Self-Reported Dental Public Health Competencies of Senior Dental Students: A Cross-Sectional Study

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Objectives In line with the World Health Organization's goal of improving the community oral health, Iranian oral health policymakers have integrated dental public health (DPH) courses into the latest dental curriculum to improve the students' competencies. The aim of the current study was to evaluate DPH competency of senior dental students of Shahid Beheshti University of Medical Sciences according to the specified educational objectives.

Methods In this cross-sectional study, 195 senior dental students (enrolled in 2014-2015) completed a standardized online questionnaire. The instrument included demographic information as well as 31 statements about 10 domains of DPH. The participants self-assessed the level of their competency on a Likert scale of 0 to 10 for each statement; zero indicating "not competent at all", and 10 indicating "fully competent". The mean score was calculated for each domain. SPSS version 21 was used for data analysis by independent samples t-test, one-way ANOVA, and repeated measures ANOVA**.**

Results The sum of scores for each participant ranged from 63 to 310, with a mean of 216.68±43.69. Students were most competent in "providing preventive dental care" (8.22±1.59), "adherence to professional ethics" (7.56±1.68), and" understanding the determinants of oral health" (7.50±1.52). They were least competent in "understanding the components and functions of the healthcare system" (5.96±2.06), "planning" (6.06±2.45), and "oral health research" (6.24±2.44). Female students had a significantly higher mean score (223.30±38.21) than male students (207.15±49.25; P=0.011).

Conclusion : Failure to achieve the desired competency in domains such as "understanding the components and functions of the healthcare system," "planning," and "oral health research" indicates the need for a revision in the content, teaching methods, or both, focusing on the aforementioned areas.

Keywords Public Health Dentistry; Competency-Based Education; Self-Assessment; Students, Dental

Introduction

Dental public health (DPH) is about providing leadership and expertise in population-based dentistry, oral health surveillance, policy development, community-based disease prevention, and health promotion. The main focus of DPH programs to improve the oral health is on communities rather than individuals. As a discipline, DPH is the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts. Thus, the main objective of oral healthcare providers should be identifying oral health problems and their causes, severity, and prevalence, as well as conducting appropriate interventions to improve and maintain the highest oral health status in the community.[1]

The DPH modules and courses are included in the general dentistry curriculum of Iran, as they are in many other dental schools around the world.[2] Indeed, the primary goal of these courses is to instill a preventive and community-oriented attitude in dental students. As a result, developing content and delivering these courses must be done with utmost accuracy and authenticity.[3] Furthermore, because of the importance of this field in promoting public oral health, continuous supervision is required to reveal the strengths and weaknesses.[4] Community-based education, primary oral healthcare,

and comprehensive care subjects were included in the third revision of general dentistry curriculum in Iran (conducted in 1998).[5] Later in 2012, the fourth revision was completed, directing the curriculum towards meta-competencies and preventive care. Consequently, efforts were made to replace requirement-based education with competency-based education (CBE).[6]

In the CBE method, instructors assess the trainees to see if they have attained the desired competencies.[7, 8] Regarding the DPH courses, the competence of novice dentists in understanding, assessing, and planning programs for the oral health needs of the population has been the area of concern.[9] When compared with the traditional methods, CBE has several advantages, including focusing on outcomes and potential weaknesses, emphasizing on the desired abilities, de-emphasizing time-based training, and student centeredness. As a result of its higher efficiency, CBE may be preferred over traditional approaches.[10, 11]

According to the most recent version (2017) of the Iran's general dentistry curriculum, a dental student should be competent in the following areas: preventive and therapeutic care, oral health education, administration of oral health projects, and research in DPH topics. As previously stated, almost all of the competencies expected of a dental student by the Iranian Ministry of Health and Medical Education are covered by DPH.

However, the course allocation in the dental curriculum does not correspond to the desired competencies because only 5 out of 217 courses are directly administered and supervised by DPH experts and faculty members.[2]

Yazdani et al. compared the overall competency achieved in DPH with other clinical fields such as orthodontics and endodontics. The comparison revealed that DPH and orthodontics had the highest and lowest levels of competency, respectively.[12] Pakdaman et al. reported that there were deficiencies in meeting the educational goals in DPH and periodontics.[13] Also, some studies were limited to a specific domain of DPH, such as evidence-based dentistry or preventive dentistry. The results showed deficient knowledge but good attitude towards evidence-based dentistry.[14] Moreover, the students' attitudes toward preventive dentistry needed to be improved.[15] Before and after participating in a community dentistry course, Eslamipour et al. assessed dental students' competencies in six DPH domains. The findings revealed that two domains of need assessment and planning required more time and resources.[3] In a similar study in India, Khanagar et al. used a questionnaire to evaluate DPH competencies among postgraduates. The highest level of competency was reported in preventive interventions, while the lowest level was reported in applying ethical standards.[16] According to the current literature, only a few studies have examined competencies in all DPH domains individually and collectively.

Given that DPH is a relatively new discipline added to general dental education in Iran, any information about the current curriculum outcomes could aid in identifying the gaps and improving the deficiencies. As a result, the purpose of this study was to assess the competencies attained in 10 domains of DPH by senior dental students at Shahid Beheshti University of Medical Sciences in Tehran, Iran.

Methods and Materials

In this cross-sectional study, 198 senior dental students from Shahid Beheshti University of Medical Sciences self-assessed their DPH competencies at the end of their final semester. The study was carried out between November 2019 and June 2021. The ethics committee of the university approved this study (approval reference no.: IR.SBMU.DRC.REC.1398.231). The study included all students who had completely passed the DPH courses. Dental students who had not yet completed DPH courses, or were guest students from other universities were excluded. The original questionnaire by Asgari et al. was used after minor modifications.[17] The first section of the questionnaire contained the study objective as well as instructions on how to complete it. This was followed by demographic information, including gender, enrollment date, and region of birth/residence. In terms of unequal distribution of educational, healthcare, financial, and socioeconomic facilities, Iran can be divided into three regions. The residents' access to these facilities in each region degrades from region one to region three.[18] The second part consisted of 31 statements describing competencies related to each of the 10 DPH domains, and participants were asked to select a number ranging from 0, indicating "not competent at all", to 10, indicating "fully competent" to demonstrate their self-perceived competencies. The sum of each student's scores could range from 0 to 310, with a higher score representing a higher level of perceived competency. The number of statements associated with each domain was not necessarily equal. Consequently, for a more straightforward judgment, the score for each domain was converted into a scale of 0 to 10 by dividing the sum of scores for each domain by the number of related statements. Following this procedure, it was easier to compare domains and report higher or lower levels of competency (domains and statements are available in Table 1). The mean scores were divided into three groups: low level of self-perceived competency (0 to 3.33), medium level of self-perceived competency (3.34 to 6.66), and high level of self-perceived competency (6.67 to 10). The questionnaires were anonymous, and students filled them up voluntarily. Due to the COVID-19 pandemic, the questionnaire was accessible in the online platform of Google Forms.

For descriptive statistics, mean and standard deviation values were reported. For variables with normal distribution, independent sample t-test and one-way ANOVA were applied. Repeated measures ANOVA with Greenhouse-Geisser correction was used to compare the converted mean scores of the domains. All of the procedures described above were carried out using SPSS version 21. Statistical significance was defined as P-values less than 0.05.

Table 1- Evaluated domains of dental public health and their related statements in the questionnaire

Domain	Statement
Adherence to professional ethics	1. Understanding DPH-related professional ethics 2. Adherence to professional ethics in all DPH services
Evidence-based dentistry	3. Using electronic databases to look for scientific evidence 4. Critical assessment of scientific evidence 5. Providing therapeutic and preventive advice based on scientific evidence 6. Providing oral health services based on the most reliable scientific evidence 7. Responding to patients' concerns about therapeutic and preventive services as a reliable reference

Oral health promotion and education	8. Understanding behavioral change patterns and health education models	
	9. Oral health education based on risk assessment	
	10. Adherence to DPH programs at the national, regional, and international levels	
	11. Cooperation with mass medias, schools and healthcare providers in other fields	
	12. Designing oral health promotion media for different target groups	
	13. Using oral health data for oral health promotion and education	
	14. Oral health assessment in different target groups	
Understanding the determinants of oral health	15. Realizing close determinants of oral health	
	16. Realizing remote determinants of oral health	
	17. Understanding the dentist's role in controlling oral diseases	
Need assessment	18. Measuring the prevalence and incidence of oral diseases	
	19. Selecting proper indicators for assessing oral health needs	
	20. Analyzing and reviewing population's oral health data	
Planning	21. Understanding components of an oral health plan	
Advocacy and communication	22. Communicating with various target groups	
	23. Interaction and collaboration with other healthcare providers	
	24. Interaction and collaboration with people outside of the healthcare field	
Providing preventive dental care	25. Risk assessment and detecting risk factors	
	26. Preventive clinical dental care e.g. fissure sealant therapy and fluoride therapy	
Oral health research	27. Designing, managing, and implementing oral health investigations	
Understanding the components and functions of the healthcare system	28. Understanding the healthcare system components such as financing and stewardship	
	29. Understanding the functions of national healthcare system	
	30. Understanding the healthcare system's intermediate and long-term objectives	
	31. Economic analysis in oral healthcare	

Results

From a total of 198 eligible participants, 195 students completed the questionnaire (response rate=98%); of whom 59% were females (n=115). Table 2 contains the demographic information of the participants.

Table 2- Demographic characteristics of senior dental students of Shahid Beheshti University of Medical Sciences (n=195)

Gender	Female	59% (n=115)
	Male	41% (n=80)
Enrollment date	January 2014	26.7% (n=52)
	September 2014	21.9% (n=41)
	January 2015	30.8% (n=60)
	September 2015	21.5% (n=42)
Place of birth/residence	Region 1	50.3% (n=98)
	Region 2	36.9% (n=72)
	Region 3	12.8% (n=25)

The minimum and maximum overall competency scores were calculated to be 63 and 310, respectively, with a mean of 216.68±43.69. The highest mean score recorded across all 10 competency domains belonged to "providing preventive dental care" (mean=8.22±1.59), and the lowest belonged to "understanding components and functions of the healthcare system" (mean=5.96±2.06). More detail is provided in Figure 1. The results of repeated measures ANOVA with Greenhouse-Geisser correction revealed that the difference in the domains' mean scores was statistically significant (P<0.001). However, in pairwise comparisons, the differences between the mean scores of a few domains were insignificant, as shown in Table 3.
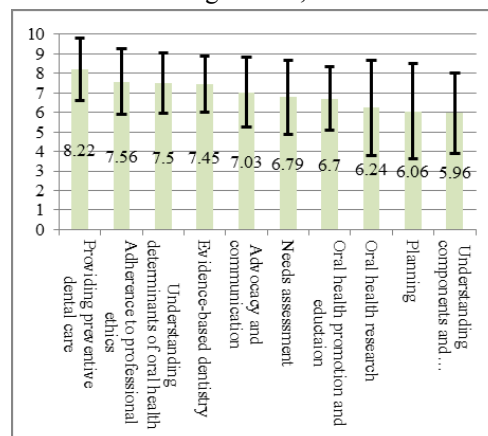

Figure 1: Mean score for all domains that were standardized to a scale of 0 to 10 (standard deviations are displayed using error bars) (n=195)

Table 3- Pairwise comparisons of the domains' mean scores using repeated measures ANOVA with Greenhouse-Geisser correction (only domains with insignificant differences in mean scores are mentioned here. The differences between the rest of the domains were statistically significant) (n=195)

Compared Domains (mean Score)		Mean Difference	Standard Error	P value
Adherence to professional ethics (7.56)	Evidence-based dentistry (7.45)	0.111	0.104	1.000
	Understanding the determinants of oral health (7.50)	0.064	0.107	1.000
Evidence-based dentistry (7.45)	Understanding the determinants of oral health (7.50)	-0.047	0.089	1.000
Oral health promotion and education (6.70)	Need assessment (6.79)	-0.091	0.089	1.000
Need assessment (6.79)	Advocacy and communication (7.03)	-0.241	0.103	0.899
	Oral health research (6.24)	-0.174	0.154	1.000
Planning(6.06)	Understanding the components and functions of the healthcare system (5.96)	0.100	0.132	1.000
Oral health research (6.24)	Understanding the components and functions of the healthcare system (5.96)	0.274	0.135	1.000

The majority of the participants reported a high level of self-perceived competency in all domains, with "providing preventive dental care" having the highest frequency of high competency (84.6%). The majority of students reported low self-perceived competencies in "planning" and "oral health research" (15.4%) (Figure 2).
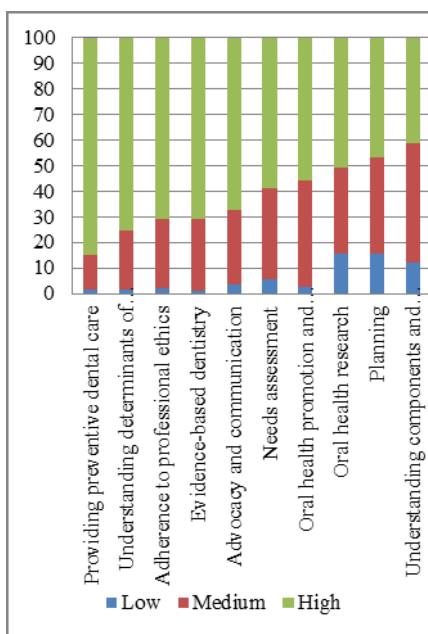

Figure 2: Distribution of dental students' (n=195) DPH competency according to their mean score for each competency domain as low (0 to 3.33), medium (3.34 to 6.66), and high (6.67 to 10).

According to the enrollment series results, September 2015 enrollees had the highest overall competency score (mean=224.33±39.08 out of 310), while January 2014 enrollees had the lowest overall competency score (mean=199.96±50.98 out of 310). However, the mean score of January 2014 enrollees was significantly lower only when compared with the enrollees of January 2015 (P=0.039) and September 2015 (P=0.033).

After classification of participants according to their birth/residence regions, students raised in region three had the highest overall competency score (mean=235.16±38.68 out of 310), while students raised in region two had the lowest score (mean=208.47±43.05 out of 310). The only statistically significant difference was found between residents of regions three and two (P=0.023).

Female students had a significantly higher overall mean score (=223.30±38.21 out of 310) than male students (=207.15±49.25 out of 310; P=0.011).

Discussion

The current study aimed to assess senior dental students' self-perceived competencies in 10 DPH domains at Shahid Beheshti Dental School. Data analysis revealed that among DPH domains, students' self-perception of providing preventive dental care was relatively higher. They were, however, less competent in understanding the components and functions of the healthcare system.

Achieving a high competency in "providing preventive dental care" may be due, in part, to rehearsing related subjects in other courses such as restorative dentistry and pediatrics, in addition to demonstrations received in DPH courses.[3] Furthermore, students practice clinical aspects of preventive dentistry in the mentioned courses. In a similar study on 124 postgraduate students of public health dentistry in India, preventive intervention ranked first among competencies, which was in line with our findings.[16] In contrast, Khami et al. found that theoretical units and practical courses of preventive dental care were satisfactory only to 55% and 46% of 432 dental students in Iran, respectively.[19]

Students reported the least competency in "understanding the components and functions of the healthcare system". One possible explanation is that dental students may prefer focusing on clinical aspects of their education due to its noticeable impact on their career. Simultaneously, the impact of a DPH domain such as "understanding the components and functions of the healthcare system" may not be recognizable on their practical abilities. As a result, some students may conclude that such a topic does not appear to be useful in their practice. Another probable reason may be inappropriate training methods deployed by the faculty. Therefore, additional research appears to be necessary in order to find reasons with greater certainty. Khanagar et al. reported that students had less competency in formulating health policies, lobbying, and simplifying payment plans.[16] Understanding these concepts may enable dentists to play a more influential role in the health system and awaken a desire to improve oral health beyond their clinical practice and for larger target groups. Thus, it is suggested to keep students exposed to this subject from the first semesters of dental education until graduation. Repeated exposures would increase the frequency of learning and assist students in developing a more profound understanding.[20, 21]

The difference in DPH competencies achieved by enrollees in four series may be the result of different tutoring approaches or educational methods. However, Motallebnejad et al. reported no significant difference in professional abilities of Babol Dental School graduates with different enrollment dates.[22] As a result, it is strongly advised to provide a more detailed educational plan and to evaluate students and instructors at the end of each course to determine whether the new approaches have assisted in achieving the desired outcomes.

The highest mean score among students from different national regions in terms of welfare and socioeconomic status belonged to residents of region three. This may be

due to their deeper perception and higher sensitivity to public health topics such as prevention and health promotion as a result of growing up in a region with limited access and inadequate healthcare facilities. In other words, these students appear to be more aware of the impact of social context on oral health, and they may be more eager to learn DPH courses in order to resolve related issues. Motallebnejad et al, on the other hand, denied any significant difference in the professional abilities of dental graduates from different national regions.[22]

Female students had a significantly higher mean competency score than male students. This prominence could be attributed to women paying more attention while working on DPH projects. According to Ghasemi et al., female dentists had a more positive attitude towards preventive dentistry than male dentists. Although both genders' knowledge and attitude towards preventive dental care needed to be improved.[23] Yazdani et al, on the other hand, found no statistical difference between males and females in DPH competencies.[12]

When using the self-assessment method, participants' self-confidence may influence their answers, reducing the validity of evaluation. It is worth noting, however, that self-confidence is the outcome of knowledge, experience, and competency, making self-assessment a useful method of educational judgment.[12] "Socially desirable responding" is a phenomenon that occurs in conjunction with self-assessments. It expresses that participants attempt to report answers that appear to be more appropriate in general. Consequently, the results would be incorrectly more desirable than their actual quality.[24]

However, this bias can be reduced using a variety of techniques, including participants' anonymity, which was deployed in the current study.[25]

Accessing all senior dental students was not possible following COVID-19 pandemic and the switch to online education. To avoid losing the sample population, we converted the paper questionnaire into an online one. Since participation in the study was entirely voluntary, we assigned an extra grade to the DPH course in order to increase the students' participation rate.

Conclusion

Participants felt adequately competent in most domains of DPH, such as "providing preventive dental care", "adherence to professional ethics", and "understanding the determinants of oral health". Other areas, such as "understanding the components and functions of the healthcare system," "planning," and "oral health research," require additional efforts. Based on this observation, it may be necessary to modify the DPH curriculum, teaching method, or both. Each DPH domain may require additional individual investigations to identify barriers against achieving higher competencies. Increasing the inter-departmental courses between DPH and other groups, such as pediatrics, is also strongly advised for further improvements

Conflict of Interest

No Conflict of Interest Declared ∎

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