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A review of the environmental implications of the COVID-19 pandemic in the United Arab Emirates

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A B S T R A C T

This paper reviews the environmental implications associated with the COVID-19 pandemic at the individual and community levels in the UAE. The positive effects emanating from the pandemic include improved air quality and reduced contamination of public spaces with pollutants. On the other hand, far-reaching negative effects include poor disposal of medical plastic waste and facemasks and the rise in unhygienic health practices amongst residents of UAE. The long-term ecological implications of the pandemic are still not well understood. The findings shed the light on the importance of addressing the consequences of the COVID-19 pandemic through preventative policies and strategies for better environmental health and readiness for future crises. Future research could assess the long-term environmental consequences of the pandemic on the UAE.

1. Introduction

The outbreak of Covid-19 in Wuhan and its rapid spread became the century’s environmental health issue. According to the United Arab Emirates National Emergency Crisis and Disasters Management Authority (UAE-NCEMA), 905,468 diagnosed cases and 2,302 deaths were reported by May 25, 2022 (National Emergency Crisis and Disaster Management Authority, 2022). Since the start of the pandemic, the UAE government has immediately intervened with unprecedented measures to curb the spread of the virus. These include closure of international borders, national lockdowns, travel bans, isolation and quarantine, curfews, social distancing, and educational institutions’ closure. The immediate actions taken by the UAE government had played an essential role in controlling the spread of the disease and lowering the death rate emanating from the pandemic. However, the complex and uncertain nature of the pandemic has had severe short and long-term environmental and public health implications on the community. On the social level, many people were subjected to emotional and psychological stress such as depression and anxiety due to isolation, fear, and worries of contracting the disease. Businesses were closed, and movement was discouraged (Radwan et al., 1964; Saddik et al., 2020). People developed new habits and coping mechanisms, including exercising at home using fitness apps to reduce stress and anxiety, use of online health services for diagnostics and prescriptions, online shopping and takeaways, and working from home. Thus, individuals’ behaviors were affected within different environmental settings, including private and public spaces, contributing to changes in hygiene and sanitation practices, use of health facilities or hospitals, generation of domestic and healthcare waste, transportation, and environmental protection actions. Despite the positive environmental changes observed, several studies have found that the COVID-19 pandemic has implications on the environment (Abedin et al., 2022; Miyah et al., 2022; Atoufi et al., 2021; Shakil et al., 2020). The public health policies that governments have adopted during the pandemic are likely to influence future legislative and policy frameworks related to protecting marine and terrestrial ecosystems from the adverse effects of human-mediated pollution. This paper aims to discuss the environmental impacts and concerns associated with the COVID-19 pandemic at the individual and community levels in the UAE. The findings shed the light on the importance of addressing these concerns through preventative policies and strategies for better environmental health and readiness for future crises.

The paper is structured as follows: in the next section, we discuss the environmental impacts of the COVID-19 pandemic including improved air quality, decline in noise pollution, restoration of ecology and tourism destinations, poor waste management and disposal, deterioration of the economic environment, change in the human environment, environmental awareness and pro-environmental actions. Then, we highlight several recommended solutions such as stimulating sustainable behaviors, the usefulness of environmental solutions, sustaining a healthier environment, and the impact of online information. Finally, we draw a conclusion to the main findings of this paper.

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2. Environmental impacts

2.1. Improved air quality

Following the lockdown periods, the halt of transportation and industrial activities in many cities around the world has led to a significant decline in emissions and improved atmospheric air quality (Miyah et al., 2022; Takshe et al., 2022). The emergence and rapid spread of COVID-19 improved atmospheric air quality, with satellite imaging showing cleaner air in developed and developing countries (Siddique et al., 2021). A critical analysis of 57 studies conducted by Shakil et al. showed that the COVID-19 pandemic correlates with positive environmental effects such as reduced nitrogen dioxide emission and greenhouse gasses (GHG) (Shakil et al., 2020). GHG reduction showcases an essential gain in the fight against climate change and reducing air pollution’s health effects. According to Alqasemi et al., the lockdown periods have resulted in a decline in the average of Nitrogen Dioxide (NO₂), Aerosol Optical Depth (AOD), and Surface Urban Heat Island Intensity (SUHII) levels in the UAE by 23.7%, 3.7%, and 19.2% respectively, as compared to a similar time frame in 2019 (Alqasemi et al., 2021). This was attributed by the same authors to the industrial and transportation restrictions. A common declining trend in NO₂ levels has also been recorded in other countries such as Bangladesh (Islam et al., 2021), Morocco (Sekmoudi et al., 2020), India and China (Agarwal et al., 2020). Similarly, reductions in AOD levels were documented in India (Gautam, 2020), China (Fan et al., 2020), and South Asia (Zhang et al., 2020). Another study done by Kaeid et al. showed drastic reductions in different types of air pollutants levels (SO₂ 60%, NO₂ 50%, CO 33%, PM₂.₅ 40%, PM₁₀ 12%) during the lockdown periods as compared to the same period in 2019 (Kaeid et al., 2021). The lockdown periods have also contributed to a reduction in global CO₂ emissions, which are projected to drop by 8% compared to the levels reported 10 years ago (Samara et al., 2022). In addition, the sharp reduction in the overall electricity consumption in many parts of the world has contributed to the improvement of air quality. For instance, the countries that implemented a full lockdown at the beginning of the pandemic have reported a reduction of 25% in the energy demand per week compared to 18% decline for countries that applied partial lockdowns (Samara et al., 2022).

2.2. Decline in noise pollution

The adverse effects of noise pollution have been identified as a major public health concern in numerous studies including hearing impairments, annoyance, sleep disorders, hypertension, cardiovascular diseases, endocrine responses, and impairment of cognitive performance in children (Rume and Islam, 2020; Basner et al., 2014; Fooladi, 2012). Peplow et al. reported that, prior to the COVID-19 pandemic, airports and traffic were the most significant sources of noise worldwide (Peplow et al., 2021). In the UAE, music from the entertainment industry and clubs are also identified as important source of nuisance to individuals (Peplow et al., 2021). A comparable study by Zambrano-Monserrate et al. indicated that contingency measures, taken by most governments around the world to curb the spread of coronavirus, contributed to a decline in environmental noise. The decrease in motor vehicle traffic, closure of nightclubs and entertainment joints with the institution of late-night curfews, and the decline in economic activities during the lockdown were the main contributors to the positive ecological effects associated with the COVID-19 pandemic (Zambrano-Monserrate et al., 2020).

2.3. Restoration of ecology and tourism destinations

Over the past few decades, the tourism sector has experienced rapid growth due to increased security in the various destinations, better transport and communication networks, and advancements in technology. Lenzen et al. estimate that 8% of the total global Green House Gasses (GHGs) emissions are from tourism (Lenzen et al., 2018). Destinations such as forests, mountains, and beaches attract millions of tourists every year who generate significant amounts of waste in these places, thus degrading them. To accommodate many tourists, accommodation facilities and hotels have been established in such destinations leading to a high energy consumption and space occupancy in the natural environment. Following the COVID-19 pandemic and local restrictions, the number of tourists visiting the UAE has declined (Mannaa, 2020). This in turn is expected to be coupled with a reduction in carbon emissions and waste generation from the tourism sector. A recent study done by Abou-Shouk et al. to investigate public perceptions of travel intentions following the COVID-19 pandemic in the UAE and Egypt showed an increase in travel fear and anxiety, which has a negative influence on individuals’ intention to travel (Abou-Shouk et al., 2022).

2.4. Poor waste management and disposal

The COVID-19 pandemic has led to an increase in domestic waste generation and has forced governments to postpone waste recycling programs (Rume and Islam, 2020). Consequently, there was a rise in unrecycled shipped package materials resulting in an intensification of environmental degradation. In addition, the handling and disposal of waste during the COVID-19 pandemic constitutes a critical environmental issue. The use of real-time Polymerase Chain Reaction (PCR) tests in the diagnosis of the coronavirus had generated more than 15,000 tons of plastic residue globally, which had raised concerns about the disposal and control of such waste (Celis et al., 2021). For instance, almost 97% of the plastic residues from the real-time PCR tests are incinerated, which releases toxic chemicals to the atmosphere during the process. In addition, the excess use and disposal of personal protective equipment (PPE) has been associated with contamination of the marine environment in many parts of the world (Abedin et al., 2022; De-la-Torre et al., 2022; Hassan et al., 2022; Ribeiro et al., 2022). According to Celis et al., the United Arab Emirates is ranked nine out of the ten countries with the most plastic residues generation globally (Celis et al., 2021). Furthermore, the improper disposal of face masks has resulted in environmental degradation in the region, particularly in cities and towns where comprehensive modern waste collection facilities and technologies are inadequate. A study done by Abbasi et al. showed that the COVID-19-related use of facemasks in the Arabian Peninsula, including the UAE, contributes to increased marine ecosystems contamination with microplastics (Abbasi et al., 2020). The study indicates that microplastics from facemasks create favorable conditions for the growth and development of pathogenic microorganisms, including spores, bacteria, fungal filaments, and viruses (Abbasi et al., 2020). Therefore, improper disposal of facemasks into marine ecosystems predispenses individuals in Arabian Peninsula to infections and adverse health outcomes. Shakil et al. assert that future studies should apply meteorological data to examine lockdowns’ environmental implications due to a global pandemic (Shakil et al., 2020). An analysis of meteorological data could enable researchers to determine the ecological changes that followed the COVID-19 pandemic and estimate the associated health impacts with more accuracy.

2.5. Deterioration of the economic environment

The world’s economic and financial environment was significantly affected by the COVID-19 pandemic. According to Ali Mansoori et al., the COVID-19 pandemic has wreaked havoc on the UAE’s economy and the labor market (Ali Mansoori et al., 2021). For example, measures such as full or partial lockdown have resulted in the closing down of companies causing job losses to millions of people. The UAE economy’s hardest-hit sectors include real estate, insurance, construction, insurance, travel and tourism, manufacturing, and energy, especially crude oil and natural gas (Ali Mansoori et al., 2021). The drop in oil demand destabilized the UAE economy, which is heavily dependent on oil export. At
the same time, the travel bans and restrictions adversely affected the country’s hospitality, tourism, and retail sector. In an attempt to reverse the damage exerted on the economy by the pandemic, the UAE government has taken precise measures, including the exemption of businesses registered onshore from paying corporate taxes and directing financial institutions not to take stringent actions against small and medium enterprises during the COVID-19 pandemic (Al Mansoori et al., 2021).

2.6. Change in the human environment

In an attempt to curb the spread of the coronavirus, the UAE government, as was the case in other countries all around the world, adopted strict measures such as partial or total lockdowns, quarantine, social distancing in public, and isolation (Cheikh Ismail et al., 2020). The efforts significantly redefined and altered human interactions and relationships. Consequently, most people referred to social media platforms such as Facebook, and Twitter for communication and doing business as an alternative. Moreover, most companies were closed, transportation and automobiles were restricted, public functions were discouraged, service delivery changed, and cultural and traditional practices of the UAE people changed, significantly altering the human environment. The aspects of human behavior and functioning ranging from their interactions and relationships to basic health were altered considerably, and some permanently changed. The lockdown resulted in a high predominance of unhealthy lifestyles amongst citizens such as changes in food consumption patterns (O’Meara et al., 2022) and increased symptoms of distress, depression, anxiety, frustration, and suicide (Miyah et al., 2022). In the UAE, the lockdown resulted in a high predominance of unhealthy lifestyles amongst citizens (Radwan et al., 1964; Cheikh Ismail et al., 2020). Some of the noted unhealthy lifestyles identified by Radwan et al. include an increase in food consumption and smoking by 31.8% and 20%, respectively and a reduction in physical activity by 30% (Radwan et al., 1964). Stress levels, depression, anxiety attacks, psychological issues, and disorders also rose among the residents of the UAE, with anxious parents projecting their worries and emotional problems to their children (Saddik et al., 2020). The observed changes in lifestyle resulted from people spending most of their time confined in their homes. In addition, social interactions such as face-to-face communications, meetings, and public gatherings completely changed during the pandemic. A study done by El-Sakran to explore the impact of Emergency Remote Teaching on college students’ mental health in the UAE have showed that students perceived remote teaching has provoked psychological distress and impacted their academic performance and eagerness for future work (El-Sakran et al., 2022).

2.7. Environmental awareness and pro-environmental actions

The COVID-19 pandemic has been associated with changes in individuals’ appreciation of nature. Rousseau and Deschacht report a positive shift in people’s knowledge of nature-related subjects during the COVID-19 pandemic. However, the researchers determined that public cognizance of environmental themes did not change. Reduction in pollution during the crisis led to people’s improved appreciation of local blue and green spaces (Rousseau and Deschacht, 2020). Also, the decline in atmospheric pollution during the lockdown created a unique opportunity for meteorologists, scientists, local authorities, and lawmakers to assess the impacts of the reduction of emissions on the ambient air quality and to re-strategize the current and future atmospheric pollution measures and policies (Anil and Alagha, 2020). Concerns related to the health outcomes of the coronavirus may have affected public attention to the existing environmental problems and implementation of adequate pro-environmental actions. Nonetheless, there are gaps in the literature on the UAE public’s awareness of environmental problems following the COVID. Individuals’ awareness of the ecological implications of the COVID-19 crisis influenced their facemask and medical waste disposal behaviours. Empirical evidence from Asian nations, including Saudi Arabia, reveals that the COVID-19 is associated with an increased risk of inappropriate facemask and medical waste dumping (Sanqakh, 2020). During the crisis, improper handling of medical waste could indicate limited public knowledge of the associated ecological ramifications and inadequacy of pro-environmental actions. Rousseau and Deschacht assert that media attention to the environmental issues related to the COVID-19 pandemic affected public support for initiatives and programs for building sustainable economies (Rousseau and Deschacht, 2020). However, people’s backing of environmental sustainability may not depict their levels of awareness of the pandemic’s ecological effects.

3. Recommendations

3.1. Stimulating sustainable behaviors

Environmental protection stakeholders in the UAE mandate promoting sustainable behaviors based on lessons emerging from the pandemic. Aljahdali et al. illustrate that the ecological effects of the COVID-19 pandemic depict the prospect of enforcing pollution mitigation measures in Saudi Arabia, such as controlling industrial activities and traffic and implementing green commuting programs (Aljahdali et al., 2021). A comparable study indicates the COVID-19 pandemic shows the need for implementing biodiversity conservation initiatives and environmental policy actions (Rousseau and Deschacht, 2020). The positive environmental changes such as reduced emissions achieved during the pandemic are likely to be short-lived if comprehensive control policies and structures are not in place to safeguard and spearhead the gains achieved thus far. The UAE government could adopt stringent policy frameworks designed to mandate pro-environmental behaviours and rule-out activities and projects that pose a danger to the environment in the future. Rashid suggests that a sustainable recovery could be met through a sustainable development goals-centered approach focusing on climate change (Rashid, 2020). In addition, private sector organizations could implement public education programs aimed at inspiring proper waste disposal actions. For instance, media organizations could play a leading role in encouraging pro-environmental behaviours. Also, the institution of quarantines, lockdowns, and restriction of movements by the government should be with due regard to the people’s physical and emotional well-being. Cheikh et al. point out that residents of the United Arab Emirates experienced negative lifestyle adjustments, reduced physical activity, and mental problems during the outbreak (Cheikh Ismail et al., 2020). Although quarantine, lockdown, and isolation are necessary and effective in controlling the virus’s spread, the government and policymakers in the UAE should consider its people’s basic health for future policies and regulations. Green infrastructure is viewed as a promising sustainable nature-based solution. Several studies have highlighted the importance of green spaces in improving physical and mental health as well as improving air quality during a pandemic (Marconi et al., 2022; Tashiro and Kotsubo, 2022; Vos et al., 2022; Slater et al., 2020). In a study done by Noszczyk et al. (Noszczyk et al., 2022) in Poland to explore the importance of urban green spaces to the public in times of crisis, 75% of the participants believed that visits to green spaces during the COVID-19 pandemic have positively impacted their mental and physical health and reduced stress levels. Another study done by Reid et al. in Denver to understand the effects of green space on stress reduction during the COVID-19 pandemic has showed that spending time in green space has reduced levels of anxiety and depression among residents (Reid et al., 2022).

3.2. The usefulness of environmental solutions

The solutions that the UAE government has put in place to control the spread of coronavirus are generally efficient in safeguarding the environment. They include closing down sports facilities, schools, malls, gyms, parks, swimming pools, museums, workplaces, and masjids
(Mataruna-Dos-Santos et al., 2020). The government also mandated the postponement of planned public events. Even though these solutions were not directly aimed at safeguarding the environment, they closely correlate with positive ecological benefits. For instance, decreased pollution of parks was a positive consequence of their shut down. The main environmental concern indicated in the reviewed literature is associated with ecological contamination with facemasks (Abbasi et al., 2020). Therefore, even though the COVID-19 mitigation solutions the UAE government imposed are generally beneficial to the environment, a comprehensive policy dealing with facemasks and medical plastic residues must be put in place to control the environmental degradation associated with their use.

3.3. Sustaining a healthier environment

Limited empirical knowledge is available on the impact of the COVID-19 pandemic on people’s pro-environmental behaviors in the UAE. The indirect health benefits associated with the crisis pertain to changes in individuals’ health and environmental choices following the COVID-19 lockdowns (Radwan et al., 1964). Nonetheless, there are evidence-based ways of fostering pro-environmental actions or behaviors within communities. For instance, Espejo et al. recommend ecosystem services directed at improving environmental management during future pandemics, including controlling climatic variants, mitigating pollution, and minimizing exposure to infections (Espejo et al., 2020). Therefore, the UAE government could implement programs that create awareness of pandemics’ ecological issues to prevent improper disposal of medical waste and other pollutants during future pandemics. Rajagopalan et al. suggest utilizing personalized protective equipment during pandemics designed to prevent environmental pollution. Such measures will enable UAE communities to promote a healthier environment in the advent of a pandemic (Rajagopalan et al., 2020).

3.4. The impact of online information

Online information enabled individuals to learn about the impacts of COVID-19, including its ecological effects. The online platforms of influential news organizations allow individuals to determine ways of alleviating infection spread and environmental contamination with protective equipment. However, Marbouh et al. elucidate that online information about COVID-19 is associated with challenges such as data manipulation and miscommunication (Marbouh et al., 2020). As a result, the scholars recommend using innovative technologies, including blockchain, to enhance the authenticity of online information related to a pandemic. Therefore, individuals should validate online sources’ authenticity to prevent being misled about the effects of an epidemic or pandemic.

4. Conclusion

This paper carries valuable insights into the correlation between the COVID-19 pandemic and environmental outcomes in the UAE. The positive effects emanating from the pandemic include clean air and decreased contamination of public spaces with pollutants. Clean air and fewer gaseous effluents in the atmosphere mean reduced respiratory and skin diseases as well as a decline in adverse climatic patterns. On the other hand, far-reaching negative effects such as poor disposal of medical plastic waste and facemasks as well as the rise in unhygienic health practices amongst residents of the UAE are some of the main concerns associated with the COVID-19 pandemic. However, the far-reaching environmental implications of the crisis are still not well understood. Therefore, there is still insufficient evidence on the overall behavioral and environmental outcomes pertaining to the pandemic in the UAE. Future research could assess the long-term environmental consequences of the pandemic on the UAE. Furthermore, comprehensive evidence-based policies should be implemented to minimize long-term ecological implications of the pandemic.

Declaration of Competing Interests

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.

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