health centers (ODHCs), and public hospitals (PHs) (6). According to the data of the Public Hospitals Institution (PHI), there are 22 ODHHs, 132 ODHCs, and 510 PHs providing oral and dental health services (7). Services provided in these institutions are compensated by general health insurance. Besides, such services are offered by private dentists in their clinics (n=10.775) (8). 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 (9). While there is an average of 35 dentists per hundred thousand people in Turkey, this number is 73 in OECD countries (10). For this reason, governmental policies are oriented at increasing the number of dentists in our country. Planning the dentist staffing is particularly essential in developing policies in oral and dental health programs and dental education (11). However, studies on workforce planning seem to be ample considering the importance and impact of oral and dental health (12,13). In planning, different methods are used in addition to the dentist/population ratio, which is the first primary indicator of the WHO (14,15). One of these methods is the workload indicators of staffing need (WISN) developed by WHO (16,17). While there are studies in the literature where the numbers of different health professionals are calculated based on the WISN method (18-26), any study in which the number of dentists is calculated based on the WISN has not been encountered. Based on this preliminary study, it was aimed to determine the dentist staffing need for oral and dental health services offered by the institutions affiliated to the MoH in Turkey. In this way, the current number of dentists can be compared with the number of dentists calculated based on this method.

MATERIALS AND METHODS

Study Design

In this study, the WISN method developed by the WHO was used to calculate the dentist staffing need (16). The method covers the steps presented below.

- Identifying the health institutions and types of these institutions where the study will be carried out,
- Identifying the actual working time,
- Identifying the workload components,
- Identifying the service standards,
- Healthcare services
- Support services
- Calculating the standard workloads,
- Identifying the workload-based staffing need.

Data Sources

The data used in the research were obtained from two different sources. (1) The data regarding the activities generating workload and operation time required to perform these activities in ODHCs, ODHHs, and PHs affiliated to the MoH were identified by obtaining expert opinion. 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. Interviews took approximately 30 minutes. (2) The numbers of dentists staffed and services produced were obtained from the "Oral and Dental Health Indicators, 2017" latest report published by the PHI (6). Our research was conducted in full accordance with the World Medical Association Declaration of Helsinki. Ethics was granted from the Local Faculty of Dentistry Ethics Committee (36290600/14, 05/01).

Data Analysis

The parameters used in the WISN method and the formulas used in the calculations are presented below (16).

- *Actual Working Time:* Active working time of dentists employed in the public institutions within one year is:

  365 days-the number of off-days = Actual Working Time

- *Standard Workload:* Refers to workload generated by oral and dental health services.

  (Annual Total Working Time/Activity Standard) = Standard Workload

- *Staffing Need:* Refers to the number of dentists required for oral and dental health services.

  (The Number of Annual Operations/Workload) = Staffing Need

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- *Adjustment Factor:* Refers to the ratio of support activities performed outside oral and health services on the workload.

  1 / [1-(Total Category Factors/100)] = Adjustment Factor

- *Workload-Based Staffing Need:* Refers to the number of dentists needed based on workload.

  (Total Staffing Need×Category Adjustment Factor) + Individual Adjustment Factor = Workload-Based Staffing Need)

- *WISN Ratio:* Refers to the ratio of the current number of staff and workload-based staffing need.

  (The Current Number of Staff /Workload-Based Staffing Need)

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

  WISN Ratio < 1 means the number of staff is insufficient.

  WISN Ratio > 1 means there is a surplus staffing.

RESULTS

The results obtained according to the stages of the WISN method are given below. ODHCs (n=132), ODHHs (n=22), and PHs (n=510) were selected for the planning the dentist staffing. The total number of dentists employed in these institutions is 8,685. The actual working time of dentists was calculated. The number of days that dentists did not work due to annual leave, official holidays, illness/casual leave, and weekends was determined based on the interviews with specialist dentists (Table 1).

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

Accordingly, the number of off-days within one year was 144 days, and active working time was 221 days. Currently, dentists serving in institutions offering oral and dental health services work 8 hours a day. Therefore, the actual working time was calculated as 106,080 minutes. Then, the workload components of dentists were identified. According to the legal framework, oral and dental health services consist of exodontia, root canal operation, filling treatment, surgical intervention, fixed and mobile denture operations, scaling, curettages, orthodontic treatment, fissure sealant, local fluorine, implant, operation, and referral. In terms of the operations, according to the Oral and Dental Health Indicators Report, filling treatment (n=13.2 million) and exodontia (n=7.9 million) are in the first ranks; orthodontic treatment (n=104.7 thousand) and implant (n=17.7 thousand) are in the last ranks. Besides, activities other than dental health care, which generate extra workload for dentists, were determined as support services, training/congresses, meetings, and private and other works. The activity standards of the services were determined in line with expert opinions. Accordingly, in oral and dental health services, implants and operations take the maximum time with 45 minutes, while referral and local fluorine applications take the minimum time with 10 minutes. Five days a year are reserved for training and congresses, 1 hour a month is reserved for meetings, and private and other works. Moreover, workload and staffing needs were calculated for each health institution. For example, the standard workload for exodontia in ODHCs was calculated as 106,080/15 = 7,072 and staffing need was 4,373,582/7,072 = 618.43. Then, the adjustment factor was calculated. Thus, the workload-based staffing need was determined for all services provided. The category adjustment factor was used to calculate the adjustment factor for services not included in the service statistics. For the category adjustment factors, the activities and their durations, other than routine services, were determined. Calculating the impact of these activities within the total workload, the total category factor was found to be 3.08 and the adjustment factor was calculated as 1.031 (Table 2).

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

Another parameter used in the WISN method is the individual adjustment factor. This factor is used only in the calculation of the adjustment standards of work performed by a certain number of people. Since there is no difference in professions in this study, the individual adjustment factor was not calculated. The number of dentists needed was multiplied by the adjustment factor and the workload-based staffing needs of the health institutions providing oral and dental health services were calculated (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 staffing was needed the most for filling treatment and fixed denture operations and the least for implant and referral services. After determining the workload-based dentist staffing needs for all operations, the WISN ratios were calculated by comparing the current situation and the workload-based staffing needs in the three institutions (Table 4).

Considering the WISN ratios, the WISN ratios are lower than 1 in ODHCs and ODHHs, whereas this ratio is higher than 1 in PHs. As a result of the calculations,

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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	4373582	15	7072	618.43	1.031	637.6
	ODHCs	1700538			240.46		247.91
	PHs	1903819			269.2		277.55
Root Canal Operation	ODHHs	2081783	30	3536	588.73	1.031	606.99
	ODHCs	923332			261.12		269.21
	PHs	443435			125.4		129.29
Filling Treatment	ODHHs	8291209	20	5304	1563.19	1.031	1611.65
	ODHCs	3285196			619.38		638.58
	PHs	1722930			324.83		334.9
Surgical Intervention	ODHHs	533284	30	3536	150.81	1.031	155.49
	ODHCs	258104			72.99		75.25
	PHs	122008			34.5		35.57
Fixed Denture Operations	ODHHs	4113793	30	3536	1163.4	1.031	1199.46
	ODHCs	1795533			507.78		523.52
	PHs	1188018			335.97		346.39
Mobile Denture Operations	ODHHs	699783	20	5304	131.93	1.031	136.02
	ODHCs	265413			50.04		51.59
	PHs	291549			54.96		56.67
Scaling	ODHHs	942385	15	7072	133.25	1.031	137.38
	ODHCs	323735			45.77		47.19
	PHs	332545			47.02		48.48
Curettage	ODHHs	280102	30	3536	79.21	1.031	81.67
	ODHCs	116129			32.84		33.86
	PHs	97236			27.49		28.35
Orthodontic Treatment	ODHHs	35655	30	3536	10.08	1.031	10.39
	ODHCs	53811			15.21		15.68
	PHs	15260			4.31		4.44
Fissure Sealants	ODHHs	2286272	15	7072	323.28	1.031	333.3
	ODHCs	864954			122.3		126.09
	PHs	558917			79.03		81.48
Local Fluorine	ODHHs	286315	10	10608	26.99	1.031	27.82
	ODHCs	134928			12.71		13.11
	PHs	136103			12.83		13.22
Implant	ODHHs	13230	45	2357.3	5.61	1.031	5.78
	ODHCs	3807			1.61		1.66
	PHs	733			0.31		0.32
Operation	ODHHs	244560	45	2357.3	103.74	1.031	106.96
	ODHCs	188244			79.85		82.33
	PHs	25530			10.83		11.16
Referral	ODHHs	131508	10	10608	12.39	1.031	12.78
	ODHCs	24455			2.3		2.37
	PHs	51387			4.84		4.99

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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	4956	5063	-107	0.978
ODHCs	2013	2128	-115	0.945
PHs	1716	1372	344	1.250
Total	8685	8563	122	1.014

while ODHCs (n=107) and ODHHs (n=115) need dentist staffing, there is a surplus of dentist staffing in PHs (n=344). When the total number of dentists and the number of dentists needed based on workload was compared, it was found that the WISN ratio was quite close to 1. Consequently, it was found that the total number of dentists serving in public institutions providing oral and dental health services was adequate, but paradoxically the dentists were not evenly distributed among the institutions.

DISCUSSION

The workforce is an essential source especially for labor-intensive sectors, such as healthcare. Health workforce planning is carried out to raise individuals to be employed with sufficient knowledge and skills at a reasonable cost and to staff them in the right place at the right time by considering the healthcare needs of society (27,28). In this preliminary study, the workload-based dentist staffing needs of three public health institutions were determined and such needs were compared with the actual number of dentists. Currently, it was found that the total number of dentists was adequate, but the dentists were not evenly distributed among the three institutions. Accordingly, the number of dentists in PHs with a low workload is high and the number of dentists in ODHCs and ODHHs with a high workload is low. Because of insufficient facilities and treatment diversity PHs, this situation may be interpreted as being less preferred by patients. In a study conducted in a province of Turkey using the WISN method, it was found that the workload of dentists was 0.94 and the number should be increased by 6% (39). In studies conducted on nurses and pathologists, it was found that there was an unequal distribution among institutions by workload (22,26). The findings obtained in this study bear essential implications for dental education in Turkey, the employment of dentists, and the quality of patient care. The distribution of health workforce among public health institutions is carried out by the MoH (24). Failure to consider factors such as demand and workload in planning leads to poor planning and unbalanced distribution. For this reason, the numbers of faculty of dentistry and student quotas have increased recently (29). In this context, the number of faculties of dentistry, which was 15 in 2005, reached 63 faculties in 2018 (9). There are 62 faculties of dentistry in the USA, where the population size is almost quadrupled of Turkey, and 31 of them in Germany with similar demographic characteristics to Turkey (30). Turkish Dental Association (TDA) has suggested that the number of dentists required for staffing will be reached within 5 years thanks to the current student quotas of faculties of dentistry, and therefore, the quotas should be started to be reduced to avoid unemployment in the future (8). The findings of the study also support this suggestion. The fact that the unplanned increase in the number of faculties of dentistry adversely affects the employment of dentists has also been reported in the studies conducted in other countries. The sudden increase in the number of faculties of dentistry in India has led to problems in the employment of dentists (30-32). It is stated that 100,000 dentists will remain unemployed in India in 2020 if no measures are taken (31,33). In other studies, it has been revealed that it is the case for Saudi Arabia and Lebanon (34,35). 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 (32). 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 (36,37). The TDA attributes the reason for problems related to oral and dental healthcare not because of the lack of an adequate number of dentists, but that the frequency of applying to oral and dental health services is quite low compared to developed countries (8). 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 (9). It should be noted the future success of dental schools, the quality of its 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 schools must succeed in the recruitment and retention of talented individuals (38). Another issue that has been scrutinized in dental planning studies is inequality and unbalanced distribution (12,30). Gallagher and Hutchinson found that the majority of 1.6 million dentists in the world are located in Europe and the USA, and 69% of them serve 27% of the global population (11). Africa has only 1% of the global workforce. While there are 40-50 dentists per hundred thousand people in some regions of Turkey, the number is 20-30 dentists in some other regions (9). Regional distribution imbalance is also observed in other countries, which reveals that people desire to live in urban zones with better opportunities. There are some limitations to the study. The time that will be reserved for the treatment by a well-trained dentist in Turkey was considered in determining the activity standards, and it was assumed that there were no differences between dentists serving in all three group institutions. Furthermore, the variable nature of hospital conditions was not considered. Because of the private sector data is not available

this study is limited by the dentists serving in three group public institutions affiliated to the MoH. Studies including dentists serving in the private sector can provide a wider perspective on planning and distribution of dentists across the country.

CONCLUSION

This study will contribute to the development of evidence-based policies for dentist training, employment, and quality in patient care. There is a clear need to determine the evidence-based dentist staffing need in all countries by using the WISN method. Furthermore, the workload-based planning method should be used instead of planning a standard number of dentists for each health institution. It should be ensured that dentists are staffed in institutions with high workload and evaluation and monitoring activities are strengthened. Besides, the findings of this research can be used in planning the number of students of the faculties of dentistry.

Ethics

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

Authorship Contributions

All authors contributed equally to the writing of this paper.

Declaration of competing interest

The authors report no conflicts of interest.

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