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Original Article

Self-Assessment of Competencies about Dental Public Health among Dental Interns and Dental Practitioners: A Cross-sectional Study.

Rabaa Aboubakr[1], Rasha Ramadan[1]

[1]Department of Pediatric Dentistry and Dental Public Health, Faculty of Dentistry, Mansoura University, Mansoura, Egypt

Email: rabaa4444mahmoud@gmail.com

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Abstract

Objectives: This study was conducted to assess dental public health competencies among dental interns and dental practitioners with different specialties. ***Subjects & Methods***: This questionnaire-based cross-sectional study was carried out on 406 dental interns and practitioners. The new competency for dental public health specialists of the 21st century was used in this study. The questionnaire was divided into four sections; the first section was about demographic data, the second section was about the best method to earn knowledge and skills about dental public health, while the third and fourth sections were about dental public health competencies and the importance of each competency from our participants' point of view. Differences in frequencies between groups were assessed using the Chi-square test. The association between study participants' characteristics and competency level was studied using a linear regression analysis model. ***Results***: Moderate Competency level was found among our participants (average score 3.80/6), and females were better than males (average score 3.95 vs 3.70). Participants' age, qualifications, and specialty were significantly associated with their competency. ***Conclusion***: Our findings support the urgent need for updating and improving the undergraduates' dental curricula, also continual dental education programs in dental public health specialists are highly recommended to be conducted by ministries of health in collaboration with dental schools.

Keyword: Dental Public Health, Competency, Dental Practitioners.

INTRODUCTION

The American Board of Dental Public Health (ABDPH) defined Dental Public Health (DPH) as " the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts". The old clarifying paragraph was: "It is that form of dental practice which serves the community as a patient rather than the individual.". This was the official definition of DPH for about 65 years which focused on the roles of DPH specialists (DPHSs) and used a narrow definition of the community [(1)]. Then revision with minor word changes and a

clarifying paragraph on roles of DPHSs was approved by the American Dental Association (ADA) House of Delegates in 1976 and remains the official definition for 40 years later. The new clarifying paragraph reads: "It is concerned with the dental health education of the public, with applied dental research, and with the administration of group dental care programs as well as the prevention and control of dental diseases on a community basis"[(2)].

Competency was defined as "the ability or a skill of an individual to do a job properly." It comprises knowledge, skill, ability, and behavior that individuals should have to fulfill certain job [(3)]. Competencies for DPH were first established in 1978[(4)], then at 1998 The American Board of Dental Public Health (ABDPH) updated these competencies and established 10 core competencies for all DPHSs [(5, 6)]. The latest update of DPH competencies was initiated in 2014 by ABDPH and finished in 2016 by the American Association of Dental Public Health (AADPH), with the aid of some DPH experts. These dynamic processes for modification and updating of DPH competencies to align with roles and functions of DPHSs in the 21st Century [(7)].

Each competency is composed of domain and intent statement. Each competency domain illustrates the performed task by DPHS, while the intent statement describes the "job responsibilities" or "core abilities of every DPHS, it clears the meaning of each domain. Despite this, the tasks and roles of each competency are not comprehensive as they give representative examples of functions performed by DPHS [(7)].

Need assessment is the base for any curriculum development process, it is based on the expected competency of the target group. It enables to conduct of an effective situation analysis and identifying the actual resources required to establish and implement an educational program [(8)].

Nowadays, the importance of public health specialty became clear to the community members and policymakers especially after the widespread of some endemics and pandemics worldwide. This emphasizes the roles of public health specialists in these down breaks. The number of DPHSs in Egypt and Arab countries is few, even the knowledge and skills of graduated dental students about DPH functions are too little. So, this study was aimed to assess dental public health competencies among dental interns and dental practitioners with different specialties.

Subjects and Methods

This cross-sectional study was conducted to assess dental public health competencies among dental interns and dental practitioners in different dental specialties. The competency statements used in this study were the new competencies for DPHS of the 21st century which was developed and revised by the American Board of Dental Public Health, along with the American Association of Public Health Dentistry and its many partners. These competencies were later used to test DPH competencies in several studies [(3, 7)].

The study subjects and ethical approval:

A convenient sampling technique was used in this study to recruit subjects who were staff members of some dental schools, dental interns, and some dental practitioners from private and governmental dental clinics. The proposal of this study was approved by the Ethical Committee in the College of Dentistry, Mansoura University, Egypt. Study participants were informed about the aim and specific objectives of the research and the value of their participation. Further, they have been informed that their participation is only voluntary and that they have the right to withdraw at any time without any penalty. Also, they were informed that their identity will be kept anonymous and confidential, and they would not be required to clear their names, or academic numbers, or any sort of personality identification. Subjects' responses were only accessed by the research investigators and data were dealt with as aggregate rather than individual scores.

Questionnaire preparation:

Our tool for data collection was a self-administered well-structured close-ended electronic questionnaire. The questionnaire was divided into four sections; the first section contained five multiple-choice questions (MCQ) about demographic data related to participants' age, gender, nationality, qualifications, and specialties. The second section was only one MCQ question about the best method to earn knowledge and skills about DPH. The third section of the questionnaire consisted of 10 DPH competencies items (program planning, ethical rule, evaluation of oral health care services, collection and interpretation of data, transmission of oral health information to the community, leadership, ability to advocate, Evidence-based Dentistry, conducting research, integration of social determinant of health into DPH practice).

Ghere et al [9] self-assessment rating scale from 1 to 6 was used to evaluate our participants' competencies in DPH. This scale was described as follows; Score between 1 and 2 (Entry/Novice): Developing awareness/building knowledge; limited repertoire; limited experience; unaware of potential problems; unaware of questions to ask. The score between 3 and 4 (Proficient/Skilled): Applies knowledge routinely; basic repertoire; a moderate amount of experience; solves problems as they arise; aware of questions to ask and can access resources to answer the questions at hand. The score between 5 and 6 (Mastery/Expert): Uses knowledge fluently and effectively; advanced repertoire; extensive experience; anticipates problems before they arise; poses questions to the field; sought out for input.

The last section consisted of the same DPH competency items previously evaluated in section 3, to assess the importance of each competency. The importance of each competency was evaluated on a five-point Likert scale from 5 to 1; where 5: Very important, 4: important, 3: moderately important, 2: of little importance,1: unimportant. The questionnaire was created on Google Form on May 4, 2021, and kept available for the participants till July 28, 2021. During this period, the questionnaire was sent

via E-mails and WhatsApp messages to the target groups. Gentle reminders were sent to those who did not respond to the questionnaire the first time.

https://docs.google.com/forms/d/e/1FAIpQLSdJY2WT7fyvobEQ-1BnaIyVMIiR91C_Ln5xJuZlF2RrIxzkOw/viewform?usp=sf_link

Data analysis

Responses of our participants were collected and downloaded in spreadsheets from Google Forms. The data was then abstracted and analyzed using [IBM, SPSS version 20, IL, USA]. P<0.05 was set as the level of significance. Descriptive analysis was conducted using frequency with percentage for nominal variables and means for continuous variables. Differences in frequencies between groups were assessed using the Chi-square test. The association between study participants' characteristics and competency level was studied using a linear regression analysis model.

RESULTS

About 406 responders out of 570 were responded to the questionnaire with a response rate of 71.2%**.** According to the ages of a participant, about 58.4% were less than 30 years, and for the gender, most of them were males (58.1%). About 29.8% of our participants were having a doctorate, while 3.9% had a diploma degree. The participation of general practitioners was the highest (38.2%) (Table 1)

Referring to the preferred methods for gaining DBH Competencies, it was found that the highest percentage of study participants recommended certified programs as a source for DPH knowledge and skills (31.77%). (Figure 1)

The overall score for the participants' competency and importance of each competency were 3.80 and 4.27 respectively. The highest competency score was 4.25 for competency #5 and the lowest score was 3.59 for competency #4. The most important competency was competency #10, and the least important one was #5. (Table 2)

Concerning the competency levels, the results revealed that 25.86% of our participants were having low competency, and 60.1% had a moderate level, while 14.04% had a high level of competency. (Figure 2)

Statistically significant differences were found between the three competency levels regarding each of age, gender, qualifications, and specialties. In our sample, participants with ages 30 to less than 40 were highly competent than others (4.72). For gender, females were highly competent than males (3.95 vs 3.70 mean competency score). Participants with a Doctorate were more competent than participants with other qualifications (4.52). The average competent score for DPHSs was the highest among all specialties (4.62). (Table 3 & 4)

Predictors for DPH competency was displayed through regression analysis model and the results were shown as follows: Participants' qualifications were positively associated with their competency level (β: 0.601, p: 0.000, CI: 0.465 - 0.755), which was meant by increasing participants' qualification the competency level also increased.

Table (1): Distribution of Demographic Characteristics Among Study Participants (N=406)

Variables		N (%)
Age	< 30 years	237(58.4)
	From 30 to < 40 years	48(11.8)
	≥ 40 years	121(29.8)
Gender	Male	236(58.1)
	Female	170(41.9)
Qualifications	Bachelor's in dental sciences	245(60.3)
	Diploma	16(3.9)
	Master's degree	24(5.9)
	Doctorate	121(29.8)
Specialties	Dental intern	74(18.2)
	General practitioner	155(38.2)
	Dental public health specialist	89(21.9)
	Periodontology/Pedodontics /Ortho	48(11.9)
	Resto/Endo/ Dental Biomaterials	16(4)
	Prosthodontics (fixed/removable)	24(5.9)

However, participants' age was negatively associated with their competency (β: -0.295, p: 0.000, CI: -0.746 - -0.230), which could be explained by increasing participants' ages their competency level decreased. In the same vein, participants' specialty was negatively associated with their competency (β: -0.793, p:0.000, CI: -0.750 - -0.549), this means specialty with higher entry code (dental interns) had the lowest competency level. For gender, it was not significantly associated with competency level. (Table 5)

DISCUSSION

Dental Public Health is one of the 9 dental specialties that were early recognized by ADA [(7)]. The concept of community that serves as one patient is the main difference between DPH practice and dental private practice. In private practice, every patient is treated individually with a separate treatment plan that is based on the patient's needs and desires. However, in DPH treatment plans are not provided to the individual patient but the community based on the community need and financial capacity of the country [(10)]. The main role of public health dentistry is to measure and assess the distribution and determinants of dental diseases and to advocate, educate, motivate, empower and improve oral health in diverse populations [(11)].

In general, testing the competencies regarding any specialty is an essential step for

safeguarding the practices, maintaining accreditation certificates, and curriculum evaluation accordingly [12-16]. The used competencies in this study were the updated DPH competencies which were evaluated in several previous studies, at 2016, Mascarenhas and Altman [3] surveyed to collect opinions of DPHSs about the new DPH competencies, and their results were encouraging as about 92.12% of their participants acknowledged these competencies to be essential for all DPHSs.

Table (2): Average Score of Study Participants' Competencies and the Ranking Importance of each Competency about DPH

DPH Competencies	Competencies	Ranking Importance of each competency
	Average Score	
Total Average Score	**3.80**	**4.27**
1. Ability to manage oral health programs for population health	3.64	4.40
2. Ability to demonstrate ethical decision-making in the practice of dental public health	3.89	4.22
3. Ability to evaluate the system of care that impact oral health	3.78	4.20
4. Ability to design surveillance systems to measure oral health status and its determinants	3.59	4.14
5. Ability to communicate on oral and public health issues	4.25	4.03
6. Ability to lead collaborations on oral and public health issues	3.70	4.12
7. Ability to advocate for public health policy, legislation, and regulations to protect and promote the Public's oral health, and overall health	3.71	4.08
8. Ability to critically appraise evidence to address oral health issues for individuals and populations	3.97	4.40
9. Ability to conduct research that addresses oral and public health problems	3.64	4.54
10. Ability to integrate the social determinants of health into dental public health practice	3.85	4.57

DPH: *Dental Public Health*

Competency scores:

**Score between 1 and 2: Developing awareness/building knowledge; limited repertoire; limited experience; unaware of potential problems; unaware of questions to ask.*

**Score between 3 and 4: Applies knowledge routinely; basic repertoire; a moderate amount of experience; solves problems as they arise; aware of questions to ask and can access resources to answer the questions at hand.*

**Score between 5 and 6: Uses knowledge fluently and effectively; advanced repertoire; extensive experience; anticipates problems before they arise; poses questions to the field; sought out for input.*

Importance ranking scale:

5= very important; 4= important; 3 =moderately important; 2= of little importance; 1=unimportant.

In the same year, Gaunkar et al, 2016 [17] cleared that questionnaire-based surveys are considered an efficient tool for a competency evaluation. Till now there were no studies conducted in Egypt to evaluate DPH competencies among dental practitioners. Even in Arab countries, few studies were conducted to evaluate DPH competencies and used the old version of competency. So, our survey aimed at evaluating the DPH competency of dental interns and dental practitioners with different specialties.

Table (3): Frequency Distribution of Competency Levels Among Study Participants' Characteristics

Characteristics (N=406)		**Competency levels**			
		Low	**Moderate**	**High**	**P-value**
Age	< 30 years	65(61.9)	172(70.5)	0	0.000
	From 30 to < 40 years	8(7.6)	16(6.6)	24(42.1)	
	≥ 40 years	32(30.5)	56(23)	33(57.9)	
Gender	Male	65(61.9)	147(60.2)	24(42.1)	0.029
	Female	40(38.1)	97(39.8)	33(57.9)	
Qualifications	Bachelor's in dental sciences	65(61.9)	164(67.2)	16(28.1)	0.000
	Diploma	8(7.6)	8(3.3)	0	
	Master's degree	8(7.6)	16(6.6)	0	
	Doctorate	24(22.9)	56(23)	41(71.9)	
Specialty	Dental intern	8(7.6)	58(23.8)	8(14)	0.000
	General practitioner	49(46.7)	98(40.2)	8(14)	
	Dental public health specialist	16(15.2)	40(16.4)	33(57.9)	
	Periodontology/Pedodontics /Ortho	24(22.9)	16(6.6)	8(14)	
	Resto/Endo/ Dental Biomaterials	0	16(6.6)	0	
	Prosthodontics (fixed/removable)	8(7.6)	16(6.6)	0	

The level of significance was set at p< 0.05 by the Chi-square test

Table (4): Comparison of Average Competency Scores within Study Participants' Characteristics

Characteristics (N=406)		Competency Mean ± SD	P-value
Age	< 30 years	3.46 ± 0.97[a]	0.000#
	From 30 to < 40 years	4.72 ± 1.31[a]	
	≥ 40 years	4.12 ± 1.56[a]	
Gender	Male	3.70 ± 1.11	0.052
	Female	3.95 ± 1.94	
Qualifications	Saudi Arabia	4.19 ± 1.12[b]	
	Syrian	3.6 ± 0	
	Bachelor's in dental sciences	3.62 ± 1.08[acdf]	0.000#
	Diploma	2.70 ± 0.93[acdf]	
	Master's degree	2.83 ± 1.43[cdf]	
	Doctorate	4.52 ± 1.34[acdf]	
Specialty	Dental intern	3.84 ± 0.92[acd]	0.000#
	General practitioner	3.57 ± 1.08[bcd]	
	Dental public health specialist	4.62 ± 1.51[abcdef]	
	Periodontology/Pedodontics /Ortho	3.43 ± 1.32[cf]	
	Resto/Endo/ Dental Biomaterials	3.75 ± 0.67[bcd]	
	Prosthodontics (fixed/removable)	2.93 ± 1.46[abcde]	

***SD**: Standard Deviation*
**Statistically significant difference between males and females by independent sample t-test at P< 0.05*
 # One Way Anova for the comparison between more than two means at P< 0.05
Similar superscripts in the same characteristics indicate statistically significant differences between different variables by LSD-test at P< 0.05

Table (5): linear regression analysis for the association between study participants' characteristics and their competency level

Participants' Characteristics		Beta	P-value	Exp(B)	95% Confidence Interval for Exp(B)	
					Lower Bound	Upper Bound
Competency	Gender	-0.073	0.096	-0.222	-0.483	0.039
	Age	-0.295	0.000*	-0.488	-0.746	-0.230
	Qualifications	0.601	0.000*	0.610	0.465	0.755
	Specialty	-0.793	0.000*	-0.649	-0.750	-0.549

**: significant relation at p<0.05 by linear regression analysis*

Dependent variable: participants' competency

FIGURE (1): THE PREFERRED METHODS FOR GAINING DPH COMPETENCIES

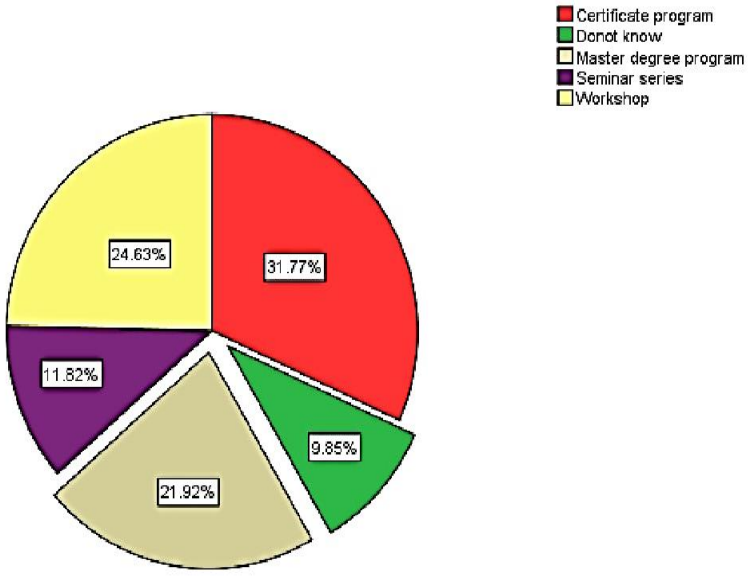
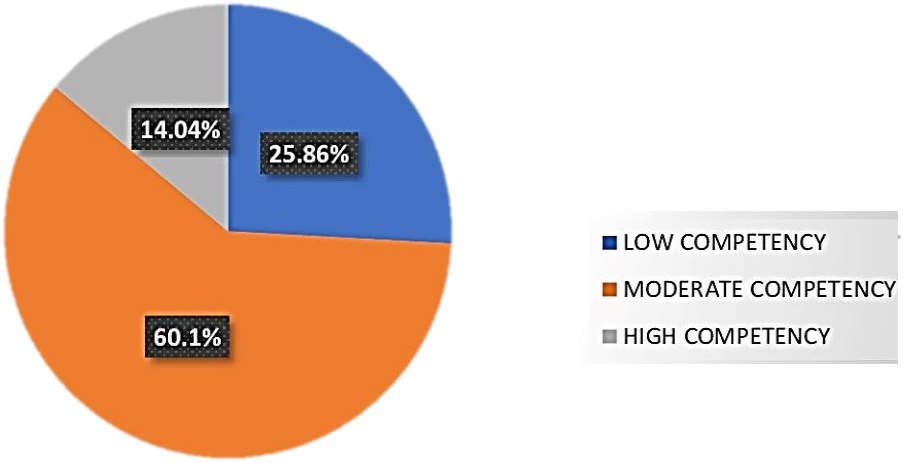


FIGURE (2): Distribution of Study Participants' Competency Levels



Our findings revealed that most of our participants preferred to gain DPH knowledge and skills through certified programs (31.77%) followed by workshops (24.63%) and a master's degree was chosen by only (21.92%) of the participants. However, (Al Agili, 2015) [18] cleared another order of her participants' interest as; (47.9%) preferred seminar series followed by workshops (42.5%), then master's degree program (27.4%).

Concerning competency level, 60.1% of our participants experienced average competency

level in comparison to 14.04% who were highly competent. Although the competency among our sample was average, they acknowledged the importance of these competencies for any DPHS (mean competency and importance scores were 3.80/6, and 4.27/5 respectively). These findings were consistent with (Al Agili, 2015) [18] who reported a moderate amount of competency with high importance score, their maximum competency score was 3.9/6, and their maximum importance score was 4.2/5. In contrary to that, (Gaunkar et al, 2016) [17] reported another opinion, as a high competency level was recorded among their participants regarding the management of oral health problems at the community level.

The most competent skill among our participants was related to their ability to communicate on oral and public health issues. However, the least competent skill was about designing a surveillance system to measure oral health status and its determinants. This has slightly differed from (Al Agili, 2015) [18] as her most competent skill was the ability to incorporate ethical standards in oral health programs and activities, while her least competency skill was the ability to advocate for, implement, and evaluate public health policy, legislation, and regulations to protect and promote public oral health

The results of the present study found that dental practitioners with ages 30 to < 40 years showed the highest competency level among all (4.72), and females were better than males (3.95 vs 3.70). participants with a Doctorate showed better competency than participants with other qualifications (4.52). DPH specialists were at the top in average competency scores in comparison to the other specialties (4.62).

The findings that dental practitioners aged from 30 to < 40 years and who had DPH specialty had higher competency scores agreed with (Al Agili, 2015) [18]. Also, the same author concluded that there was no significant difference between male and female participants regarding self-assessed competency scores which were matched with our results. While, (Gaunkar et al, 2016) [17] reported that females showed significantly higher competencies in functions related *"*to develop activities to motivate the community development*,"* *"*to motivate health and oral health through health education," and *"*to motivate health and oral health through the creation of healthy settings" more than males.

Additionally, our results revealed that participants' qualifications (doctorate) were considered a good predictor for their DPH competency. Similarly, Al Agili, (2015) [18] reported that qualifications were significantly associated with DPH competency.

The strong point of this study was the larger sample size in comparison to other studies conducted on the same topic (146 participants at Al Agili [18], 133 at Gaunkar [17], and 109 at Mascarenhas [3] studies). Also, the participation of dental practitioners with different qualifications ranging from dental interns to doctorates in addition to the participation of most dental specialties gave the study external validity and power to generalize its results.

CONCLUSION:

Our findings support the urgent need for updating and improving the undergraduates' dental curricula, also continual dental education programs in DPH specialty including certified programs, workshops, and seminars are highly recommended to be conducted by the ministry of health in collaboration with dental schools.

STUDY LIMITATIONS

Although questionnaire-based studies are considered efficient tools for competency evaluation, their response rate cannot be controlled, and some respondents may sometimes give false responses. So, our findings considered the impetus for DPH competency evaluation, and further investigations like interventional studies are mandatory.

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AVAILABILITY OF DATA

The data used in this research is available on reasonable request from the corresponding author

CONFLICT OF INTEREST

The authors declared that there is no conflict of interest

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