

# Impact of Protracted War Crisis on Dental Students: A Comparative Multicountry Cross-sectional Study

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## ABSTRACT

**Background:** The impact of conflict and war crisis on dental students is poorly understood. Given the prolonged conflicts and political instability in the Arabic-speaking countries, it is crucial to investigate the effect of these conditions on dental students. This study aimed to assess the impact of protracted war on dental students by comparing the personal, university, and wider context challenges they face across war-affected and unaffected countries. **Methods:** A cross-sectional study was conducted including a convenience sample of dental students from 13 universities in 12 Arabic-speaking countries. Respondents were those at entry and exit points of their undergraduate dental training. A self-administered paper questionnaire collected anonymized data on sociodemographics, and personal, university, and wider

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context challenges that students were facing. Multivariable Poisson regression analyses were carried out. **Results:** The overall response rate was 64.8%. The mean age was 21.2 (standard deviation = 2.1) years, with 68% of participants being female. After adjusting for age and sex, dental students in Arabic-speaking countries affected by protracted war crisis were significantly more likely to report wider context challenges compared to their counterparts in unaffected countries ( $n = 2448$ ;  $\beta = 1.12$ ; 95% confidence interval: 1.10–1.13;  $P < 0.001$ ). **Discussion:** Dental students in Arabic-speaking countries affected by protracted war crisis were more likely to suffer from wider context challenges such as difficulties in attendance due to the deterioration of security and lack of flexibility of teaching time to accommodate the different circumstances induced by the war crisis. Supporting dental students in areas affected by protracted war crises is needed and may include developing online dental education programs.

**Keywords:** Armed conflicts, dental education, dental student, distance learning, online learning, violent conflicts, war stressors

## Background

Conflict and war crisis are among the major persistent global challenges. Two billion people now live in countries where development outcomes are affected by fragility, conflict, and violence (FCV). It has been estimated that by 2030, almost half of the world's poorest people would be living in countries affected by FCV.<sup>[1]</sup> Violent conflict has increased dramatically since 2010. The Middle East and part of North Africa have witnessed most of the current protracted violent conflicts and war crises, such as those in Syria, Yemen, Libya, Palestine, and Iraq. One of the major impacts associated with protracted conflicts and war crises is the breakdown in civic activities such as employment, health care, and education.<sup>[2-4]</sup> The latter causes delay, reduction, or cessation of education and training programs affecting those who are still studying, about to graduate, or already in practice.<sup>[5-8]</sup>

The health needs of conflict-affected populations are of paramount importance. However, the negative impact on the training and graduation of health-care students presents a twofold challenge. First, there is a stagnation or reduction in the national health care workforce capacity due to the decrease in the number of qualified health-care providers who are culturally and linguistically competent to address local health needs. Second, there is an economic loss due to the sums of money invested in their training, which have not led to qualified health-care providers ready to practice in their country. These issues have been documented in previous research.<sup>[9]</sup>

There is a growing body of literature detailing the impact of armed conflicts and war crisis on medical education and students.<sup>[10-12]</sup> During the Lebanese Civil War, educational activities at the American University of Beirut Medical College were intermittently suspended.<sup>[13]</sup> In addition, during the Lebanon–Israel War in 2006, despite the continuity of formal medical education, some medical students faced additional wartime medical challenges and received wartime medical training.<sup>[14]</sup> During the 1990s Balkan Wars, the buildings and hospitals of Zagreb Medical School were significantly damaged, the Osijek branch was closed, and students transferred to

Zagreb city.<sup>[5]</sup> In Liberia's only recognized medical school, training was delayed due to the infrastructure destruction and loss of teaching staff during the conflict.<sup>[7]</sup> Currently, with the protracted violent conflict in Iraq, medical schools are facing challenges in staff recruitment and adequate resource provision. As a result, the quality of training has suffered. Medical students reported experiencing additional psychological stress and lower quality of teaching, with the majority intending to leave Iraq after graduation.<sup>[9]</sup> The impact of war in Ukraine was reported in terms of disruption or complete cessation of medical education as well as displacement and trauma of medical students.<sup>[15]</sup>

Very little is known regarding the impact of protracted conflict and war crisis on dental students. In addition, all previous studies were isolated reports that have focused on investigating the impact in one country affected by the conflict or war crisis.<sup>[16,17]</sup> There are no multicountry studies that mapped the landscape of such impact through comparing it across different countries both affected and unaffected by protracted violent conflicts or war crisis. Thus, the aim of the current multicountry study is to assess the impact of protracted conflict and war crisis on dental students by comparing the personal, university, and wider context challenges dental students are facing across 12 war-affected and unaffected Arabic-speaking countries. This could inform future educational interventions to support dental students during times of protracted conflict.

## Methods

### Study design

This study used a cross-sectional design and adopted an inclusive sampling strategy that targeted all dental students at entry and exit points of the undergraduate dental training program in 13 universities from 12 Arabic-speaking countries. In most Arabic-speaking countries, dental education takes place in dental schools affiliated with academic health centers or hospitals, which are part of parent universities. Typically, the first 3 years of the dental program include courses in biological sciences, basic medical and dental sciences, and preclinical preparation. The clinical courses are usually

introduced in the following years, with some schools offering clinical courses as early as the 3<sup>rd</sup> year. The design, content, instruction and assessment methods in the curriculum vary between countries and even between different schools within the same country. Schools with modern teaching methods have curricula based on a set of intended learning outcomes and competencies. Some schools have integrated the concept of oral care, including the basics of scientific research, statistics, and evidence-based practice, into their curricula.<sup>[18]</sup>

Ethical approval or a confirmation of not requiring ethical approval was obtained from all participating dental schools, as per their internal regulations.

**Sampling process and participants**

The participating universities were selected using a convenience sampling strategy based on the willingness of collaborators to respond to the invitation of the principal investigator. The study involved 3355 dental students from the 13 universities. As dental programs vary across the 13 universities, the present study included all first- or second-year dental students and last-year dental students from each university. For example, in some universities, the actual first year of dental education starts in the second rather than the first year of the program. The latter (1<sup>st</sup> year) is a generic medical science preparatory year for medical, dental, and pharmacy students. Similarly, the duration of dental programs varies, with some span 5, 6, or 7 years.

**Location and period**

The current study was conducted in the academic year 2018–2019 in 12 Arabic-speaking countries: Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Saudi Arabia, Tunisia, Syria, and Yemen.

**Data collection process**

Anonymized data were collected through paper-based questionnaires administered in Arabic language [Appendix 1]. To invite all eligible students to participate in the current study, students were approached at the beginning of academic activities with mandatory attendance. Before distributing the questionnaire to students, a brief explanation of the study purpose was given. It was also highlighted that participation is voluntary and that by completing the questionnaire, the student was consenting to participate in the study. The questionnaire included statements developed based on preliminary work conducted in Syria, which collected qualitative data regarding the difficulties and challenges that dental students were facing during the current Syrian war crisis. In the present study, students were asked to indicate the extent to which they agree or disagree with each statement using a five-point Likert scale. The face validity and content validity of the questionnaire were confirmed by four dental

educators who were native Arabic speakers and who did not participate further in the study. Furthermore, the questionnaire was piloted before commencing data collection confirming that it was understood by dental students and took 5–10 min to be completed.

**Data analysis**

Statistical analyses were conducted using IBM SPSS Statistics for Windows, version 25, IBM Corp. Armonk, New York, USA. Principal component analysis was carried out to reduce the questionnaire items into a smaller number of challenges. Poisson regression analyses adjusted for age and sex were performed to assess the association between protracted war crisis status and challenges faced by dental students. Age was entered into the regression model as continuous variable. Significance was set at 5%.

**Results**

The overall response rate was 64.8% [Table 1]. The response rate per each country is presented in Table 1. A total of 3355 dental students from 12 Arabic-speaking countries participated in the study, with 45% of them being from countries affected by protracted war crisis. The mean age of the participants was 21.2 years (standard deviation = 2.1), and 68% were female.

Before performing the principal component analysis, the suitability of the data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser–Meyer–Olkin value was 0.917, and Bartlett’s test of Sphericity reached

**Table 1: Number and response rate of students participating in the study from the 12 Arabic-speaking countries**

Country	Total number of students	Number of respondents	Response rate (%)
<b>Affected by war crisis</b>			
Iraq	132	111	84.1
Libya	140	127	90.7
Syria	1423	960	67.5
Yemen	165	165	100
Palestine	320	146	45.6
Total	2180	1509	69.2
<b>Unaffected by war crisis</b>			
Egypt – Alexandria University	596	382	64.1
Egypt – Cairo University	851	449	52.8
Jordan	400	254	63.5
Kuwait	51	49	96.1
Lebanon	150	74	49.3
Morocco	323	250	77.4
Saudi Arabia University	194	158	81.4
Tunisia	430	230	53.5
Total	2995	1846	61.6
<b>Total</b>	<b>5175</b>	<b>3355</b>	<b>64.8</b>

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statistical significance ( $P < 0.001$ ), supporting the factorability of the correlation matrix. Using the parallel analysis and inspecting the scree plot, two components were considered. They could explain 20.4% and 10.2% of the variance, respectively. Seventeen items, reflecting wider context challenges, loaded highly on component 1, whereas the rest of the items (24 items), reflecting personal (psychological) and university-related challenges, loaded highly on component 2 [Appendix 2]. The wider context challenges included items such as “it takes me a long time to reach the faculty because of the multiple checkpoints,” while the personal and university challenges included items such as “I suffer from the scarcity of books and reading resources at the university library.”

Table 2 presents the multivariable Poisson regression analyses to predict coefficients of age, sex, personal, university, and wider context challenges among dental students in protracted war-affected and unaffected Arabic-speaking countries. Age and gender were significantly associated with personal, university, and wider context challenges [Table 2]. Older dental students reported lower levels of personal- and university-related challenges than younger students. Females reported higher levels of personal- and university-related challenges but lower levels of wider context challenges than males. Dental students in Arabic-speaking countries affected by protracted war crisis were significantly more likely to report wider context challenges than their counterparts in unaffected Arabic-speaking countries. Such challenges included difficulties in attendance due to the deterioration of security and a lack of flexibility in teaching time to accommodate the different circumstances induced by the war crisis.

## Discussion

To the best of our knowledge, this is the first comparative multicountry study to assess the impact of protracted war crisis on dental students in terms of personal, university, and wider context challenges across 12 war-affected and unaffected Arabic-speaking countries. Overall, the study findings suggest

that dental students in Arabic-speaking countries affected by protracted war crisis experience significantly more wider context challenges compared to their counterparts in unaffected Arabic-speaking countries.

We found that age and sex were significantly associated with personal and university challenges. Younger and female dental students reported higher levels of such challenges compared to their older and male counterparts. With respect to age, the finding of the current study was inconsistent with previous findings in war-affected zones that showed older dental students perceived higher levels of stress compared to the younger.<sup>[16,17]</sup> This inconsistency might be explained by the difference in measures used and hence in the type of stressors captured. While previous studies used the Dental Environmental Stress questionnaire (which is a generic questionnaire on stressors related to dental education in nonconflict contexts), the present study used a questionnaire that was developed based on challenges reported by dental students within a conflict context. With regard to sex, previous studies in conflict-affected zones showed that female dental students tended to report higher levels of stress compared to their male counterparts.<sup>[16,17]</sup> For example, a cross-sectional study from Yemen found that gender was one of the most significant determinates of perceived stress in the dental environment, which was further exacerbated by the war circumstances present.<sup>[17]</sup> The present study lends further support to this finding in relation to personal- and university-related challenges.

After adjusting for age and sex, dental students in war-affected countries were significantly more likely to report wider context challenges compared to their counterparts in unaffected countries. Examples of such challenges are related to difficulties in attendance due to the deterioration of security and a lack of flexibility in teaching time to accommodate the different circumstances induced by the war crisis. Interestingly, Arheiam *et al.* (2019) compared dental school-related stress among Libyan dental students living in a war-affected and unaffected zone within the country.<sup>[16]</sup> They found that students living in conflict-free areas had higher perceived dental school stress than their counterparts living in a war zone. Such dental school-related stress in the conflict-active zone was likely to be perceived by students as less important against the backdrop of stressors imposed by the conflict, which are not related to the dental school *per se*. It is worth mentioning that the authors used the Dental Environmental Stress questionnaire, which is a generic questionnaire on stressors related to dental education in nonconflict contexts. The findings of the current study showed that the wider context challenges rather than the university- or dental school-specific challenges were significantly different between war-affected and unaffected countries.

**Table 2: Multivariable Poisson regression analyses to predict coefficients of personal, university, and wider context challenges among dental students in protracted war crisis-affected and unaffected Arabic-speaking countries**

Variable	Wider context challenges <sup>^</sup>		Personal and university challenges <sup>^^</sup>	
	β (95% CI)**	P	β (95% CI)	P
Age*	1 (0.99–1.003)	0.852	0.99 (0.98–0.99)	<0.001
Gender				
Female	0.96 (0.95–0.98)	<0.001	1.04 (1.03–1.05)	<0.001
Protracted war crisis				
Yes	1.12 (1.10–1.13)	<0.001	0.99 (0.98–1.00)	0.213

\*Age was entered into the regression model as a continuous variable, <sup>^</sup>n=2448, <sup>^^</sup>n=2390. CI: Confidence interval



The present study used a questionnaire that captures some of the unique stressors and challenges that dental students face during conflict and war crises. These unique stressors are presented in statements such as “I see that the problems of those surrounding me such as arresting some members of their families or networks affect me and stop me from continuing my education/studying,” “I hesitate to go to the university because of the deterioration of security in some areas,” “It takes me a long time to reach the faculty because of the multiple checkpoints,” “My family does not allow me to attend lectures because of external threats,” and “Lack of security prevents me from attending evening lectures.”

The findings of this study highlight the need for designing interventions that support dental students in conflict-affected areas and provide them with quality dental training. This is essential to ensure the availability of an adequate and capable dental workforce to meet the oral and general health needs of the populations in these areas.

One of the potential interventions to counteract some of the wider context challenges faced by dental students in conflict-affected areas, is the use of online education. The latter has become the main method of teaching and learning worldwide due to the COVID-19 pandemic.<sup>[19]</sup> The increased acceptability of online education among university teachers and learners, accompanied by the development of their digital skills, supports adopting online delivery in dental education in conflict-affected areas. Despite some reported challenges related to intermittent power outage and instable internet connectivity in conflict-affected zones, online education might be the feasible solution to design interventions that can reform and improve dental education in these areas. This can facilitate the delivery of quality dental education directly to dental students and indirectly through upskilling dental academics and trainers in conflict-affected countries. Indeed, Goncharuk-Khomyn *et al.* have called for investing in online education to mitigate the impact of war on medical education in Ukraine.<sup>[20]</sup>

The current study suggests that both asynchronous and synchronous methods of delivery could be adopted. The teaching and learning environment could be hosted on a learning management system, integrating gamification, peer work, group study, badges, and competitions. Authoring tools to address the practical aspects of dental training, such as augmented and virtual realities, could be utilized to support dental education. Optimizing the quality of the abovementioned online dental education could be achieved through involving experts in online education in general and online dental education in particular from the Arabic-speaking academic diaspora. Further research is needed to investigate the effectiveness of these proposed interventions in mitigating some of the conflict wider context impacts and improving

dental students’ learning experiences in war-affected zones. In addition, it is essential to consider the psychological and emotional well-being of dental students in these contexts and provide adequate support to promote resiliency and coping strategies.

One of the strengths of the current study was the use of a questionnaire that was developed to capture war crisis impacts on dental students. Previous individual reports conducted in war-affected countries used the Dental Environment Stress questionnaire to measure stressors experienced by dental students in relation to their dental education.<sup>[16,17]</sup> The Dental Environment Stress questionnaire was not developed to reflect or capture stressors experienced by dental students in conflict contexts. Halboub *et al.*<sup>[17]</sup> tried to address this limitation by adding an extra 12 items to reflect what extent students were affected by the war circumstances in Yemen. However, the abovementioned previous studies called for qualitative research to better understand how conflict and war crisis environment impacts on dental students and education. In other words, they called to explore what unique stressors conflicts and war crises can introduce to dental students and their education.<sup>[16]</sup> Thus, this study addressed partly this gap using a questionnaire that was developed based on a qualitative study conducted to understand the difficulties and challenges that dental students were facing during the present Syrian war crisis. The current findings provided preliminary evidence on the face, content, and construct (discriminative) validity of this new questionnaire, which should be refined further in future studies.

The present study is not without limitations. The cross-sectional nature of the current study hinders causality inference. Similar to other large multicountry studies, the sample included in the present study was not representative of all dental students in included war-affected and unaffected countries. Hence, the results cannot be generalized to all dental students in included Arabic-speaking countries. In addition, except for Egypt, only one dental school in each country was surveyed. The validity of the questionnaire used in this study should be refined further in future studies. The latter might wish to give different weights to items within each component using a regression analysis approach. Furthermore, future multicountry qualitative studies could explore in more depth the impact of protracted war crises on dental education including dental students, faculty staff, and the educational system. Exploring impacts of protracted war crises on the wider dental health-care system is warranted.

## Conclusion

Within the limitations of this study, our findings suggest that dental students in Arabic-speaking countries affected by protracted war crisis face significant challenges related

to the wider context, in which they live and study. These challenges, such as lack of security, having some members of their families or networks arrested, and taking long time to reach the faculty because of the multiple checkpoints, can have a negative impact on their education and well-being. Developing online dental education programs may be a viable option to improve access to quality dental education and overcome some of the wider challenges imposed by the war crises.

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### Conflicts of interest

There are no conflicts of interest.

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## Appendices

### Appendix 1: The personal, university, and wider context challenges and difficulties questionnaire

#### Challenges and Difficulties Questionnaire

Dear student,

The aim of the current research is to explore the most important problems that university students face as perceived by them. Thus, we would be grateful if you can tick (✓) the appropriate answer for each statement of the following 41 statements as accurately as possible.

About you?

Age ..... Sex ..... Year .....

Statement number	Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	I feel afraid of the unknown after graduation					
2	I feel worried about the inability to continue my education because of the surrounding circumstances					
3	I don't feel safe and secure					
4	I feel frustrated and hopeless					
5	I feel like I don't want to carry on with my education					
6	I feel less motivated to study					
7	I have a severe psychological stress because of the political and security situations					
8	I am worried about the future because of the scarcity of job opportunities					
9	I find difficulty in adapting to the studying situation at the university					
10	I feel I am a stranger inside the university campus					
11	I am afraid from failing in my education and life					
12	I feel bored, thus I spend time on the Internet and social media instead of studying					

#### Challenges and difficulties questionnaire

Statement number	Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
13	I think there is imbalance between the theoretical and practical parts of the academic subjects					
14	I feel suffocated by the scarcity of university services at the university site (or by the lack of availability of an appropriate educational environment such as appropriate auditoriums/theaters, modern demonstration methods, or clean hygienic premises)					
15	The lack of liaison among students with respect to the lecture and examination timetables bothers me					
16	I suffer from the scarcity of books and reading resources at the university library					
17	I join the faculty because of my grade, not desire					
18	I see that the lecturer does not consider the hard (security and economic) circumstances that the student has					
19	I have a problem with the lack of Internet at the university or faculty					
20	I see that there is no interest in the cleanliness of some of the academic auditoriums/theaters at the faculty					
21	There is no appreciation for the efforts made by some students					
22	I think that the violence phenomena present in the faculty have led to the loss of the university's prestige					
23	I think that the presence of many familial commitments prevents me from caring about my studies					
24	Friendship in the university is built on self-interests					

Challenges and Difficulties Questionnaire

Statement number	Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
25	I see that the problems of those surrounding me such as arresting some members of their families or networks affect me and stop me from continuing my education/studying					
26	I suffer from shortage of time due to busyness at home and the increase in the educational burden					
27	I find difficulty in reaching the faculty on time because of the traffic congestion					
28	I miss many lectures because I live away from my family					
29	I have many problems in my accommodation					
30	I am bothered with the scarcity of transportation services that transport students					
31	I suffer from the continuous power cut at home or at the faculty					
32	The rise in the university fees prevents me from continuing my education					
33	Familial circumstances such as poor heating at home affects my studying					
34	Supporting my family prevents me from attending lectures every day					
35	I have to work daily and be absent continuously from the faculty so that I can pay my university fees					
36	I hesitate to go to the university because of the deterioration of security in some areas					
37	I find difficulty in committing to attend lectures because of road dangers, especially in rural areas					
38	It takes me a long time to reach the faculty because of the multiple checkpoints					
39	My family does not allow me to attend lectures because of external threats					
40	I have a problem with the long distance between my accommodation and the faculty because of the changes in the location or accommodation due to the circumstances					
41	Lack of security prevents me from attending evening lectures					

Appendix 2: The structure coefficients of principal component analysis

Structure coefficient					
Statement*	Component 1 <sup>^</sup>	Component 2 <sup>s</sup>	Statement*	Component 1 <sup>^</sup>	Component 2 <sup>s</sup>
Statement 37	0.767	0.185	Statement 4	0.175	0.641
Statement 34	0.732	0.142	Statement 8	0.197	0.622
Statement 35	0.730	0.146	Statement 3	0.261	0.613
Statement 39	0.711	0.120	Statement 9	0.218	0.611
Statement 38	0.701	0.173	Statement 6	0.124	0.559
Statement 41	0.688	0.159	Statement 18	0.212	0.544
Statement 33	0.683	0.245	Statement 11	0.111	0.533
Statement 40	0.655	0.176	Statement 1	0.073	0.531
Statement 36	0.644	0.151	Statement 14	0.119	0.521
Statement 32	0.579	0.238	Statement 21	0.109	0.509
Statement 31	0.559	0.257	Statement 2	0.256	0.502
Statement 29	0.544	0.225	Statement 5	0.153	0.501
Statement 28	0.512	0.240	Statement 13	0.085	0.495
Statement 30	0.478	0.302	Statement 7	0.301	0.491
Statement 24	0.431	0.358	Statement 12	0.035	0.477
Statement 27	0.386	0.270	Statement 15	0.130	0.476
Statement 25	0.327	0.223	Statement 10	0.218	0.475
			Statement 23	0.218	0.401
			Statement 26	0.296	0.397
			Statement 20	0.158	0.394
			Statement 16	0.223	0.390
			Statement 22	0.332	0.386
			Statement 19	0.113	0.324
			Statement 17	0.179	0.294

\*Statements' details are in Appendix 1, <sup>^</sup>Wider context challenges, <sup>s</sup>Personal and university challenges