Review article

Navigating the crisis: A review of COVID-19 research and the importance of academic publications - The case of a private university in Lebanon

Nada Khaddage-Soboh [a],[*], Samah Tawil [b]

[a] *Adnan Kassar School of Business, Lebanese American University (LAU), Beirut, Lebanon*
[b] *School of Medicine, Lebanese American University (LAU), Beirut, Lebanon*

A B S T R A C T

Objectives: The threat of the Corona virus has had a profound global impact, prompting extensive discussions among academicians and medical researchers seeking to understand its implications across various fields. Consequently this review aims to explore the COVID-19 research approaches adopted at the Lebanese American University (LAU) between 2019 and 2022 and, to eventually shed light on the importance of the academic publications during this crisis period in the context of Lebanon.

Design, Data sources, Eligibility criteria: Studies related to "Coronavirus", "SARS-CoV-2," or "COVID-19″ were extracted from the SciVal database spanning the period 2019 to 2022. The identified studies, totaling 97 publications, were indexed in Scopus and Web of Science and underwent narrative analysis along with an evaluation using a predefined scale to determine their eligibility. The majority of the studies were literature reviews, followed by observational studies, modeling studies, systematic reviews, and meta-analyses.

Results: The majority of the identified studies (31 %) were focused on the medical field, primarily the impact of SARS-CoV-2 infection. Additionally, 22 % of studies discussed updates related to global finance and economic markets, while 18 % addressed the psychological burden of the pandemic. Other areas covered in the literature included the impact on performance, nutrition, tourism, politics, and telecommunication.

Conclusion: This study marks a pioneering endeavor that sparks a crucial dialogue regarding peer-reviewed scientific literature during a period of immense need for accurate information. The prevalence of literature reviews can be attributed to the demand for swift dissemination of pre-liminary findings and the increased call for COVID-19-related research. However, despite the abundance of publications in this specific domain, it is imperative for future research to shift its focus towards the development of novel therapies, preventive measures, psychological insights, and strategies to address the socioeconomic and financial burdens stemming from the pandemic. This study has the potential to establish a standardized framework for addressing similar crises across diverse fields and at various levels.

Limitations: The review readily acknowledges certain limitations. By solely relying on specific databases like Scopus and WoS, there is a possibility of inadvertently overlooking relevant studies. Although the study provides insights into the impact of COVID-19 across different fields and their respective publications, it is important to recognize that the continuous updates to

* Corresponding Author.
  E-mail address: nada.khaddage@lau.edu.lb (N. Khaddage-Soboh).

databases and potential exclusions of related studies may have imposed constraints on the findings. Moreover, the urgency for expeditious peer-review during the pandemic may have heightened the chances of errors and diminished transparency. This urgency has unfortunately increased the risk of fraudulent activities and misconduct.

1. Introduction

The COVID-19 pandemic has had a significant global impact on health, economies, and various socio-economic factors. It has had far-reaching effects on diverse sectors, including the stock market, gold and precious metals, fuel prices, and even crypto currencies [1]. As a result, there has been a surge in collaborative research aimed at assessing the impact of COVID-19 on different sectors [2]. The urgency to identify affected areas has prompted experts and academicians to find effective treatments, and vaccines for the disease while also exploring preventive measures in response to potential future threats [3,4]. Despite the ongoing efforts by researchers from diverse fields, the available data remain insufficient, emphasizing the need for further dedicated endeavors [5–8].

Lebanon, like other countries, has not been immune to the effects of the pandemic and has actively engaged in various research projects related to COVID-19. Academic research in Lebanon has highlighted the challenging repercussions of the disease in a low-resource country [9,10]. The rapid evolution of the virus into a major epidemic has spurred studies focused on treatments, co-infection cases and the commonly employed therapies [11]. Concurrently, vaccines for COVID-19 are also being studied with different platforms [12]. In this COVID-19 era, publications that delve into its consequences have taken precedence, especially within academic circles [13,14].

Lebanese universities, particularly the LAU, are at the forefront of providing credible information and addressing the pandemic's economic, political, and mental health consequences. Notably, LAU oversees and operates the esteemed academic medical institution, Rizk Hospital, which has played a crucial role during the most critical times through its mobile clinics dedicated to serving the country. Rooted in the values of empathetic healthcare and enhancing the quality of life for patients, Rizk Hospital is unwavering in its commitment to advancing human well-being through research and progressive practices, resulting in remarkable growth and evolution. The hospital remains steadfast in its commitment to placing the human element of medicine at the forefront, guaranteeing a patient-centered approach and compassionate care through ongoing deep research and publications. LAU and other universities have published numerous papers in peer-reviewed journals.

This work aims to address the following research questions concerning COVID-19 and its impact, particularly in Lebanon;

1 What were the primary research focus areas on the topic of COVID-19 covered in LAU's publications from 2019 to 2022?
2 How do certain fields of study enable a better understanding of the current state of knowledge regarding COVID-19 research?

These research aims are crucial for Lebanon for several reasons. Firstly, they provide insights into the local research landscape, enabling the country to allocate resources efficiently and tailor its public health response to its specific needs. Secondly, understanding which fields contribute to COVID-19 research facilitates collaboration and networking among researchers and institutions. Additionally, it guides educational programs and training opportunities, positioning Lebanon as a global contributor to pandemic understanding. Furthermore, this research contributes to evidence-based decision-making, informing policies and practices at various levels and aligning them with Lebanon's unique challenges in combating COVID-19 and similar cases.

In this study, following the introduction, we present the methodology comprising key elements; the search strategy, eligibility criteria, data sources, and the selection and extraction process. Subsequently, the results section specifically examines data sources, the diverse sectors affected by COVID-19, and provides a comprehensive analysis of LAU publications on COVID-19 across various academic fields from 2019 to 2022. The discussion segment interprets the research findings, and the paper concludes with a summary of key insights.

2. Methods

This review adheres to the structure outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [15]. Although the review was not formally registered, a protocol was drafted prior to gathering the articles, and it was diligently followed throughout the entire study, summarized in Table 1.

Table 1
Search and selection criteria between Scopus and WoS.

Search Criteria	#
Records published by LAU members on both databases searching between 2019 and 2022	2137
Publications not related to Covid-19	1885
Related Articles including "Coronavirus", "SARS-CoV-2," or "COVID-19″	252
Articles excluded due to duplicated and/or Redundant works, corrections or erratum	155
Articles Used in the study	97

2.1. Search strategy

The electronic databases Scopus and Web of Science (WOS), at LAU as a sample of COVID19 research center, were searched and articles published between the 2019 and 2022. The keywords "COVID-19", "Coronavirus", "SARS-COV-2", "2019-nCoV", "review" and "meta-analysis" were used and combined using Boolean operators "AND" or "OR". A string was adopted ("COVID-19" OR "Coronavirus" OR "SARS-COV-2" OR "2019-nCoV") AND (review OR meta-analysis). The data set was extracted from SciVal, a research performance assessment tool that helps analyze data from Scopus and Web of Science (WOS).

2.2. Eligibility criteria

Different eligibility criteria were adopted for the population, intervention, comparison, outcomes, and study design (PICO–S criteria). Only publications targeting Coronavirus in Scopus and WOS were considered. Although a significant variation exists in the coverage between the two indices, we considered articles that appear in both databases, which provides a broader perspective of association between citations count and authors' number. These two main databases of academic papers were used to find out how many papers have been published up to the current date. The only limitation applied was that articles had to be published between 2019 and 2022. Reviews were excluded only if they were redundant works or correction to erratum. The review focused on English-written systematic reviews and meta-analyses, while other study typologies were excluded.

2.3. Data sources, selection and extractions

To eliminate duplicate manuscripts, EndNote X8 was utilized during the data collection process. In the subsequent phase, two independent investigators screened the gathered studies against the predetermined eligibility criteria. The screening process involved evaluating titles, abstracts, and full texts. In cases where discrepancies arose between the two investigators, the final decision was
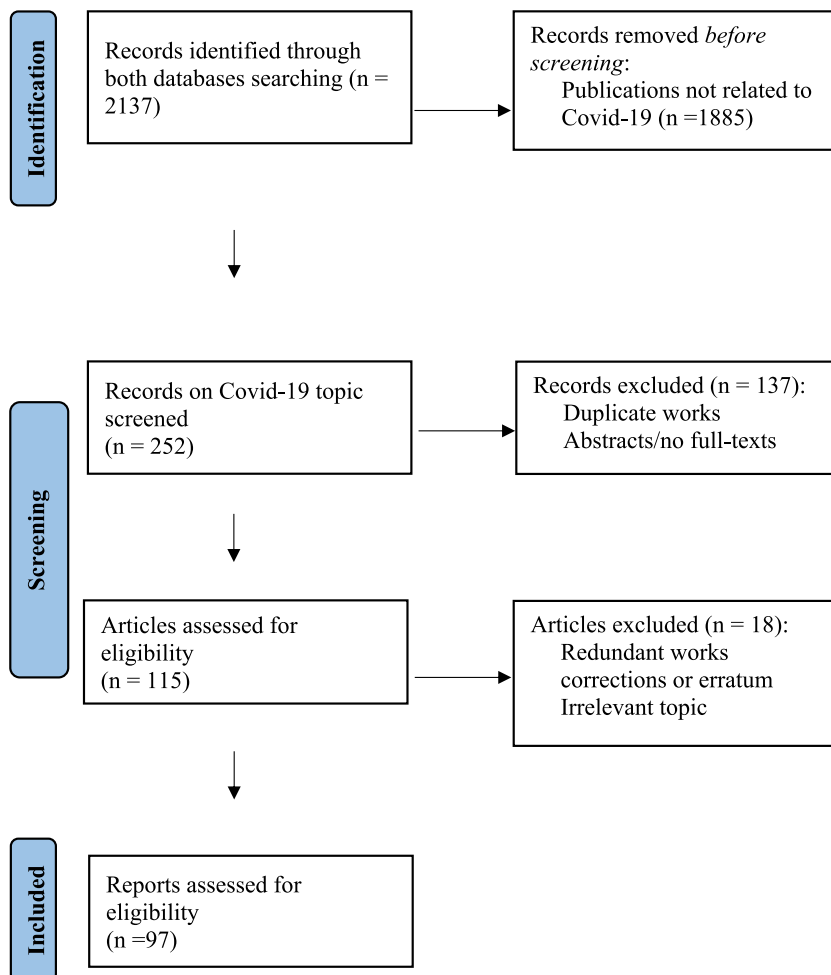
Fig. 1. PRISMA flow diagram of studies selection process.

made by the principal investigator.

We assessed all study titles for potential relevance to coronavirus publications by searching the full text aricles. The selected articles underwent bibliometric analysis to compare published works. For this purpose, we adopted the CiteScore (CS), one of the most commonly used metrics reflecting the yearly average number of citations to recent articles published in academic journals. This metric served as the primary technique for counting citations in this review [16,17].

We included only peer-reviewed journals containing original articles and reviews, taking into consideration different quartiles of journals based on the citation-based metric system. We included published manuscripts that resulted from institutional collaborations, national collaborations (where co-authors don't belong to the same institution but reside in the same region), or international collaborative works (where co-authors don't share the same country of residence). We excluded single authored and hyper-author publications, conference proceedings, book series, and unpublished material.

We created a flow diagram to provide a concise overview of the selection process. Additionally, a table was constructed containing information such as the first investigator, publication year, methodology, screened electronic databases, number of included studies, objectives, risk of bias assessment and score, conclusions, population, and relevance to Covid-19. We employed descriptive summarization to present the extracted information from the manuscripts and made comparisons among the extracted data to identify common aspects. We also reassessed the suitability and reliability of the targeted titles, considering the characteristics of the intended population.

For the data analysis, we used bibliometric methods to access our primary data, which we collected directly for our specific research objective. The methods we adopted were originally designed for evaluating research in life sciences but are now being applied in various areas, especially in Lebanon, to reveal development and relevant characteristics of different studies using secondary data collected by LAU scholars for purposes other than our specific research objective [18,19].

We exported the data from the Scopus database to Microsoft Excel and then conducted bibliometric data analysis to uncover emerging trends in the included studies, identify study types, collaboration patterns, and research constituents.

3. Results

3.1. Data procurement, criteria for inclusion, and information retrieval

Between 2019 and 2022, LAU published 2137 works indexed in Scopus and WOS, among which 252 studies focused on COVID-19 publications. Following screening by title and removal of abstracts, 115 papers were included in the full-text review after removing duplicates. Ultimately, 97 studies were found to meet the inclusion criteria. Articles were excluded mainly due to redundancy or correction to erratum. The study selection process is illustrated in Fig. 1 (PRISMA flow-diagram).

The study focused on publications that are ranked within the top three quartiles according to Scimago. Among these, 65 % were published in Q1 journals, 28 % in Q2 journals, and the remaining 7 % in Q3 journals (Fig. 2).

Furthermore, the study analyzed publications with h-index values ranging from 15 to 404. Among the publications, 4 % had an h-index between 15 and 20, while 15 % fell within the range of 21–40, as well as 41 to 60. Approximately 22 % of the publications had an h-index between 61 and 80, while 14 % fell within the range of 81–100. Additionally, 6 % had an h-index between 101 and 140, and the remaining 4 %–5 % had an h-index exceeding 121, going up to more than 400 (Fig. 3).

3.2. Different sectors affected by COVID-19

COVID-19 studies at LAU extended beyond the medical or health-related faculties. They encompassed various sectors as outlined below:
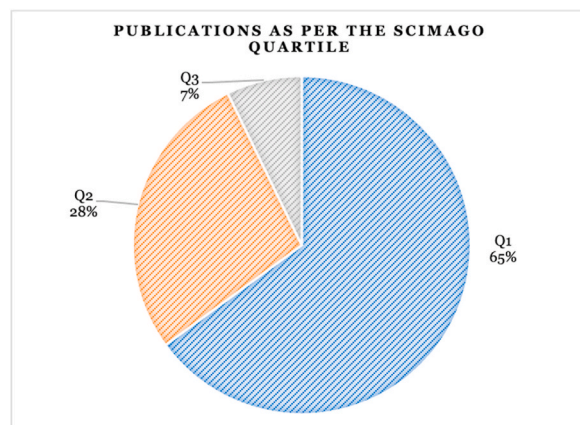

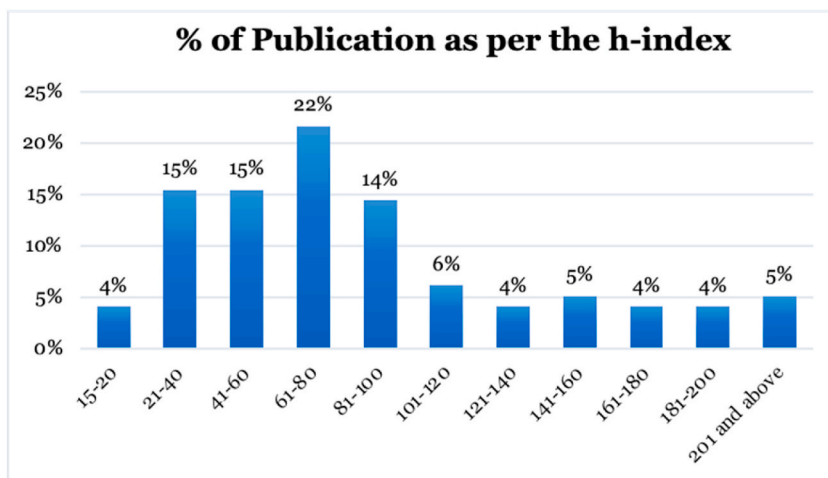**Fig. 2.** Publications as per the Scimago quartile.

Fig. 3. % of publications as per the H-index.

- Medical Field: The largest proportion, 31 %, focused on medical aspects.
- Financial News and Updates: 22 % of the studies targeted the financial sector, examining its implications.
- Psychological Health: 18 % delved into the psychological health challenges stemming from lockdowns and national restrictive measures.
- Other Impacted Fields: COVID-19 also affected research in areas such as nutrition, tourism, organizational preparedness, attitudes, and socio-economic publications.

For further insights into the different implications of COVID-19, refer to Fig. 4. It provides a summary of the findings.

As specified before, almost three quarters (76 %) of LAU COVID-19 studies involved collaborations between LAU researchers and their international counterparts. Only 14 % of the studies were co-authored by LAU academicians and colleagues from Lebanese institutions. The remaining 10 % were internal studies without any external research collaboration (Fig. 5).

3.3. Detailed description of LAU publications on COVID-19 between 2019 and 2022

Table 2 offers an overview of the diverse types of studies adopted by researchers in various schools. Health-oriented faculties primarily engaged in meta-analysis, systematic reviews, and interventional studies. On the other hand, cross-sectional, qualitative, and descriptive studies were prevalent among the authors across all fields of study. All studies related to the impact of COVID-19 on tourism employed modeling techniques.

In this section, we review the newly published literature covering COVID-19, examining its effects on various sectors, and summarize the key findings and significance of each publication.
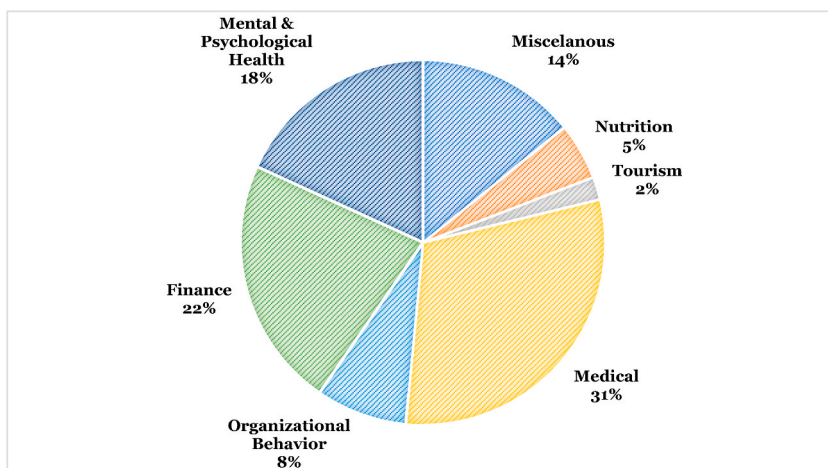

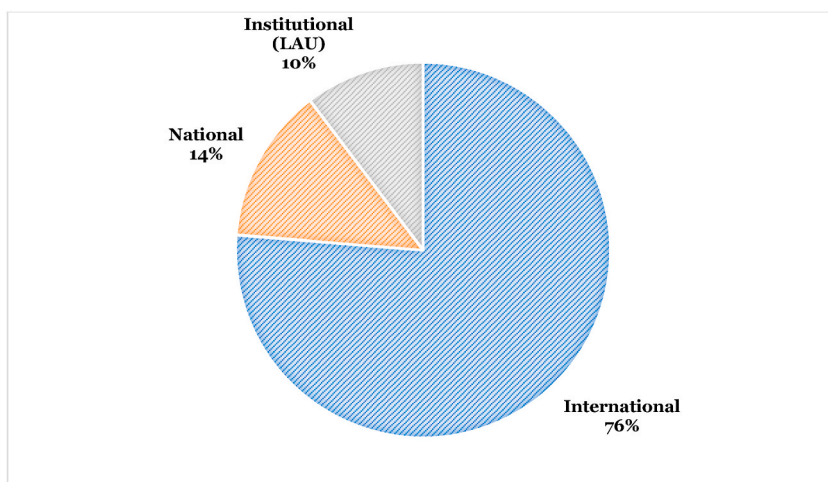**Fig. 4.** LAU COVID19 Publications' fields 2019–2022.

Fig. 5. COVID19 articles' collaboration type.

Table 2
COVID-19 Studies' methodological types.

	N	%
Medical Field		
Meta-analysis	1	3.33
Systematic review	3	10
Cohort	1	3.33
Case-report	1	3.33
Cross-sectional	3	10
Modeling	4	13.33
Literature reviews/Descriptive	14	46.66
In-vitro	3	10
Total	**30**	**100**
Mental and Psychological Health		
Meta-analysis	1	6.25
Cross-sectional/Qualitative	14	87.5
Literature review	1	6.25
Total	**16**	**100**
Nutrition		
Cross-sectional	4	80
Literature review	1	20
Total	**5**	**100**
Organizational Performance		
Cross-sectional/Qualitative	7	87.5
Modeling	1	12.5
Total	**8**	**100**
Finance		
Literature review	15	68.18
Modeling	7	31.82
Total	**22**	**100**
Tourism		
Modeling	3	100
Miscellaneous		
Cross-sectional/Observational	5	38.46
Literature review	4	30.76
Modeling	4	30.76
Total	**13**	**100**

Reference: The authors.

3.3.1. COVID19 and medical research

A multitude of rigorous medical studies has been conducted to investigate the impact of COVID-19 on general health, elucidating various aspects of the disease and its management. Some studies have delved into the intricate pathophysiology and transmission mechanisms of the virus, unraveling crucial insights into its behavior [20,21]. Furthermore, several laboratory and clinical investigations have diligently documented the emergence of distinct SARS-CoV-2 strains and their subsequent mutations, providing essential information for understanding the evolving nature of the virus [22,23].

Expanding the breadth of COVID-19 research, modeling techniques, and statistical analyses have been employed to comprehensively elucidate the epidemiology and transmission dynamics of the disease [24,25]. Notably, innovative approaches such as custom tracking websites and dashboards have facilitated the real-time monitoring and reporting of the international spread of concerning lineages, enabling timely decision-making and resource allocation [26,27]. Additionally, researchers have developed deterministic models that quantitatively assess the effectiveness of preventive measures implemented worldwide based on reported death trends [28]. These multifaceted investigations have contributed to our understanding of the disease's impact on populations and guided public health interventions.

Moreover, a systematic review conducted by Matta, I. et al. specifically focused on the probability of COVID-19 transmission through surgical smoke and aerosols in hospital settings, emphasizing the need for cautious surgical practices to ensure the safety of operating room personnel [29]. This study sheds light on a critical area of concern during the pandemic and underscores the importance of stringent infection control measures in healthcare environments.

In parallel, numerous studies have explored novel approaches for the detection of SARS-CoV-2. Some investigations have utilized symbolic recurrence quantification measures to automatically detect the presence of the virus in cough sounds, demonstrating the potential for non-invasive diagnostic techniques [30]. Additionally, the relevance of telemedicine in diagnosing conditions such as diabetic foot ulcers amidst reduced clinic visits has been underscored, providing valuable insights into remote healthcare delivery during the pandemic [31].

The research landscape surrounding COVID-19 has also encompassed treatment options and the management of its complications. Numerous publications have explored both existing and prospective therapeutic interventions, offering a comprehensive overview of potential strategies [32,33]. Furthermore, investigations have delved into the diverse complications associated with COVID-19, including cardiovascular consequences, hematological effects such as thrombosis, and kidney manifestations [34–38]. These studies have contributed to the identification of potential risks and informed clinical decision-making for patients affected by the virus.

Addressing the impact of COVID-19 on specific populations, a cross-sectional survey focused on pediatric patients treated for cancer, highlighting the potential for an unfavorable disease course in this vulnerable population [39]. The study serves as a reminder of the need to consider the unique challenges faced by specific patient groups during the pandemic.

Beyond clinical considerations, published works have explored the knowledge, coping mechanisms, awareness, and treatment perceptions among patients, shedding light on the psychological and social dimensions of the disease [40]. Moreover, the pandemic advent has spurred the rapid development and implementation of online medical education programs. These initiatives have rigorously evaluated the feasibility, acceptability, and efficacy of new online undergraduate medical education initiatives, encompassing both teaching and learning methodologies [41–43]. By examining the adaptability and effectiveness of these educational platforms, researchers have responded to the evolving educational landscape during the pandemic.

Taken together, these diverse studies represent a robust body of research encompassing a wide range of topics related to COVID-19. By employing rigorous methodologies and focusing on different facets of the disease, researchers have collectively contributed to our understanding of COVID-19's impact on general health, diagnostic approaches, treatment options, complications, vulnerable populations, and innovative educational practices.

3.3.2. COVID19 and mental health

The implementation of various government restrictions, including social isolation during the COVID-19 pandemic, has had a profound and detrimental impact on the mental and psychological well-being of millions around the world. This has prompted a surge in publications investigating the intricate relationship between SARS-CoV-2 infection and mental health. A multitude of publications have emerged, predominantly focusing on the short and long-term consequences of altered COVID-19 health behaviors during the rapid spread of the infection [44,45].

Among the specific groups extensively studied are healthcare workers [46,47] and college students [48], both of whom have exhibited elevated levels of sleep deprivation, work fatigue, and stress. Furthermore, individuals with pre-existing conditions, such as schizophrenia [49] and cancer patients [50], have reported significant negative impacts on depression, psychological distress, and overall quality of life.

In addition to investigating the repercussions of COVID-19 on mental health, a substantial number of publications have explored the role of various psychological coping mechanisms throughout different phases of the ongoing crisis [51,52]. Furthermore, researchers have examined the association between these coping mechanisms and sociodemographic characteristics [53]. Moreover, studies have delved into the influence of trait emotional intelligence and positive thinking on overall well-being, investigating factors such as flourishing, religious coping, life experiences, and the economic burden [54,55].

The role of social support during periods of quarantine has been a central focus of numerous qualitative studies [56]. These investigations have emphasized the importance of digital media platforms that facilitate support groups for individuals experiencing social isolation, as they have shown promise in minimizing the incidence of mental deterioration in the post-COVID-19 era [57]. Notably, positive experiences with online psychological consultations have been documented, with tele-psychotherapy emerging as a viable and stable option in mental healthcare during this pandemic, provided that adequate awareness and previous training in online consultations are in place [58,59].

3.3.3. COVID-19 and finance

Financial researchers have conducted comprehensive investigations into the intricate connections between the consequences of the COVID-19 pandemic and various financial concepts, yielding substantial insights. One notable area of research focused on the intraday return predictability in the crypto currency market following the unprecedented monetary injections [60]. Additionally, studies

explored the return and volatility connectedness between the rare earth stock market and clean energy markets, world equity, base metals, gold, and crude oil [61]. Furthermore, researchers examined the interrelationships with indexes of clean energy, consumer electronics, telecommunications, aerospace, and defense [62].

The impact of the pandemic on specific financial pairs was also explored, such as the return and volatility transmission of oil-gold and oil-Bitcoin pairs before and during the crisis [63]. Moreover, the abilities of Bitcoin, gold, and US VIX futures to withstand downside movements in BRICS stock market indices during the pandemic were investigated [64]. An intriguing focus for finance researchers was the market integration across clean and green investments, crude oil, and conventional stock indices across the US and European stocks from 2008 to 2020 [65].

In-depth analyses were carried out to understand the daily return spillover among 18 crypto currencies under both low and high volatility regimes [66]. Crypto currencies and their connectedness measures with different assets, including gold, crude oil, world equities, currencies, and bonds, were thoroughly examined in light of the pandemic [67]. Researchers also explored time-varying correlations between climate bonds, considered attractive investments, and US equities, crude oil, and gold markets [68]. The pandemic's effect on the extreme return spillovers between US stock market sectors was also a subject of investigation [69,70]. Furthermore, the effect on gold market returns volatility was studied using the heterogeneous autoregressive realized variance model [71].

To bridge gaps in the literature, some studies focused on the asymmetric volatility spillover among Chinese stock market sectors during the COVID-19 pandemic [72]. Others delved into return spillovers across stock sectors under high and low volatility regimes [73]. The asymmetric efficiency of crypto currencies, including Bitcoin, Ethereum, Litecoin, and Ripple, was examined using the asymmetric multifractal detrended fluctuation analysis based on 1-h data [74]. Additionally, researchers analyzed the tail dependence between five energy markets (crude oil, natural gas, heating oil, gasoline, and coal) and green bonds using a time-varying optimal copula model [75].

Financial studies at LAU also encompassed the examination of countries most affected by the pandemic and their systemic distress risk spillover between global and individual stock markets [76]. Investigating investors' herding behaviors in the global stock market also yielded practical implications [77]. The strict governmental policies implemented by New Zealand during the pandemic prompted researchers to explore and compare the effects of three key policies on 14 New Zealand industry stock indices [78].

Additionally, studies explored the effect of US newspaper-based uncertainty related to infectious diseases on the structure of interest rates, covering maturities ranging from 1 year to 30 years [79]. LAU scholars [80] also examined income inequalities and the effects of uncertainties, such as COVID-19, on the risk profiles of 19 emerging market economies from 1985 to 2020.

These comprehensive and diverse research endeavors shed light on the complex interplay between the COVID-19 pandemic and various financial aspects, contributing to a deeper understanding of the multifaceted challenges and opportunities presented by this global crisis.

3.3.4. COVID-19 and nutrition

The COVID-19 pandemic had profound implications for individuals' lifestyles and dietary practices, prompting extensive research in this domain to unravel the complex dynamics at play [81]. In particular, a notable nutritional study delved into the assessment of Chinese traditional medicine and nutrition interventions, revealing their potential complementarity to medical approaches and highlighting the need for further exploration in future studies [82].

Recognizing the significance of comprehending these elements in the context of the pandemic, researchers also directed their attention towards previously understudied aspects of food hygiene and shopping knowledge, particularly in developing countries [83]. This effort aimed to shed light on the role of knowledge and practices related to food safety and purchasing habits in mitigating the spread of the virus and promoting healthier dietary choices.

Additionally, a comprehensive nutritional study focusing on weight fluctuations surveyed over 2000 participants during the pandemic and intriguingly revealed no significant weight variation among the Lebanese population. The study showed that the absence of weight gain was associated with increased physical activity levels and adherence to well-designed diet plans [84]. This finding underscores the potential effectiveness of targeted interventions in maintaining healthy weight during challenging times.

Furthermore, a cross-sectional study specifically examined the impact of quarantine measures on adult Lebanese individuals' eating habits and lifestyle behaviors [85]. By capturing valuable insights into the changes experienced during prolonged periods of confinement, this publication elucidated the factors influencing dietary choices and lifestyle patterns during quarantine.

Collectively, these studies offer valuable contributions to our understanding of the complex interplay among the COVID-19 pandemic, individuals' lifestyles, and dietary practices. By examining diverse aspects such as traditional medicine, food hygiene, shopping knowledge, weight fluctuations, and quarantine's effects, researchers have provided a more nuanced understanding of the challenges and opportunities for promoting healthier behaviors during these unprecedented times.

3.3.5. COVID-19 and tourism

The field of tourism studies has dedicated significant attention to examining the profound influence of the COVID-19 pandemic on pro-environmental travel behavior and its potential to shape a more sustainable future for the industry [86]. This article underscores the pivotal role of the pandemic as a catalyst for redefining tourist consumer behaviors, prompting a shift towards safer travel destinations. Consequently, touristic places have been compelled to adopt new strategies and innovative attraction activities to cater to these evolving demands [87]. Such adjustments in response to shifting consumer preferences highlight the tourism industry's resiliency and adaptability.

In addition to exploring the changing behaviors of tourists, another noteworthy study investigated the interconnectedness among

95 U S. tourism firms during the pandemic. This publication revealed that smaller firms assumed greater systematic importance within the tourism industry, possibly as a consequence of larger firms facing greater challenges and disruptions. Moreover, the study found a decrease in the stock performance of tourism firms, indicating the far-reaching consequences of the pandemic on the financial viability and stability of the sector [88]. These findings shed light on the intricate dynamics within the tourism industry during the pandemic, emphasizing the need for comprehensive strategies to support both large and small enterprises and mitigate the adverse effects on their performance.

By delving into the effects of the pandemic on pro-environmental travel behavior, changes in tourist consumer preferences and the interconnectedness and financial performance of tourism firms, these studies contribute to a deeper understanding of the multifaceted impacts of the pandemic on the tourism industry. They underscore the importance of adapting to changing consumer demands, innovating tourism experiences, and implementing sustainable practices in order to foster the recovery and resilience of the sector.

3.3.6. COVID-19 and organizational performance

The COVID-19 pandemic had far-reaching effects on various sectors and negatively impacted the performance of employees. In order to comprehend the implications of this global crisis, researchers have delved into different dimensions, employing rigorous frameworks and perspectives rooted in sustainability theory. One such study [89] highlighted the crucial importance of this proactive approach by shedding light on how organizations' performance can be improved through efficient COVID-19 emergency planning.

Simultaneously, an in-depth investigation [90] explored the influence of ethical leadership, commitment to proper protocols, and the implementation of healthy workplace practices. This study specifically examined the perception of bank employees toward the intrusiveness of COVID-19 vaccination technologies. Considering these essential factors into consideration, researchers aimed to provide valuable insights into how organizational practices can effectively navigate the challenges brought forth by the pandemic.

Furthermore, researchers at LAU [91] contributed to the existing body of knowledge by establishing a direct link between organizational learning and work engagement. Notably, they also highlighted the mediating effects of employee resilience and psychological empowerment. This comprehensive exploration not only emphasized the positive impact of organizational learning but also elucidated the underlying mechanisms that foster employee well-being and engagement during times of crisis.

In the health sector, it has been recognized that both community and hospital pharmacists played a significant role as consultants during the pandemic [92,93]. Their extensive medical knowledge and adherence to best practices in managing the disease were instrumental in assisting the studied population. This finding highlights the importance of pharmacists' expertise in ensuring optimal healthcare outcomes during critical situations.

Moreover, another study [94] examined the preparedness of Intensive Care physicians in hospitals regarding COVID-19. This publication shed light on the readiness of these medical professionals in dealing with the challenges posed by the pandemic. The findings provide valuable insights for healthcare institutions and policymakers to strengthen their strategies and support systems for intensive care units.

Additionally, two separate publications [95,96] focused on nurses, addressing their resilience levels, burnout, intention to quit, and perceived risk associated with COVID-19. These studies provided a comprehensive understanding of the unique challenges faced by nurses during the pandemic. By examining the psychological well-being and work-related factors affecting nurses, these publications contribute to the development of targeted interventions and support systems to mitigate burnout and ensure their well-being.

In summary, a plethora of studies has shed light on the profound impact of COVID-19 on various sectors and employees' performance. Rigorous research methodologies, encompassing frameworks based on sustainability theory, have enabled a deeper understanding of the implications of the pandemic. Furthermore, investigations into the perception of employees, such as bank workers, and the exploration of factors like ethical leadership, commitment, and healthy workplace practices have enhanced our knowledge of effective strategies for navigating crises. In the healthcare domain, the consultancy role of pharmacists and the preparedness of physicians and nurses have been extensively studied, providing valuable insights for improving healthcare delivery and supporting frontline workers. These multidimensional studies have expanded our understanding of the challenges posed by COVID-19 and paved the way for evidence-based interventions and strategies.

3.3.7. COVID-19 impact on miscellaneous fields

The impact of the COVID-19 pandemic extends far beyond its effects on health and social activities. The economy, market rates and shares, communication, and telecommunication are just a few of the areas of society where this infectious disease has had a significant negative impact. To comprehensively understand these far-reaching consequences, numerous published studies have explored the multifaceted effects of COVID-19. By employing rigorous methodologies and in-depth analyses, these studies have provided substantial insights into the implications of the pandemic on different domains.

During the global pandemic crisis, social networks played a critical role as an emerging research engine, as some of these studies have highlighted [97–99]. They have emphasized the influence of social networks on people's health behavior, particularly their observance of preventive hygiene measures. Understanding the impact of social networks on individuals' health-related decision-making and their adherence to protective measures is crucial in shaping efficient public health interventions.

In addition, review studies have examined changes in consumer behavior before and after COVID-19 periods [100]. These studies offer valuable insights into shifts in consumption patterns, shedding light on the ways in which the pandemic has affected consumer preferences and choices. Furthermore, other investigations have focused on consumers' social distancing practices and online grocery shopping behavior both during and after the pandemic [101]. These studies provided a comprehensive understanding of the changes in consumer habits and preferences in the face of unprecedented challenges.

The interconnectedness of international Real Estate Investment Trusts (REITs) markets in different countries has also been studied

in the context of COVID-19 [102]. By analyzing the time-varying dynamics of these markets, researchers have provided a deeper understanding of the global economic impact of the pandemic and its implications for the real estate sector.

Moreover, two models have been developed to assess the use and impact of electronic databases in the fields of healthcare and communication, particularly in response to their emerging overuse during the pandemic [103,104]. These models are designed to help policymakers and healthcare professionals make well-informed decisions about the use of electronic databases by assessing their efficacy and any potential negative effects.

In addition to the direct impacts of the virus, miscellaneous studies have explored unconventional aspects related to SARS-CoV-2 infection. For instance, one study delved into the affective and cognitive dynamics associated with the online sharing of cultural heritage during the pandemic [105]. This publication aimed to understand the ways in which the pandemic has influenced the online cultural discourse and the sharing of heritage among individuals.

Furthermore, a recently published political and economic review examined the major takeaways and lessons learned from the COVID-19 response in humanitarian and low-resource settings [106]. This study emphasized the unique challenges faced in these contexts and sought to extract valuable insights to enhance future preparedness and response strategies.

The impact of the pandemic on women's health has also been a significant area of research. Two publications summarized the specific effects of COVID-19 on women's well-being [107,108]. These studies shed light on the gendered implications of the pandemic, exploring the differential impacts on women's physical and mental health, as well as the socioeconomic challenges they face.

Through conducting these rigorous studies, researchers have expanded our understanding of the far-reaching effects of COVID-19 beyond the realms of health and social activities. Their findings contribute to evidence-based decision-making and the development of targeted interventions in areas, including public health, consumer behavior, real estate markets, electronic databases, cultural heritage, humanitarian settings, and women's health.

Several studies with high h-indexes have been conducted in various sectors, including medicine, mental and psychological health, marketing, and organizational behavior. In the medical field, one study focused on the impact of COVID-19 on children undergoing anticancer treatment. The research showed that most children in the study had mild symptoms or were asymptomatic, despite concerns about their weakened immunity. Only a small number of at-risk patients tested positive for COVID-19, emphasizing the importance of preventive measures and discussing treatment options for immune-compromised children [46].

Another study highlighted the association between diabetes and COVID-19. Administering corticosteroids to severe COVID-19 patients was found to be linked to lower mortality rates. Additionally, an increase in maxillofacial fungal infections, specifically mucormycosis or black fungus, was connected to COVID-19. These conditions share a deregulated immune response potentially influenced by interleukin 37 (IL-37), a cytokine known for reducing inflammation. To mitigate COVID-related secondary infections, caution should be exercised when using corticosteroids in diabetic COVID-19 patients, managing hospital capacity, and ensuring sufficient medical oxygen supply [39].

In the field of mental and psychological health, a study focused on the severe impact of the COVID-19 pandemic on Lebanon, exacerbating both physical and psychological distress during a period of instability. The study examined the mental well-being outcomes and sociodemographic factors associated with the pandemic, identifying predictors for good COVID-19 practices. The findings revealed various factors influencing health concerns, life satisfaction, and social well-being, which can inform a coordinated national strategy to address the long-term mental health effects of the pandemic [59].

A marketing study explored the spread of misinformation about COVID-19 as a global public health issue. The study aimed to understand the connection between exposure to and trust in COVID-19 news from different sources and belief in false information. The findings indicated that trust in news from social media, interpersonal communication, and clerics increased belief in COVID-19 myths, while trust in government information and higher education decreased such beliefs. Media literacy training was found to increase critical social media posting practices and help mitigate the spread of misinformation [105].

Lastly, an organizational performance paper introduced a research framework utilizing sustainability theory perspectives to address challenges posed by unpredictable events like pandemics and natural disasters. The framework validated the relationships between key variables through a large-scale survey involving global food, pharmaceutical, and medical manufacturing companies. Effective pandemic emergency planning was found to positively impact organizational performance metrics in these industries, emphasizing the importance of implementing triple sustainability practices for market competitiveness and corporate reputation during critical times [96].

These studies offer insightful information on a variety of COVID-19-related topics and its effects on various industries, influencing future research and potential pandemic-related strategy options.

4. Discussion

Our comprehensive analysis has yielded compelling evidence supporting that healthcare professionals at the Lebanese American University (LAU) have predominantly participated in COVID-19 publications. Notably, a significant proportion of the published works at LAU encompassed medical investigations, including both physical and psychological aspects of the pandemic. When examining the fields with the highest volume of publications, it became apparent that health-related sectors emerged as the foremost contributors, followed by finance studies and mental and psychological health. This observation highlights the profound impact of COVID-19 on both individual well-being and economic stability worldwide, as corroborated by numerous studies [109–111].

However, it is essential to acknowledge that COVID-19 represents a global crisis necessitating a multifaceted approach to comprehensively understand the interrelated dimensions of the disease. In addition to healthcare perspectives, exploring the ramifications of COVID-19 through the lenses of economics, tourism, real estate, and other relevant sectors becomes imperative. Our review

encapsulated this broader perspective by revealing the substantial interest and engagement of researchers from diverse professional backgrounds, extending beyond healthcare. This phenomenon is not exclusive to the Lebanese American University but is observed across various studies that elucidate the extensive impact of the COVID-19 pandemic on multiple sectors, including finance and economics [112], real estate [113], the rise of digital media [114], and other areas such as violence against women [115] and obesity [116].

It is noteworthy that individualized reviews made up a sizable portion of the published works when it comes to the types of studies that were included in our analysis. This result is consistent with our initial scoping searches, despite the fact that reviews are typically quicker to complete and have less evidence than experimental studies [117]. Nevertheless, it is crucial to recognize the pressing need for more interventional and experimental human studies, as these methodologies are known to offer higher consistency, control, and ultimately yield more generalizable conclusions and trustworthy recommendations [118].

Despite the evident scholarly interest in COVID-19 research, it is disconcerting to observe that the volume of such studies conducted in Lebanon remains relatively low compared to analogous investigations conducted globally [119]. Given the World Health Organization's classification of COVID-19 as a major threat to many countries, it becomes imperative to generate recommendations aimed at augmenting research efforts in this domain [2]. One potential explanation for this disparity could be the lack of funding allocated to such studies. Adequate funding has the potential to bolster the publication rate and enable researchers to incorporate a broader range of independent variables related to COVID-19, fostering an environment conducive to conducting more experimental studies rather than relying solely on observational data [120].

5. Limitations

This review draws attention to several shortcomings. First off, since we only used Scopus and Web of Science databases, it is possible that we missed some studies that are published in other databases. Second, no information was provided or made available regarding the retractions of the articles.

To our knowledge, this is one of the very few reviews that describes the different fields affected by COVID-19 along with their various publications. However, among the limitations of this work is the continuous updating that takes place in the WoS and Scopus databases of the Lebanese American University. Although they are quite representative to date, it should be noted that many other related studies may be still submitted or under publication or even published but not included in our analysis. Adding to that, the urgent demand for speedy peer-review, coupled with the essential need for healthcare professionals' attention, has increased the likelihood of errors and heightened the risk of inadequate transparency and reproducibility in research studies. In turn, this has increased the possibility of fraudulent activities and misconducts. The publishing journey has also become a more time-sensitive process during the pandemic, as COVID-19 papers are expedited and put on fast tracks, further intensifying the pressure [121]. Despite these limitations, as far as we are aware, no additional studies on this topic have yet been published. As a result, this study initiates a much-needed conversation about peer-reviewed scientific literature during a time when there is a high demand for accurate new information [122,123]. The majority of the included published articles are literature reviews, which is primarily because many of them are brief and only present an article or preliminary findings. Researchers may stop at this statement due to the large number of requests for papers on COVID-19 and the need of many journals to publish on this trendy subject, which encourages researchers to communicate any potential findings.

6. Conclusion

One-third of LAU studies targeting Covid-19 were in the medical field, which seems reasonable given the serious threat posed by the virus. Finance came second after medical studies, as indicated in the literature. It is evident that Covid-19 burdened not only citizens but also organizations and the country as a whole. Mental and Psychological Health was the third most targeted field, yet the virus attracted researchers from various fields, including organizational behavior, nutrition, tourism, and more. Through their unique perspectives and expertise, these fields of study help us understand the current state of COVID-19 research publications. For instance, medical health disciplines provide insights into the virus's spread, impact, and potential treatments, while social sciences explore its psychological and societal implications. By integrating these diverse fields, we gain a comprehensive picture of COVID-19 research publications, enhancing our understanding of the current state of knowledge.

The environment has a significant impact on the publishing process, as this review has shown. The presented work is an example from the Lebanese American University (LAU), a university in the Middle East. Our analysis has demonstrated that researchers at this institution were motivated to advance our understanding of the COVID-19. Over the past three years, the institution has worked diligently to examine how the SARS-CoV-2 virus affects various fields, not limited to medicine or health. It has been discovered that this virus has also had an impact on social networks, socio-economics, real estate, tourism, nutrition, and the global business market.

Regarding recommendations for the future, to improve the generalizability of the findings, one could investigate the effects of COVID-19 at the national level by expanding the sample size and obtaining data from other higher education institutions in Lebanon or the region.

Especially during pandemics, the role of academic institutions in research is critical to the development of research-centered training. To ensure that people receive timely and accurate information, academic institutions must disseminate content that is scientifically correct and participate in awareness campaigns. Universities have a responsibility to continue their research efforts despite the limitations. In order to inform the public with accurate scientific information, numerous initiatives were actually started. For instance, some schools have embraced more adaptable program delivery methods like lifelong learning, distance learning, and e-

learning.

However, other challenges persist, including the government's internationalization strategy and financial sustainability. A national action plan is also necessary to manage pandemics in low-income nations like Lebanon. Focusing on national prevention initiatives that target social determinants beyond health, such as food security and access to education, is also required given the pandemic's pervasive economic effects.

In conclusion, this comprehensive analysis of COVID-19 research publications from the Lebanese American University reveals a multifaceted response to the pandemic across various academic fields. LAU's researchers have made significant contributions to understanding the virus's medical, economic, psychological, and societal dimensions. This study underscores the vital role of academic institutions during public health crises, emphasizing the importance of disseminating accurate scientific information and engaging in multidisciplinary research. As we move forward, it is imperative to expand research collaboration, improve the generalizability of findings, and address broader societal challenges that extend beyond health. By doing so, we can better prepare for future pandemics and contribute to global efforts aimed at mitigating their impact.

CRediT authorship contribution statement

Nada Khaddage-soboh: Writing - original draft, Conceptualization. **Samah Tawil:** Writing - review & editing, Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Y. Xiang, W. Li, Q. Zhang, Y. Jin, W. Rao, L.Z. al, Timely research papers about COVID-19 in China, Lancet (2020) 684–685, https://doi.org/10.1016/S0140-6736(20)30375-5.

[2] W.H. Who, Statement on the Second Meeting of the International Health Regulations (2005) Emergency Committee Regarding the Outbreak of Novel Coronavirus (2019-nCoV), 2020.

[3] M. Al-Abbas, S.S. Saab, The impact of collaborative research: a case study in a developing country, in: 4th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT), 2020, pp. 1–7.

[4] B. Shihada, T. Elbatt, A. Eltawil, M. Mansour, E. Sabir, S.R. al, Special issue on arab world region, Commun. ACM 64 (4) (2021) 114–119.

[5] M. Gilbert, G. Pullano, F. Pinotti, E. Valdano, C. Poletto, P. Boëlle, e. al, Preparedness and vulnerability of African countries against importations of COVID-19: a modeling study, Lancet (2020) 871–877.

[6] N. Lurie, M. Saville, R.H. al, Developing Covid-19 vaccines at pandemic speed, N. Engl. J. Med. 382 (2020) 1969–1973.

[7] K. Khan, M. Mamun, M. Griffiths, e. al, The mental health impact of the COVID-19 pandemic across different cohorts, Int. J. Ment. Health (2020) 1–7.

[8] P. Boutros, A. Fakih, Drivers of research outcomes in developing countries: the case of Lebanon, Economies 10 (3) (2022) 58.

[9] P. Khoury, E. Azar, E. Hitti, COVID-19 response in Lebanon: current experience and challenges in a low-resource setting, August, JAMA 11 (324) (2020) 548–529, 6.

[10] M. Fawaz, M. Itani, The psychological experiences of Lebanese ground zero front-line nurses during the most recent COVID-19 outbreak post Beirut blast: a qualitative study, June), Int. J. Soc. Psychiatr. 68 (4) (2022) 754–761.

[11] E. Mehraeen, O. Dadras, A.M. Afsahi, A. Karimi, M.M. Pour, P. Mirzapour, A. Barzegary, F. Behnezhad, P. Habibi, M.A. Salehi, F. Vahedi, M. Heydari, S. Kianzad, B. Moradmand-Badie, M. Javaherian, S. SeyedAlinaghi, J.M. Sabatier, Vaccines for COVID-19: a systematic review of feasibility and effectiveness, Infect. Disord.: Drug Targets 22 (2) (2022), e230921196758, https://doi.org/10.2174/1871526521666210923144837. PMID: 34554905.

[12] S. SeyedAlinaghi, A. Karimi, A. Barzegary, Z. Pashaei, A.M. Afsahi, S. Alilou, N. Janfaza, A. Shojaei, F. Afroughi, P. Mohammadi, Y. Soleimani, N. Nazarian, A. Amiri, M.M. Tantuoyir, S. Oliaei, E. Mehraeen, O. Dadras, Mucormycosis infection in patients with COVID-19: a systematic review, Health Sci Rep 5 (2) (2022 Feb 28) e529, https://doi.org/10.1002/hsr2.529. PMID: 35252593; PMCID: PMC8885749.

[13] O. Craig, Which universities are leading the research into COVID-19?, Available from: https://www.topuniversities.com/courses/medicine/which-universities-are-leading-research-covid-19. (Accessed 23 December 2022).

[14] B.M. Belcher, R. Claus, R. Davel, S.M. Jones, Evaluating and improving the contributions of university research to social innovation, Soc Ent J 18 (1) (2022) 51–120, https://doi.org/10.1108/SEJ-10-2020-0099.

[15] D. Moher, et al., Preferred reporting items for systematic reviews and meta-analyses: the PRISMA Statement, Open Med. 3 (3) (2009) e123–e130.

[16] E. Mehraeen, Z. Najafi, B. Hayati, M. Javaherian, S. Rahimi, O. Dadras, S. SeyedAlinaghi, M. Ghadimi, J.M. Sabatier, Current treatments and therapeutic options for COVID-19 patients: a systematic review, Infect. Disord.: Drug Targets 22 (1) (2022), e260721194968, https://doi.org/10.2174/1871526521666210726150435. PMID: 34313204.

[17] S. Baron, R. Russell-Bennett, EDITORIAL: beyond publish or PERISH: the importance of citations and HOW to GET them, Journal of Service Marketing 30 (3) (2016) 257–260.

[18] R. Jaafar, V. Pereira, S. Saab, A.-N. EL-Kassar, Which journal ranking list? A case study in business and economics, EuroMed J. Bus. (2020) 361–380, https://doi.org/10.1108/EMJB-05-2020-0039.

[19] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, W.M. Lim, How to conduct a bibliometric analysis: an overview and guidelines, J. Bus. Res. 133 (2021) 285–296, https://doi.org/10.1016/J.JBUSRES.2021.04.070.

[20] Y.A. Adhebisi, M. Pius, Nigeria's scientific contributions to COVID-19: a bibliometric analysis, Ann Med Surg (Lond). 80 (2022 Aug), 104316, https://doi.org/10.1016/j.amsu.2022.104316.

[21] J. Harb, H. Noureldine, G. Chedid, M. Eldine, D. Abdallah, N. Chedid, W. Nour-Eldine, SARS, MERS and COVID-19: Clinical Manifestations and Organ-System Complications: A Mini Review. *Pathogens and Disease*, 2020.

[22] E. Issa, G. Merhi, B. Panossian, T. Salloum, S. Tokajian, SARS-CoV-2 and ORF3a: Nonsynonymous Mutations, Functional Domains, and Viral Pathogenesis, mSystems, 2020.

[23] C.A. Khoury, Z. Bashir, S. Tokajian, N. Nemer, G. Merhi, G. Nemer, In silico evidence of beauvericin antiviral activity against SARS-CoV-2, in: Computers in Biology and Medicine, 2022.

[24] H. Issa, A. Eid, B. Berry, V. Takhviji, A. Khosravi, S. Mantash, K. Zibara, Combination of angiotensin (1-7) agonists and convalescent plasma as a new strategy to overcome angiotensin converting enzyme 2 (ACE2) inhibition for the treatment of COVID-19, Front. Med. (2021) 8.620990, https://doi.org/10.3389/fmed.2021.620990.

[25] S.E. Kantar, B. Nehmeh, P. Saad, G. Mitri, C. Estephan, M. Mroueh, R. Taleb, Derivatization and combination therapy of current COVID-19 therapeutic agents: a review of mechanistic pathways, adverse effects, and binding sites, Drug Discov Today (2020) 1822–1838.

[26] M. Merimi, R. El-Majzoub, L. Lagneaux, D.M. Agha, F. Bouhtit, N. Meuleman, M. Najar, The therapeutic potential of mesenchymal stromal cells for regenerative medicine: current knowledge and future understandings, Front. Cell Dev. Biol. 9 (2021) 661532.

[27] R. Feghali, G. Merhi, A. Kwasiborski, V. Hourdel, N. Ghosn, S. Tokajian, Genomic Characterization and Phylogenetic Analysis of the First SARS-CoV-2 Variants Introduced in Lebanon, PeerJ, 2021.

[28] N. Fayad, W. Habib, A. Kandeil, R. El-Shesheny, M. Kamel, Y. Mourad, J. Abdallah, Sars-cov-2 variants in Lebanon: evolution and current situation, Biology. 10 (6) (2021) 531.

[29] J. Koweyes, T. Salloum, S. Haidar, G. Merhi, S.T. S, Covid-19 pandemic in Lebanon: one year later, what have we learnt? mSystems. 6 (2) (2021) 10–128.

[30] O.E. Deeb, M. Jalloul, The Dynamics of COVID-19 Spread: Evidence from Lebanon, Mathematical Biosciences and Engineering (2020) 2005.07251.

[31] A. O'Toole, M. Kraemer, V. Hill, O. Pybus, A. Watts, I. Bogoch, J. Giandhari, Tracking the International Spread of SARS-CoV-2 Lineages B.1.1.7 and B.1.351/501Y-V2, Wellcome Open Research, 2021.

[32] H. Tannous, S. Akiki, R.E. Boulos, C.E. Eid, G.E. Hasbani, L. Khoueiry, G. Khazen, SARS-CoV-2 historical global testing and genomic variability, BMC Infect. Dis. 22 (1) (2022) 322.

[33] S. Saab, M.A. Abbas, R. Samaha, R. Jaafar, K. Saab, S.S. Jr, Setting the Boundaries of COVID-19 Lockdown Relaxation Measures, Library Hi Tech, 2021.

[34] I. Matta, A. Laganà, E. Ghabi, L. Bitar, A. Ayed, S. Petousis, Z. Sleiman, COVID-19 transmission in surgical smoke during laparoscopy and open surgery: a systematic review, in: Minimally Invasive Therapy and Allied Technologies, 2022.

[35] A. Helwan, M. Ma'Aitah, H. Hamdan, D. Ozsahin, O. Tuncyurek, Radiologists versus deep convolutional neural networks: a comparative study for diagnosing COVID-19, Comput. Math. Methods Med. (2021) 1–9.

[36] R. Sakr, C. Ghsoub, C. Rbeiz, V. Lattouf, R. Riachy, C. Haddad, M. Zoghbi, COVID-19 detection by dogs: from physiology to field application-a review article, Postgrad. Med. (2022) 212–218.

[37] P. Mouawad, T. Dubnov, S. Dubnov, Robust detection of COVID-19 in cough sounds: using recurrence dynamics and variable markov model, SN Computer Science 2 (1) (2021), 34.

[38] K. Yammine, M. Estephan, Telemedicine and Diabetic Foot Ulcer Outcomes. A Meta-Analysis of Controlled Trials, The Foot 50 (2022), 101872.

[39] S. Tokajian, G. Merhi, C.A. Khoury, G. Nemer, Interleukin-37: a link between COVID-19, diabetes, and the black fungus, Front. Microbiol. 12 (2022), 788741.

[40] W.A. Saleh, Z. Aoun-Bacha, M.B. Khalil, P.B. Khalil, R. Boulos, H. Chami, P. Yazbeck, Statement of the lebanese pulmonary society, the lebanese society of critical care medicine & the lebanese society of anesthesiology, J. Med. Liban. (2020) 83–86.

[41] E. Sayad, M. Hammoud, D. Khreis, M.E. Shami, M. Matar, R. Farah, COVID-19 associated respiratory failure complicating a pericardial effusion in a patient with sideroblastic anemia, Respiratory Medicine Case Reports (2021), 101543.

[42] Y. Batta, C. King, J. Johnson, N. Haddad, M. Boueri, G. Haddad, Sequelae and comorbidities of COVID-19 manifestations on the cardiac and the vascular systems, Front. Physiol. 12 (2022), 748972.

[43] K. Matli, N. Chamoun, A. Fares, V. Zibara, S. Al-Osta, R. Nasrallah, G. Ghanem, Combined anticoagulant and antiplatelet therapy is associated with an improved outcome in hospitalised patients with COVID-19: a propensity matched cohort study, Open Heart 8 (2) (2021), e001785.

[44] K. Matli, R. Farah, M. Maalouf, N. Chamoun, C. Costanian, G. Ghanem, Role of Combining Anticoagulant and Antiplatelet Agents in COVID-19 Treatment: A Rapid Review, Open Heart, 2021.

[45] W. Faour, A. Choaib, E. Issa, F. Choueiry, K. Shbaklo, M. Alhajj, M. Nader, Mechanisms of COVID-19-Induced Kidney Injury and Current Pharmacotherapies, Inflammation Research, 2022.

[46] O. Hrusak, T. Kalina, J. Wolf, A. Balduzzi, M. Provenzi, C. Rizzari, J.v. Bosch, Flash survey on severe acute respiratory syndrome coronavirus-2 infections in paediatric patients on anticancer treatment, European Journal of Cancer 132 (2020) 11–16.

[47] A. Helwan, M.K.S. Ma'Aitah, H. Hamdan, D.U. Ozsahin, O. Tuncyurek, Radiologists versus deep convolutional neural networks: a comparative study for diagnosing COVID-19, Comput. Math. Methods Med. (2021) 1–9.

[48] H. Hamdy, J. Sreedharan, J. Rotgans, N. Zary, S. Bahous, V. Venkatramana, N. Momen, Virtual Clinical Encounter Examination (VICEE): a novel approach for assessing medical students' non-psychomotor clinical competency, Med. Teach. 43 (10) (2021) 1203–1209.

[49] C. Haddad, J. Dib, N. Akl, S. Hallit, S. Obeid, COVID-19 and psychosis, depression, obsession and quality of life in Lebanese patients with schizophrenia: any changes after 5 months of quarantine? BMC Psychology 10 (1) (2022).

[50] E. Ayoub, S. Bahous, D. Chamsy, M. Choukair, N. Yared, Z. Ghorayeb, E. Nemr, The impact of COVID-19 on undergraduate medical education, J. Med. Liban. (2020) 76–79.

[51] T. Arora, I. Grey, Health behaviour changes during COVID-19 and the potential consequences: a mini-review, J. Health Psychol. 25 (9) (2020) 1155–1163.

[52] Z. Bitar, M. Akel, P. Salameh, S. Obeid, S. Hallit, Phubbing among Lebanese young adults: scale validation and association with mental health (depression, anxiety, and stress), Curr. Psychol. (2022) 19709–19720.

[53] E. Sfeir, J.-M. Rabil, S. Obeid, S. Hallit, M.-C. Khalife, Work fatigue among Lebanese physicians and students during the COVID-19 pandemic: validation of the 3D-Work Fatigue Inventory (3D-WFI) and correlates, BMC Publ. Health 22 (1) (2022).

[54] S. Lam, T. Arora, I. Grey, L. Suen, E.-Z. Huang, D. Li, K. Lam, Perceived risk and protection from infection and depressive symptoms among healthcare workers in mainland China and Hong Kong during COVID-19, Front. Psychiatr. 11 (2020).

[55] J. Thomas, O. Alkatheeri, I. Grey, Cognitive vulnerability and depressive symptoms among Emirati college students before and after the enactment of COVID-19 curfew and home-learning measures, Int. J. Psychol. Psychol. Ther. (2021) 75–79.

[56] C. Haddad, H. Sacre, R. Zeenny, A. Hajj, M. Akel, K. Iskandar, P. Salameh, Should samples be weighted to decrease selection bias in online surveys during the COVID-19 pandemic? Data from seven datasets, BMC Med. Res. Methodol. 22 (1) (2022) 1–11.

[57] T. Alrubai, A. Khalil, R. Zaki, L. Sinno, S.A. Tabbah, The psychological health of patients diagnosed with cancer in Iraq during the COVID-19 pandemic: a single center study, Psycho Oncol. 31 (4) (2022) 649–660.

[58] T. Arora, I. Gre, L. Östlundh, K. Lam, O. Omar, D. Arnone, The prevalence of psychological consequences of COVID-19: a systematic review and meta-analysis of observational studies, J. Health Psychol. 27 (4) (2022) 805–824.

[59] A. Capodici, A. Salussolia, F. Sanmarchi, D. Gori, D. Golinelli, Biased, wrong and counterfeited evidences published during the COVID-19 pandemic, a systematic review of retracted COVID-19 papers, Qual Quant (2022 Nov 29) 1–33, https://doi.org/10.1007/s11135-022-01587-3. Epub ahead of print. PMID: 36466994; PMCID: PMC9707851.

[60] N. Eisenbeck, D. Carreno, P. Wong, J. Hicks, R.-R. María, J. Puga, M.-J. Sanchez-Ruiz, An international study on psychological coping during COVID-19: towards a meaning-centered coping style [Estudio internacional sobre afrontamiento psicológico durante el COVID-19: hacia un afrontamiento centrado en el sentido], Int. J. Clin. Health Psychol. 22 (1) (2022).

[61] I. Bou-Hamad, R. Hoteit, D. Harajli, Health worries, life satisfaction, and social well-being concerns during the COVID-19 pandemic: insights from Lebanon, PLoS One 16 (2021).

[62] S. Moussa, D. Malaeb, S. Obeid, S.H. S, Correlates of positivity among a sample of Lebanese university students, Front. Psychol. 13 (2022).

[63] M.-J. Sanchez-Ruiz, N. Tadros, T. Khalaf, V. Ego, N. Eisenbeck, D. Carreno, E. Nassar, Trait emotional intelligence and wellbeing during the pandemic: the mediating role of meaning-centered coping, Front. Psychol. 12 (2021).

[64] I. Grey, T. Arora, J. Thomas, A. Saneh, P. Tomhe, R. Abi-Habib, The role of perceived social support on depression and sleep during the COVID-19 pandemic, Psychiatr. Res. 293 (117) (2020).

[65] I. Grey, T. Arora, A. Sanah, Generalized Anxiety Mediates the Relationship between Loneliness and Sleep Quality Amongst Young Adults during the COVID-19 Pandemic, Psychological Reports, 2022.

[66] P. Tohme, N.D. Witte, T.V. Daele, R. Abi-Habib, Telepsychotherapy during the COVID-19 pandemic: the experience of Lebanese mental health professionals, J. Contemp. Psychother. 51 (4) (2021) 349–355.

[67] N.D. Witte, P. Carlbring, A. Etzelmueller, . Nordgreen, M. Karekla, L. Haddouk, . Schwerdtfege, Online Consultations in Mental Healthcare during the COVID-19 Outbreak: an International Survey Study on Professionals' Motivations and Perceived Barriers, Internet Interventions, 2021, p. 25.

[68] A. Kumar, N. Iqbal, S.K. Mitra, L. Kristoufek, E. Bouri, Connectedness among major cryptocurrencies in standard times and during the COVID-19 outbreak, J. Int. Financ. Mark. Inst. Money 77 (2022, March).

[69] Y. Song, E. Bouri, S. Ghosh, K. Kanjilal, Rare earth and financial markets: dynamics of return and volatility connectedness around the COVID-19 outbreak, December, Resour. Pol. 74 (2021).

[70] E. Bouri, K. Kanjilal, S. Ghosh, D. Roubaud, T. Saeed, Rare earth and allied sectors in stock markets: extreme dependence of return and volatility, Appl. Econ. 53 (49) (2021) 5710–5730.

[71] I. Yousaf, S. Ali, E. Bouri, T. Saeed, Information Transmission and Hedging Effectiveness for the Pairs Crude Oil-Gold and Crude Oil-Bitcoin during the COVID-19 Outbreak, Economic Research, 2021.

[72] S. Shahzad, E. Bouri, M. Rehman, D. Roubaud, The hedge asset for BRICS stock markets: Bitcoin, gold or VIX, World Econ. 45 (1) (2022, January) 292–316.

[73] X. Liu, E. Bouri, N. Jalkh, Dynamics and determinants of market integration of green, clean, dirty energy investments and conventional stock indices, Front. Environ. Sci. (2021), 575.

[74] S. Shahzad, E. Bouri, S. Kang, T. Saeed, Regime Specific Spillover across Cryptocurrencies and the Role of COVID-19, Financial Innovation, 2021.

[75] E. Bouri, T. Saeed, X. Vo, D. Roubaud, Quantile connectedness in the cryptocurrency market, J. Int. Financ. Mark. Inst. Money 71 (2021), 101302.

[76] E. Bouri, O. Cepni, D. Gabauer, R. Gupta, Return connectedness across asset classes around the COVID-19 outbreak, International Review of Financial Analysis 73 (2021), 101646.

[77] A. Dutta, E. Bouri, M. Noor, Climate bond, stock, gold, and oil markets: dynamic correlations and hedging analyses during the COVID-19 outbreak, Resour. Pol. 74 (2021, December).

[78] S. Shahzad, E. Bouri, L. Kristoufek, T. Saeed, Impact of the COVID-19 Outbreak on the US Equity Sectors: Evidence from Quantile Return Spillovers, Financial Innovation, 2021.

[79] N. Iqbal, E. Bouri, O. Grebinevych, D. Roubaud, Modelling extreme risk spillovers in the commodity markets around crisis periods including COVID19, Ann. Oper. Res. 6 (2022).

[80] E. Bouri, K. Gkillas, R. Gupta, C. Pierdzioch, Forecasting power of infectious diseases-related uncertainty for gold realized variance, Finance Res. Lett. 42 (2021), 101936.

[81] S. Shahzad, M. Naeem, Z. Peng, E. Bouri, Asymmetric volatility spillover among Chinese sectors during COVID-19, in: International Review of Financial Analysis, 2021.

[82] J. Hernandez, S. Shahzad, P. Sadorsky, G. Uddin, E. Bouri, S. Kang, Regime specific spillovers across US sectors and the role of oil price volatility, Energy Econ 107 (2022), 105834.

[83] M. Naeem, E. Bouri, Z. Peng, S. Shahzad, X. Vo, Asymmetric efficiency of cryptocurrencies during COVID19, in: Physica A: Statistical Mechanics and its Applications, 2021.

[84] M. Naeem, E. Bouri, M. Costa, N. Naifar, S. Shahzad, Energy markets and green bonds: a tail dependence analysis with time-varying optimal copulas and portfolio implications, Resour. Pol. 74 (2021), 102418.

[85] B. Abuzayed, E. Bouri, N. Al-Fayoumi, N. Jalkh, Systemic risk spillover across global and country stock markets during the COVID-19 pandemic, in: Economic Analysis and Policy, 2021.

[86] E. Bouri, R. Demirer, R. Gupta, J. Nel, Covid-19 pandemic and investor herding in international stock markets, Risks 9 (9) (2021).

[87] E. Bouri, M. Naeem, S. Nor, I. Mbarki, T. Saeed, Government Responses to COVID-19 and Industry Stock Returns, Economic Research, 2021.

[88] R. Gupta, S. Subramaniam, E. Bouri, Q. Ji, Infectious disease-related uncertainty and the safe-haven characteristic of US treasury securities, in: International Review of Economics and Finance, 2021.

[89] W. Wu, L. Wang, Y. Erzurumlu, G. Gozgor, G. Yang, Effects of country and geopolitical risks on income inequality: evidence from emerging economies, Emerging Markets Finance and Trade 58 (15) (2022) 4218–4230.

[90] L.I. Cheikh, T. Osaili, M. Mohamad, A.A. Marzouqi, C. Habib-Mourad, D.A. Jamous, A.A. Dhaheri, Assessment of dietary and lifestyle responses after COVID-19 vaccine availability in selected arab countries, Front. Nutr. 9 (2022, April 14).

[91] A.E. Zakhem, M.A. Chalhoub, M. Bassil, The role of herbal and nutritional treatments in the fight against COVID-19 and other respiratory tract infections, Int. J. Environ. Res. Publ. Health 18 (22) (2021, November 2).

[92] H. Dimassi, R. Haddad, L. Mattar, H.F. Hassan, R. Awada, Food shopping and food hygiene related knowledge and practices during the COVID-19 pandemic: the case of a developing country, Italian Journal of Food Safety 10 (2) (2021).

[93] M. Ibrahim, K. Ibrahim, Z. Chamseddine, G. Sleilaty, M.-H. Gannagé-Yared, COVID-19 – impact of the lockdown on the weight variation among the Lebanese population, Nutr. Clin. Metab. 36 (2) (2022, May) 122–128.

[94] L.C. Ismail, M. Hashim, M. Mohamad, H. Hassan, A. Ajab, L. Stojanovska, A.A. Dhaheri, Dietary habits and lifestyle during coronavirus pandemic lockdown: experience from Lebanon, August 30, Front. Nutr. 8 (2021).

[95] P. O'Connor, G. Assaker, COVID-19's effects on future pro-environmental traveler behavior: an empirical examination using norm activation, economic sacrifices, and risk perception theories, J. Sustain. Tourism 30 (1) (2021) 89–107.

[96] O. Itani, L. Hollebeek, Light at the End of the Tunnel: Visitors' Virtual Reality (Versus In-Person) Attraction Site Tour-Related Behavioral Intentions during and Post-COVID-19, vol. 84, Tourism Management, 2021.

[97] S. Shahzad, T. Hoang, E. Bouri, From pandemic to systemic risk: contagion in the U.S. tourism sector, Curr. Issues Tourism (2022) 34–40.

[98] J. Nader, R. El-Khalil, E. Nassar, P. Hong, Pandemic planning, sustainability practices, and organizational performance: an empirical investigation of global manufacturing firms, Int. J. Prod. Econ. (2022).

[99] S. Kabbani, S. Karkoulian, P. Balozian, S.R. S, The Impact of Ethical Leadership, Commitment and Healthy/Safe Workplace Practices toward Employee Attitude to COVID-19 Vaccination/Implantation in the Banking Sector in Lebanon, Vaccines, 2022.

[100] L. Blaique, H.N. Ismail, H. Aldabbas, Organizational learning, resilience and psychological empowerment as antecedents of work engagement during COVID-19, Int. J. Prod. Perform. Manag. 72 (6) (2022) 1584–1607.

[101] R.M. Zeenny, A. Dimassi, H. Sacre, G.E. Khoury, A. Hajj, R. Farah, P. Salameh, A cross-sectional survey on community pharmacists readiness to fight COVID-19 in a developing country: knowledge, attitude, and practice in Lebanon, Journal of Pharmaceutical Policy and Practice (2021).

[102] R.M. Zeenny, E. Ramia, Y. Akiki, S. Hallit, P. Salameh, Assessing knowledge, attitude, practice, and preparedness of hospital pharmacists in Lebanon towards COVID-19 pandemic: a cross-sectional study, Journal of Pharmaceutical Policy and Practice 13 (2020) 1–12.

[103] H. Chami, W.A. Saleh, Z. Aoun-Bacha, P.B. Khalil, S. Chamandi, K. Diab, S. Kanj, Survey of COVID-19 preparedness among lebanese ICU physicians, J. Med. Liban. 68 (1–2) (2020, January 2), 87.

[104] M. Alameddine, M. Clinton, K. Bou-Karroum, N. Richa, M. Doumit, Factors associated with the resilience of nurses during the COVID-19 pandemic, in: Worldviews on Evidence-Based Nursing, 2021.

[105] M. Clinton, K. Bou-Karroum, M. Doumit, N. Richa, M. Alameddine, Determining Levels of Nurse Burnout during the COVID-19 Pandemic and Lebanon's Political and Financial Collapse. *Determining levels of Nurse Burnout during the COVID-19 Pandemic and Lebanon's Political and Financial Collapse*, 2022.

[106] J. Melki, H. Tamim, D. Hadid, S. Farhat, M. Makki, L. Ghandour, E. Hitti, Media exposure and health behavior during pandemics: the mediating effect of perceived knowledge and fear on compliance with COVID-19 prevention measures, Health Commun. 37 (5) (2022) 586–596.

[107] J. Melki, H. Tamim, D. Hadid, M. Makki, J.E. Amine, E. Hitti, Mitigating infodemics: the relationship between news exposure and trust and belief in COVID-19 fake news and social media spreading, PLoS One 16 (6) (2021, JUNE 16), 0253030.

[108] A. Mourad, A. Srour, H. Harmanani, C. Jenainati, M. Arafeh, Critical impact of social networks infodemic on defeating coronavirus COVID-19 pandemic: twitter-based study and research directions, IEEE Transactions on Network and Service Management 17 (4) (2020) 2145–2155.

[109] S. Abosedra, N. Laopodis, A. Fakih, Dynamics and asymmetries between consumer sentiment and consumption in pre- and during-COVID-19 time: evidence from the US, J. Econ. Asymmetries 24 (2021).

[110] O. Itani, L. Hollebeek, Consumers' health-locus-of-control and social distancing in pandemic-based e-tailing services, J. Serv. Market. 35 (8) (2020) 1073–1091.

[111] K. Lesame, E. Bouri, D. Gabauer, R. Gupta, On the dynamics of international real-estate-investment trust-propagation mechanisms: evidence from time-varying return and volatility connectedness measuress, Entropy 23 (8) (2021).

[112] S. Kaddoura, R. Haraty, K.A. Kontar, O. Alfandi, A parallelized database damage assessment approach after cyberattack for healthcare systems, Future Internet 13 (4) (2021).

[113] H. Sami, A. Mourad, H. Otrok, J. Bentahar, FScaler: automatic resource scaling of containers in fog clusters using reinforcement learning, 2020 International Wireless Communications and Mobile Computing, IWCMC 2020 (2020) 1824–1829.

[114] M. Ginzarly, F.J. Srour, Cultural Heritage through the Lens of COVID-19, Poetics, 2022, p. 92.

[115] F. Fouad, L. Soares, J. Diab, A. Abouzeid, The political economy of health in conflict: lessons learned from three states in the Eastern Mediterranean Region during COVID-19, Journal of Global Health 12 (2022).

[116] C. Tang, A. Fakih, S. Abosedra, The fatality rate of COVID-19: how does education, health infrastructure and institutional quality make a change? Margin 16 (2) (2022) 166–182.

[117] M. Akel, J. Berro, C. Rahme, C. Haddad, S. Obeid, S. Hallit, Violence against women during COVID-19 pandemic, J. Interpers Violence. 37 (13–14) (2021) NP12284–NP12309.

[118] K. Oberholtzer, L. Sivitz, A. Mack, S. Lemon, A. Mahmoud, S. Knobler. eds.Learning from SARS: Preparing for the Next Disease Outbreak: Workshop Summary, National Academies Press (US, 2004.

[119] J. Gao, Z. Tian, X. Yang, Breakthrough: chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies, Biosci Trends 14 (1) (2020) 72–73.

[120] M. Chinazzi, J. Davis, M. Ajelli, C. Gioannini, M. Litvinova, S. Merler, C. Viboud, The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak, Science 368 (6489) (2020) 395–400.

[121] F. Richards, P. Kodjamanova, X. Chen, N. Li, P. Atanasov, L. Bennetts, A.E. Khoury, Economic burden of COVID-19: a systematic review, Apr 28), Clinicoecon Outcomes Research (2022) 293–307.

[122] N. Balemi, R. Füss, A. Weigand, COVID-19's impact on real estate markets: review and outlook, Finance Market Performance Management 35 (4) (2021) 495–513.

[123] Y. Lee, Y. Jeon, S.K. al, Social media use and mental health during the COVID-19 pandemic in young adults: a meta-analysis of 14 cross-sectional studies, BMC Publ. Health. 22 (1) (2022), 995.