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Impact of the economic crisis, COVID-19 and the Beirut explosion on ophthalmology training in Lebanon: an observational cohort survey-based study

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ABSTRACT

Objectives The objective of the study is to investigate the effects of the COVID-19 pandemic, the economic crisis and the Beirut explosion on the training and work of ophthalmology residents and faculty in Lebanon.

Design This is an observational cohort survey-based research conducted between January and December 2022.

Setting The study targeted all ophthalmology residents and core faculty in Lebanon.

Participants A total of 52 participants, including 27 residents and 25 core faculty members, completed the survey.

Primary outcome measure Primary outcomes comprised the subjectively reported effect of the three major external stressors on the training and well-being of ophthalmology trainees and educators in Lebanon.

Results The study found that the majority of ophthalmology residents and core faculty members were significantly affected by the COVID-19 pandemic, Beirut explosion and the economic crisis in Lebanon. Significant percentage reported financial burden, decrease in outpatient and surgical load and educational activities. Furthermore, most participants reported higher levels of stress, anxiety and depression during the time of crises.

Conclusions This study emphasises the need to support healthcare professionals during times of crisis, as they are on the frontlines and can experience high levels of stress, anxiety and depression. By providing support and resources to healthcare professionals, they can better cope with the challenges they face and continue to provide essential care to their patients.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Participation of both ophthalmology residents and core faculty members provides a comprehensive understanding of challenges across career stages.
⇒ Conducted between January and December 2022, the study captures the impact of the COVID-19 pandemic, economic crisis and Beirut explosion on ophthalmology training in Lebanon, offering timely insights.
⇒ Exploration of the combined effects of three different crises to reach a more comprehensive understanding of the challenges faced.
⇒ The study relies on self-reported data, which may be subject to recall bias and individual interpretation.

INTRODUCTION

On 4 August 2020, a devastating explosion occurred at the port of Beirut, resulting in widespread damage and loss of life.[1] This incident coincided with an already-challenging situation in Lebanon, as the country was struggling with a severe economic crisis and a rising number of COVID-19 cases.[2] The explosion further complicated Lebanon's response to the pandemic, as it destroyed critical infrastructure and medical facilities, making it even more difficult for the country to manage the outbreak. Additionally, many people were forced to leave their homes and seek shelter with others, which increased the risk of COVID-19 transmission. In an effort to mitigate the impact of the explosion and contain the spread of COVID-19, the Lebanese government imposed a 2-week lockdown. However, this lockdown was later lifted, and the number of cases continued to rise.[1–3]

Several studies have reported the negative effects of the COVID-19 pandemic on the mental health of healthcare professionals worldwide.[4 5] Ophthalmology residents and faculty have also reported increased stress, anxiety and depression due to the pandemic.[6–8] In addition, the economic crisis in Lebanon had a significant impact on the healthcare sector, leading to shortages of supplies and financial difficulties for both hospitals and healthcare providers.[9]

Moreover, the Beirut explosion in August 2020 further exacerbated the challenges faced by healthcare professionals in Lebanon.[10] Studies have reported that healthcare professionals who were directly affected by the explosion experienced higher levels of stress, anxiety and depression.[11] The explosion also caused significant damage to

hospitals, leading to interruptions in patient care and training programmes.[12]

Despite the growing evidence of the impact of these stressors on the training and well-being of healthcare professionals, limited research has focused on ophthalmology residents and faculty in Lebanon.

Recognising this gap, the primary focus of this study is to highlight the various consequences of these events on the training and overall well-being of individuals in the field. The outcomes—subjectively reported—aim to provide insights into how these external stressors have influenced academic pursuits, training experiences and the mental health as perceived by both residents and core faculty (CF) members. Furthermore, this research aims to add valuable knowledge that can inform tailored interventions, support systems and policy considerations to enhance the resilience and well-being of ophthalmology training in times of crisis.

METHODS

Study design

This observational cohort survey-based study was conducted between January and December 2022. The survey targeted all ophthalmology residents and CF attendings in Lebanese ophthalmology training programmes between 2019 and 2022. Emails were sent between May and July 2022 to 34 residents and 26 CF members who represented all ophthalmology programmes in Lebanon during that period. This eliminated the need for power analysis due to the inclusion of the full cohort. Informed consent was obtained from all participants prior to filling out the survey.

The survey underwent a meticulous process of design, development and validation by the research team. Pilot testing was conducted among a small subset of the target population (four ophthalmologists). This was facilitated by the authors, as experts in the field, to refine and enhance the clarity and relevance of the survey questions.

The online questionnaire was sent to two groups of participants (residents and programme faculty members) via their institutional email. The survey was divided into sections, including (1) demographics: age group, gender, marital status and training/employment information. (2) Questions about the effects of the COVID-19 pandemic, the economic crisis and the Beirut explosion on the participants' physical well-being and on their medical/surgical training and didactics. (3) Questions about how these multiple factors have affected the mental health of participants: self-perceived stress, anxiety, burn out and depression. The survey required approximately 10–15 min to complete.

Patient and public involvement

None.

Statistics

Descriptive statistics were reported as means with SD for continuous variables, and frequencies and percentages for categorical variables. All data were analysed using Microsoft Excel and IBM SPSS V.28.

RESULTS

Participants' population

The survey was completed by a total of 52 individuals, consisting of 27 trainee residents and 25 CF members, indicating a response rate of 79.4% and 96.2%, respectively. The proportion of male faculty members was higher than that of female faculty members (68% vs 32%). In contrast, among residents, the proportion of women was higher, accounting for 59% of the total. The mean number of residents was 5±1, and 10±3 for faculty in each training programme.

Table 1 presents demographic data. 85.2% of ophthalmology residents were between the ages of 26 and 30. The residency years were categorised based on each programme, spanning from year 1 (R1) to year 5 (R5). The percentages were 19%, 15%, 22%, 22% and 4%, respectively. Additionally, 19% of resident respondents were fresh graduates at the time of the survey. The majority of the residents were single (82%), 22% were engaged and only 8% were married, with 4% having children and 4% without. While 56% of residents were living with family, 22% were living with friends, 19% were living alone and 4% were living in a dormitory. Of the residents, 82% received their training from a university hospital, 11% from a private hospital or clinic and 7% from a community hospital with university affiliation. All respondent faculty members worked at a university hospital, with 52% as CF, 28% as programme directors and 4% as associate programme directors.

COVID-19 pandemic

Up until the time they answered the survey, 59% of residents and 52% of CF reported being infected with COVID-19. Among the infected residents, 75% did not know how they contracted the infection. In contrast, among the infected CF, 39% reported contracting it from a patient, 31% from a family member or relative, 8% from a colleague and 8% from a friend. All ophthalmology CF reported that no attending from the department was posted to help in the COVID-19 care units. However, 72% of CF reported that their residents were posted to help in those units. Only 16% of CF reported using of their patient care areas as care units to increase capacity during the pandemic. Most of the residents (82%) reported being posted to help in the COVID-19 care units.

Hardships during the past 2 years (economic crisis and explosion)

According to the ophthalmology CF and residents, 92% and 85%, respectively, reported that their workplace experienced a shortage of equipment and supplies and were

Table 1 Demographic characteristics of all participants (n=52)

Demographics	Residents	Core faculty
Age		
20–25	1 (4%)	
26–30	23 (85%)	
31–35	3 (11%)	
36–40	0	
>40	0	
Gender		
Female	8 (32%)	16 (59%)
Male	17 (68%)	11 (41%)
Marital status		
Single	22 (82%)	
Engaged	2 (22%)	
Married with children	1 (4%)	
Married without children	1 (4%)	
Lives		
Alone	5 (19%)	
With family	15 (56%)	
With colleagues/friends	6 (22%)	
Dorms	1 (4%)	
Residency year		
R1	5 (19%)	
R2	4 (15%)	
R3	6 (22%)	
R4	6 (22%)	
R5	1 (4%)	
Fresh graduate	5 (19%)	
Role		
Programme director		7 (28%)
Associate programme director		1 (4%)
Core faculty		13 (52%)
Training institution		
University hospital	22 (82%)	25 (100%)
Community hospital with university affiliation	2 (7%)	0
Private hospital/clinic	3 (11%)	0
Small urban area	0	0

under a financial burden. Among those who reported a shortage, all attributed it to the economic crisis that affected Lebanon, followed by the COVID-19 pandemic, and the Beirut explosion. The financial burden reported was due to various factors that included—in descending order of impact—increased drug prices, decreased health insurance coverage, loss of purchasing power, increased hospital/clinic fees and participants or family members losing their jobs.

A noticeable percentage (64%) of CF reported that in the past 2 years, one or more of their residents had left the programme, due to the explosion, followed by the economic crisis, and the COVID-19 pandemic. Moreover, 80% of CF reported that during this period of hardships, at least 1 ophthalmology attending had left the programme, mainly due to the economic crisis (85%), followed by the explosion (10%) and the COVID-19 pandemic (10%). Many CF thought the explosion significantly affected the department (80%), due to partial (65%) or total (25%) damage of the hospital, stopping the training for residents (40%), and physical damage to faculty members (25%) or residents (5%). In terms of the personal effects of the explosion on residents, 52% reported a direct or an indirect effect. Among those, 19% reported house and/or car damage, 15% reported psychological trauma, 7% had lost a friend/family member/colleague and 7% were physically injured.

Academics and training

In addition to the personal impact of the explosion, 56% of the residents and 80% of CF reported that the explosion also affected their training, as shown in table 2. The most common reason cited was partial damage to the hospital where they train, then total damage of the hospital and the cessation of training for a period of time. Over the past 2 years, 70% of the residents and 68% of CF reported that their clinical and operative training has been affected. This was reflected in fewer surgeries, fewer patients, reduced research and didactic sessions, less supervision and increased workload due to lack of staff. As per both the CF (60%) and residents (74%), the economic crisis was considered the major factor impacting the training programme over the past 2 years. Figure 1 illustrates the percentages of procedure interruptions as reported by both CF and residents during the economic crisis, explosion and COVID-19. The results indicate that elective, minor and refractive surgeries were the most affected, if any interruptions were reported.

Although the years 2020 to 2022 presented some difficulties, a considerable proportion of residents and CF recognised some positive outcomes on the training programme (table 2). Notably, 63% of residents and 76% of CF acknowledged an increase in trauma cases, and greater diversity of patient presentations. In addition, a substantial increase in trauma surgeries was reported by 78% and 56% of residents and CF, respectively. Figure 2 represents the percentage increase in surgeries during the past 2 years as reported by residents and CF.

Both groups of participants reported a significant decline in outpatient clinic patient load, ranging from 0% to 49%, between 2020 and 2022 (table 2). Additionally, they noted a decrease in the number of surgeries they participated in, particularly in the areas of oculoplastic, refractive and cataract surgeries, as shown in figure 3. The economic crisis was chosen as the primary reason for the decline in surgeries by 82% of residents and 52% of CF. According to the survey results, 37% of residents reported a decrease in

Table 2 Survey results on academics and training questions

	Residents (n=27)	Core faculty (n=25)
Explosion affected training		
No	12 (44%)	5 (20%)
Yes	15 (56%)	20 (80%)
Hospital partially damaged	9 (33%)	13 (65%)
Hospital completely damaged	3 (11%)	5 (25%)
Training stopped for period of time	8 (30%)	8 (40%)
Transferred to another facility for training	2 (7%)	3 (15%)
The past 2 year affected training (clinical/operative skills)		
No	8 (30%)	8 (32%)
Yes	19 (70%)	17 (68%)
Less surgeries	14 (74%)	13 (77%)
Less supervision	8 (42%)	6 (35%)
Less patients	13 (68%)	9 (53%)
Lack of personnel	2 (11%)	5 (29%)
Increased workload due to decreased number of residents	3 (16%)	2 (12%)
Increased workload due to lack of staff	4 (21%)	4 (24%)
Less research and didactic sessions	12 (63%)	14 (82%)
What affected residency training the most during the past 2 years		
The economic crisis	20 (74%)	15 (60%)
The Beirut port explosion	3 (11%)	1 (4%)
The protests	1 (4%)	1 (4%)
The COVID-19 pandemic	2 (7%)	8 (32%)
The past 2 years had any positive impact on training		
No	10 (37%)	6 (24%)
Yes	17 (63%)	19 (76%)
Increased patient load	8 (47%)	9 (47%)
Increased variety of patient presentations	8 (47%)	6 (32%)
Increased number of trauma cases	11 (65%)	13 (68%)
Increased time for research/reading	8 (47%)	6 (32%)
Increased number of lectures/didactic sessions	2 (12%)	2 (11%)
Teaching rounds during the past 2 years		
Stopped	5 (19%)	1 (4%)
Occur at same frequency as before	9 (33%)	8 (32%)
Occur less frequently as before	10 (37%)	15 (60%)
Occur more frequently as before	2 (7%)	1 (4%)
Department switched to virtual lectures and teaching sessions		
No	5 (19%)	2 (8%)
Partially	18 (67%)	17 (68%)
Completely	3 (11%)	6 (24%)
Better than face-to-face lectures	2 (10%)	–
Worse than face-to-face lectures	13 (62%)	–
Same as face-to-face lectures	4 (19%)	–
Patients' flow in outpatient clinics		
Same as before	8 (30%)	7 (28%)
Decreased by 0%–49%	10 (37%)	9 (36%)

Continued

Table 2 Continued

	Residents (n=27)	Core faculty (n=25)
Decreased by 50%–100%	2 (7%)	2 (8%)
Increased	6 (22%)	7 (28%)
Emergency visits/consults		
Same as before	8 (30%)	9 (36%)
Decreased by 0%–49%	13 (48%)	10 (40%)
Decreased by 50%–100%	1 (4%)	3 (12%)
Increased	4 (15%)	3 (12%)
Reasons for increase in some surgeries		
The Beirut port explosion	11 (41%)	7 (28%)
The protests	6 (22%)	3 (12%)
Reasons for decrease in some surgeries		
The economic crisis	22 (82%)	13 (52%)
The protests	1 (4%)	1 (4%)
The COVID-19 pandemic	1 (4%)	5 (20%)

the frequency of teaching rounds during the past 2 years and 19% reported that rounds had stopped altogether. In contrast, 60% of CF reported a reduction in the frequency of teaching rounds. Over 65% of both residents CF reported a partial shift to virtual lectures and teaching sessions. However, 62% of residents perceived virtual lectures to be inferior to face-to-face lectures (table 2).

More than 50% of residents expressed concerns that the changes in their training over the past challenging years could make them less prepared for their next career step. In contrast, 72% of CF reported no concerns that at least one of their residents would not achieve technical competence for their next career step. Therefore, 88% did not feel the need to extend the training for that current class of residents. To maintain fair educational training, virtual sessions (76%), more case discussions (52%) and educational sessions (20%) were the most implemented measures at the time.

Mental health

An overwhelming majority of ophthalmology residents (85%) and CF (88%) reported that the past 2 years had a negative impact on their mental health. Both groups described this impact similarly, with stress and burnout being the most commonly reported issues, followed by feelings of hopelessness and depression.

DISCUSSION

This paper provides an overview of the impact of the economic crisis, COVID-19 pandemic and the Beirut explosion on ophthalmology training programmes in Lebanon. The results showed that the economic crisis had the most significant impact on the training programme, followed by the COVID-19 pandemic and the explosion. The shortage of equipment and supplies, financial burden and reduced patient load were reported to have affected the training programmes.

A study published in 2018 explored the impact of the economic crisis on ophthalmology training programmes in Greece, and the results showed that the crisis had led to a reduction in surgical volume and a decline in the quality of training. These results are consistent with our

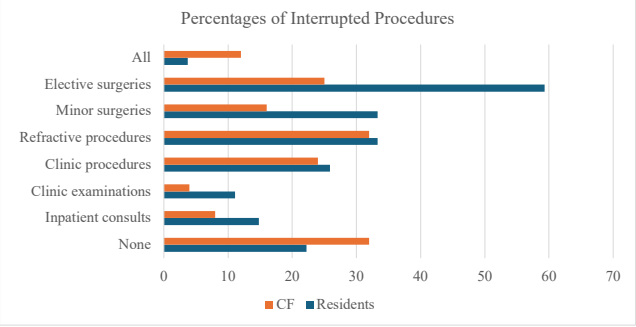

Figure 1 Percentages of interrupted procedures during years of hardship according to core faculty (CF) and residents.

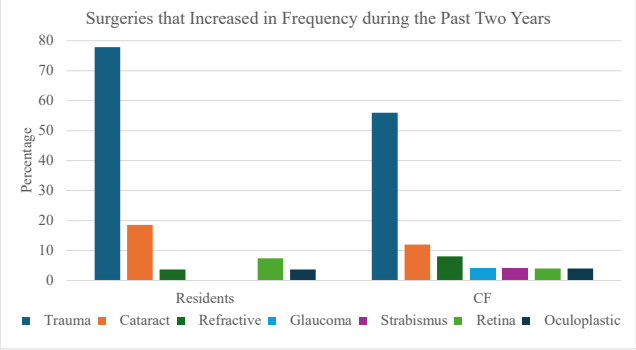

Figure 2 Types of surgeries that increased in frequency during the past 2 years as reported by residents and core faculty (CF).

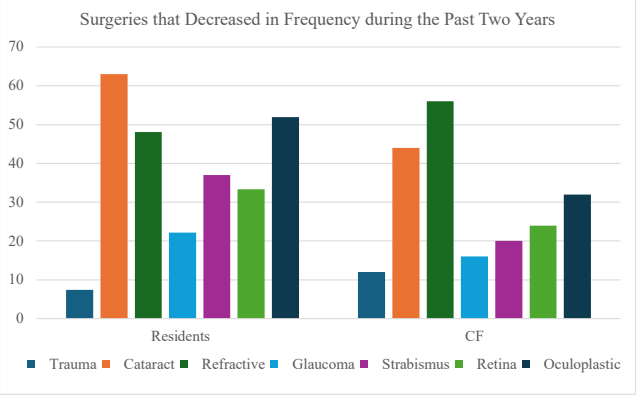

Figure 3 Types of surgeries that decreased in frequency during the past 2 years as reported by residents and core faculty (CF).

study, which revealed that the economic crisis had the most significant impact on the training of the residents. Lebanon has been facing a severe economic crisis since 2019, characterised by a devaluation of its currency, high inflation and shortage of basic goods and services.[13] The crisis has been exacerbated by the COVID-19 pandemic and the Beirut port explosion in August 2020.

On the other hand, Vongsachang *et al* investigated the impact of the COVID-19 pandemic on ophthalmology residency training in the USA.[14] The study included 195 ophthalmology residents who completed an online survey, and similar to our findings, the results showed that the pandemic had a significant impact on their training, particularly in terms of surgical volume and case diversity. Moreover, another study showed that the pandemic had a significant negative impact on both the clinical and academic aspects of their training, including reduced patient volume, limited surgical experience, decreased exposure to subspecialties and disrupted academic activities.[15] In Poland, a substantial majority of residents (89.7%) believed that the pandemic negatively impacted specialised ophthalmology training, with 62.7% reporting partial disruption and 27% indicating complete disruption. Additionally, a significant majority (88.9%) stated that the pandemic adversely affected the acquisition of surgical skills.[16]

Lebanon's unique context, marked by a prolonged economic crisis and compounded by the catastrophic events of the Beirut explosion, distinguishes this study. The severe economic conditions, characterised by currency devaluation, inflation and shortages, have intensified the challenges faced by ophthalmology training programmes.

Despite the challenges faced from the Beirut explosion, some positive outcomes were reported by residents and CF, such as an increase in trauma cases and a greater diversity of patient presentations. This was mainly due to the wide range of injuries, with the most common being lacerations, fractures and burns.[17] A devastating number of trauma injuries to the eye, mainly caused by shrapnel, were reported, including many open globe injuries.[18] This may explain the high percentage of reported stressors by residents and CF, in addition to the feelings of depression and hopelessness after encountering such a traumatic event. The risk of developing post-traumatic stress disorder by healthcare workers in Lebanon was assessed after the explosion, and that study found that 44% of the 519 participants were at high risk.[19]

While the study provides valuable insights into the impact of multiple crises on ophthalmology training in Lebanon, it is important to acknowledge its limitations. The sample size, although reflective of the number of residents and programme directors in Lebanese ophthalmology programmes, remains relatively small, potentially impacting the generalisability of the findings. However, it is important to highlight that the study included almost all individuals within the specific population, ensuring a comprehensive representation of experiences and perspectives within this group. Additionally, the temporal lag between the events and the survey timing may pose a limitation as participants were reflecting on events that had transpired few months prior to completing the survey. The potential impact of recall bias could influence the accuracy of responses and the participants' ability to recall specific details of their experiences during the earlier phases of the crises. Finally, the cross-sectional nature of the study design makes it difficult to establish causality or long-term effects of the crises on ophthalmology training in Lebanon. Despite these limitations, the study provides important data that can guide future research and interventions to support ophthalmology training and healthcare workforce development in crisis-affected settings.

Overall, the study highlights the need for a concerted effort to support ophthalmology residency training programmes in Lebanon amid times of crisis. This could include measures such as increasing funding for training programmes, ensuring the consistent availability of necessary equipment and supplies, offering robust support for faculty and residents, and establishing systematic contingency plans to mitigate the effects of crises on the training programme. The following examples illustrate actionable steps to address potential issues and enhance the resilience of these programmes in the face of external stressors:

- To address the challenges posed by currency depreciation, it is essential to implement strategies, such as establishing funding reserves in stable currencies or collaborating with international funding organisations that secure funding for ophthalmology residency training programmes.
- Ensuring the consistent availability of necessary supplies by establishing partnerships with suppliers, negotiating bulk purchase agreements or seeking support from governmental and non-governmental organisations.
- Support mechanisms for residents and medical professionals are paramount during crises. Introducing national hotline programmes can offer a dedicated

platform for addressing their concerns and providing psychological support.

These plans should encompass strategies for adapting training methodologies, addressing logistical challenges and providing emergency support for residents. Collaboration with relevant stakeholders, including healthcare institutions, governmental bodies and international organisations, can enhance the comprehensiveness and effectiveness of these contingency plans, ensuring a coordinated response to unforeseen challenges. By doing so, the provision of eye care in Lebanon can be improved, and residents can receive the training they need to become competent and skilled ophthalmologists.

Contributors This study was a collaborative effort, with ABG and HAI both contributing equally to the data collection, analysis, and drafting of the manuscript. The statistical analysis of the data was performed by BH, while RH provided valuable contributions to data evaluation and manuscript editing. The final manuscript was thoroughly reviewed, revised, and approved by all authors. RH is the guarantor of the study.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Human Research Protection Program or the Institutional Review Board at the American University of Beirut Medical Center Approval number SBS-2021-0197. Participants gave informed consent to participate in the study before taking part.

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