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Improving Egyptian museums' preparedness for epidemics

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ABSTRACT

Egyptian museums, which are famous for their rich cultural heritage and historical artifacts, are vital institutions that contribute significantly to the country's tourism industry and cultural identity. But in recent years, the world has witnessed the devastating impact of pandemics on various aspects of society, including the cultural sector. Museums, in particular, have been affected by these crises. The COVID-19 pandemic, in particular, has exposed museums to sudden disruptions, leading to lockdowns, reduced visitor numbers, economic crises, and the loss of many museum professionals. The research paper highlights the importance of improving museums' preparedness for epidemics through a theoretical study of the chronological sequence of epidemics that passed through Egypt to know their impact on society and the precautionary precautions followed in museums, followed by an analytical study that proposes a checklist of precautionary precautions followed in museums to enhance their resilience in the face of future epidemics to mitigate their impact on cultural institutions. Followed by an analytical study of The Royal Carriages Museum, which was opened during the COVID-19 pandemic, to assess the museum's ability to adapt to epidemics and crises.

Keywords*:* Egyptian museums'; museums' preparedness; epidemics; precautionary precautions

1-Introduction

Museums are an essential part of the identity of nations and peoples [1]. And evidence of technological and scientific progress in architectural design [2]. Where museums display the history, culture and customs of peoples [3].

With the emergence of epidemics, Egypt, like other countries in the world, suffered from the negative impact of epidemics, as it disrupted all museum activities around the world and threatened the livelihood of thousands of museum specialists[4]. International organizations such as the International Council of Museums (ICOM), the American Alliance of Museums (AAM) and the World Health Organization. Which in turn began to lay the foundations for facing crises and epidemics.

Accordingly, an inventory of the epidemics that passed through Egypt was conducted and the precautionary precautions were analyzed, and the research was able to reach the recommendations followed in museums to continue their work in times of crises and epidemics. And apply it to the Royal Carriages Museum[5] to determine the extent to which precautionary measures are in place there, and based on this, to determine the extent to which the museum is prepared to adapt to epidemics.

1-1-Research Aim

These studies aim to reach the recommendations that can be followed in times of epidemics to improve the preparedness of Egyptian museums to face epidemics.

1-2-Research Methodology

The study used a theoretical approach, which included a compilation of six types of epidemics that passed through Egypt and then an analytical approach to the precautionary precautions followed for each type to reach a list of recommendations to improve museums.

2- Literature review

Egypt has witnessed a major outbreak of epidemics that affected the development of mankind and its history throughout its history. We discussed some of the most serious and devastating epidemics that have hit Egypt, as well as how they affected Egyptian culture, how they were dealt with, and the steps taken to stop further outbreaks of the disease. The historical ranking of the most important epidemics that affected Egypt is shown in Figure 1.

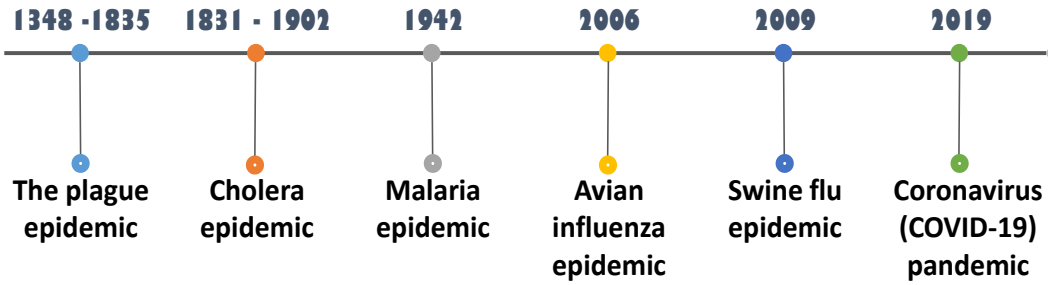

Figure 1. The chronological sequence of the most important epidemics that have passed over Egypt Source: Authors.

By studying these epidemics and understanding the precautionary measures implemented for them, we can predict future precautionary measures to be followed in the event of any outbreak.

2-1- The plague epidemic

Egypt has been plagued by plague several times throughout its history. Historians state that the origin of this epidemic was in East Asia, especially China and India, and the plague is one of the most severe infectious diseases caused by the bacterium plague persenia, which is transmitted from animals to humans, where there are more than 200 species, the most important of which mice and dogs were a source of transmission of bitter infection to humans [6].

A. The negative effects of the plague epidemic in Egypt

The plague led to the infection and death of large numbers of citizens, which led to the corruption of agricultural crops due to the lack of farmers, the cessation of fishing in the seas and oceans, and the cessation of industries from production, which led to a rise in commodity prices. The spread of the epidemic also affected the closure of all public places.

B. Symptoms of the plague epidemic

Among the symptoms of the plague epidemic are high body temperature, nausea, difficulty breathing, and the appearance of a tumor under the armpits and behind the ear in black and green, as well as anemia.

2-2- Cholera epidemic

The cholera epidemic, a dangerous disease, spreads worldwide due to unwashed hands and food. Originating in India, it spread to Egypt, where the Hijaz pilgrims brought the disease, causing significant population loss. The epidemic is a significant global health concern [7].

A. The negative effects of the Cholera epidemic in Egypt

The cholera epidemic caused significant economic activity and social disruptions, impacting the country's financial situation and livelihoods. Trade halted, agricultural activities were suspended, and tourism suffered. Public spaces were closed, and the black market saw a surge in medical treatment theft, highlighting the desperation of those seeking relief [8].

B. Symptoms of the Cholera epidemic

Severe watery diarrhea accompanied by severe dehydration can kill a person within hours of infection[9].

2-3- Malaria epidemic

The malaria epidemic in Egypt during the first half of the 20th century, caused by the Anopheles Gambia mosquito, was exacerbated by weakened immunity, malnutrition, and reduced transportation for crisis control and treatment work, affecting both health and economic aspects of Egyptian society.

A. The negative effects of the Malaria epidemic in Egypt

The cholera epidemic caused significant economic and social disruptions, affecting the country's financial situation and citizens' livelihoods. Trade halted, economic activity declined, and job losses were widespread. The disease also affected agriculture, causing worker illness and food production disruptions. Tourism suffered as travelers avoided the country due to health risks. Public spaces were closed to control the disease[10].

B. Symptoms of the Malaria epidemic

Cholera, a disease characterized by acute watery diarrhea, can progress to severe cases with fluid loss, electrolyte imbalances, weakness, fatigue, altered mental status, seizures, respiratory distress, hemodynamic compromise, jaundice, and abnormal bleeding due to altered blood clotting mechanisms. Patients may experience profound weakness, fatigue, altered mental status, and seizures[11].

2-4- Avian influenza epidemic

Avian influenza, a disease causing widespread mortality and deterioration in the Egyptian poultry industry, is primarily caused by incorrect breeding methods, particularly in the winter,

with the disease spreading rapidly and increasing in transmission, particularly in the countryside[12].

A. The negative effects of the avian influenza epidemic in Egypt

The Avian influenza epidemic caused significant economic and social disruptions, affecting the nation's financial stability and citizens' well-being. Trade halted, job losses exceeded 1.5 million, and the agricultural sector suffered, leading to food scarcity and financial burdens. The poultry industry also declined, resulting in higher prices[13].

B. Symptoms of the avian influenza epidemic

Avian Influenza, a common human illness, presents with fever, cough, sore throat, muscle aches, headache, and fatigue, but severe cases can cause complications like rapid breathing and internal bleeding[14].

2-5- Swine flu epidemic

Swine flu, also known as H1N1, is a type a respiratory infection primarily affecting pigs, which spread worldwide. The first human outbreak was identified in Mexico in 2009, leading to the World Health Organization declaring it a pandemic[15].

A. The negative effects of the Swine flu epidemic in Egypt

The cholera epidemic severely affected Egyptian families reliant on pig breeding, leading to poor living conditions and income loss. The directive to cull all pigs sparked social and political tensions, especially among Christian communities, who value pig farming for cultural or religious significance[16].

B. Symptoms of the Swine flu epidemic

The disease caused sudden temperature rise, cough, muscle pain, severe stress, diarrhea, vomiting, and pharyngitis, causing discomfort in infected individuals. Severe stress may exacerbate symptoms, while digestive issues like diarrhea and vomiting were common.

2-6- Coronavirus (COVID-19) pandemic

COVID-19, an infectious disease caused by the SARS-CoV-2 virus, first emerged in Wuhan, China in December 2019[17], and has since spread globally, leading to the World Health Organization declaring it a global pandemic[18].

A. The negative effects of the Coronavirus (COVID-19) pandemic in Egypt

The COVID-19 pandemic severely impacted Egyptian society, cancelling celebrations, events, and public spaces, limiting social interaction. Economic and tourism sectors suffered due to deteriorating working conditions, leading to job losses and wage insecurity for many Egyptians. Travel restrictions and border closures further exacerbated the situation[19].

B. Symptoms of the Coronavirus (COVID-19) pandemic

Infection with the SARS-CoV-2 virus, which causes COVID-19, can cause a variety of symptoms, including fever, chills, cough, shortness of breath or difficulty breathing, muscle aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea, vomiting, and diarrhea[20].

By examining the history of epidemics in Egypt and their impact, it is imperative to study the recommended precautionary measures for each epidemic.

3- . Precautionary and preventive measures for epidemic

Table 1. Precautionary and preventive measures for epidemic.

Epidemic	Precautionary and preventive measures for epidemic	
	Precautionary precautions for the epidemic	General precautions followed in cases of epidemics
The Plague Epidemic	-The exit of people and their stay in the desert and dry places -The use of therapeutic methods for extracting lousy blood from the body	-Not to hold prayers in mosques to prevent gatherings -Disinfect dwellings with incense and bright scents such as oud
The Cholera epidemic	-The spread of health isolation units known as "Corinthians" to isolate the injured under the supervision of a Health Association. -Setting up residences for doctors and wise men in different places. -Backfilling ponds and swamps in the city. -Sending medical missions with pilgrims to monitor the emergence of epidemics during the Hajj. -Sending medical missions with pilgrims to monitor the emergence of epidemics during the Hajj. -Spraying infected houses with lime powder.	-Preventing congestion in public places and at train stations. -Stopping funerals and funerals. -Boil water before drinking. -Wash hands and food thoroughly before eating. -Provision of nursing crews and ambulances in the affected areas.
Malaria epidemic	-Conducting advertising campaigns to increase people's awareness of the disease	-Ambulance of patients, their treatment, and the

	and the danger of approaching ponds and swamps as they are places where mosquitoes breed. -The establishment of malaria control stations and the elimination of mosquitoes and their larvae in ponds, swamps, and infected houses -Backfilling of ponds and swamps -Reduce the cultivation of rice and sugarcane.	provision of crisis medicines. -Spraying and disinfection of means of transport, such as trains and ships with the substance (D.D.T) every three months. -They send planes with disinfection materials to places difficult for workers to reach.
The Avian influenza epidemic	-Good insolation of plantations and nesting. -Placing the nest in a separate place from the parents. -Breeding birds in a roofed nest. -Wear unique clothes for handling birds. -Suspension of Animal husbandry for months for an injury. -Ward Preventing the trading of live birds in the markets. -Speed of notification to the veterinary unit upon infection. -Lack of movement of workers from one farm to another.	-Wash your hands with soap and water. -The use of disinfectants in places of Animal husbandry. -The use of antiseptic mouthwash. -Drinking large amounts of fluids and vitamin C.
The Swine flu epidemic	-Raising hygiene, sterilization, health care, and isolation of infected animals -Reducing the density of Pigs on farms. -Farmers get vaccinated against swine flu	-Wash your hands thoroughly. -Avoid approaching the infected person. -Covering the nose and mouth when coughing -The use of medical masks -Avoid touching the mouth, nose, and eyes.
The Coronavirus (COVID-19) pandemic	- Keep a physical distance of at least 1 meter from others, even if they do not appear sick. Avoid crowds and close contact. - If physical separation is not possible, wear a mask that fits adequately, especially in poorly ventilated areas. - If you become ill or test positive for COVID-19, keep yourself to yourself until you feel better. - Do not use masks with valves.	- Financial compensation for families who lost their jobs due to the virus. - Get vaccinated as soon as it is your turn and follow local guidance on vaccination. - When you cough or sneeze, cover your mouth and nose with a tissue or bent elbow. Throw away used tissues right away, and wash your hands frequently. - Once your mask is removed, put it in a fresh plastic bag and, if it's a medical mask, throw it in the garbage. If it's a fabric mask, wash it every day. - Wash your hands before donning the mask, taking it off, and anytime you come into contact with it.

4- Results and Discussion

In the face of recurring epidemics, museums must adhere to government guidelines and safety measures outlined by authorities, as evidenced by examining precautionary measures for each outbreak. This research will compile the precautionary measures mandated by the International Council of Museums, the American Alliance of Museums, and the World Health Organization, as detailed in Table 2.

Table 2. The precautionary measures that must be provided in museums.

The precautionary measures	
Preparing for the Arrival of the Public	Define the maximum number of visitors allowed into the museum and inform the public about it.
	Define a maximum number of visitors per exhibition room and inform the public (allow a safety distance of 1.5 m between each visitor)
	Determine average visit time to establish time slots
	As far as possible, set up a booking system (online, by phone or by e-mail). Set up an online ticketing system.
	Consider opening hours dedicated to specific groups of the public (e.g.,> 65 years of age)
	Deny access to persons showing symptoms of the disease
	Before entering the museum, notify the public of context-related restrictions on the institution's website (if applicable).
Adopting the flow of visitors	Avoid or manage lines at entrances and counters
	Consider ground markings for lines to maintain the recommended distance of 1.5 m.
	Ensuring distance between visitors and reception counters, possibly installing glass to protect staff and visitors
	Ensure that separate flows of entrances and exits are maintained and provide a one-way tour of the rooms (if possible)
	Guided tours and educational presentations can be offered if a safe distance between participants is respected. Set specific time slots for group visits and limit their size
	The openings of common commercial areas (cafeteria, bookshop, shops) are subject to specific national regulations
Strengthening Health Measures	Install hand sanitizer dispensers at the museum entrance and provide warning signs to encourage visitors to respect the health measures in force.
	Ensure that visitors have access to toilets (allowing them to wash their hands with soap) and adapt this access to the rules of social distancing in force (safe distances).

	Ensure that devices such as audio guides, headphones, and similar equipment are systematically disinfected after each use.
	Disability-assisted facilities and exposed devices with control buttons for educational purposes should be cleaned frequently with disinfectants.
	Interior doors will remain open (if possible). Otherwise, they must be disinfected each time they are used.
Restricting Some Access If Necessary	Restricting access to rooms and facilities that cannot be thoroughly cleaned or disinfected
	Lifts must be reserved for persons with reduced mobility, ensuring that the distance of 1.5 m is respected between users. The control buttons must be disinfected after each use.
	If the common areas do not allow the application of the rules of social distancing, an adjustment of timetables and traffic could be considered.
Reception and Security Staff	Security personnel must be present at the reception desk and in the museum rooms to ensure sufficient distance between the visitor and the works on display and between the visitors themselves.
	Provide staff with adequate protective devices (masks, disinfectants) and mandatory public opening conditions.
In work and storage areas	Ensure all staff have easy access to hand wash facilities with hot water, soap, disinfection gel, and disposable gloves.
	Museums should have a quarantine area for things. This area should contain empty shelves, cabinets, and boxes.
	Meetings, takeover committees, group activities, arenas, rallies, or other activities should be postponed.
	Wash and disinfect hard surfaces, handles, door knobs, light switches, coffee machines, and the like frequently.
	Masks, even homemade cloth masks, should be worn.
	Ensure that only a limited number of people work in the same room; 1.5 – 2 m is recommended for distance between individuals.
	Consider changing filters in HVAC systems—another type of regular, controlled ventilation for collection and storage areas.

4.1. Applied Study

4.1.1. Methodology

Through a field visit to one of the museums that was opened during the COVID-19 pandemic, the researcher observed and analyzed the extent to which the precautionary measures that should be available in museums during epidemics were available to determine how the museum adapted to periods of crises and epidemics.

4.1.2. The Royal Carriages Museum

The Royal Carriages Museum is one of the oldest specialized museums in the world. It is located in the Boulaq area and was opened after its development in 2020. It houses the royal carriages dating back to the era of Muhammad Ali Dynasty. The museum also contains horse crews and their supplies, as well as the clothes of the workers, in addition to a collection of oil paintings of kings and queens of this period [5]. **Figure** 2 Plan of the Royal Carriages Museum.

Figure 2. Plan of the Royal Carriages Museum [20]

The researcher reviewed the extent to which the points in **Table 2** were met at the museum on the visit date of November 5, 2021. Through the observation, the following was noted:

- The number of visitors to the museum is low, and there are several points that are not met, such as the fact that the allowed number of visitors is not announced on the museum's website https://egymonuments.gov.eg/ and the number of individuals and the visiting time for each hall in the museum. It was also noted that there is a shortage of providing employees with protective equipment.
- There are also several points that are met, such as the presence of floor markings to maintain the recommended distance of 1.5 to 2 meters, as shown in **Figure 3**. The museum also maintains a one-way traffic direction for visitors, as shown in Figure 2, and keeps the doors between the halls open at all times. **Table 3** summarizes all the points that are met and not met at the museum. Based on this, it is found that the museum has achieved 17 out of 30 points for the precautionary measures that should be available in museums to adapt to times of epidemics.

Figure 3. Image showing markings on the floor to ensure social distancing of 1.5

Table 3 shows the precautionary measures taken in the museum.

	The precautionary measures	Detective	Not detective
Preparing for the Arrival of the Public	Define the maximum number of visitors allowed into the museum and inform the public about it.		√
	Define a maximum number of visitors per exhibition room and inform the public (allow a safety distance of 1.5 m between each visitor)		√
	Determine average visit time to establish time slots		√
	As far as possible, set up a booking system (online, by phone or by e-mail). Set up an online ticketing system.		√
	Consider opening hours dedicated to specific groups of the public (e.g.,> 65 years of age)		√
	Deny access to persons showing symptoms of the disease	√	
	Before entering the museum, notify the public of context-related restrictions on the institution's website (if applicable).		√
Adopting the flow of visitors	Avoid or manage lines at entrances and counters		√
	Consider ground markings for lines to maintain the recommended distance of 1.5 m.	√	
	Ensuring distance between visitors and reception counters, possibly installing glass to protect staff and visitors		√
	Ensure that separate flows of entrances and exits are maintained and provide a one-way tour of the rooms (if possible)	√	
	Guided tours and educational presentations can be offered if a safe distance between participants is respected. Set specific time slots for group visits and limit their size	√	
	The openings of common commercial areas (cafeteria, bookshop, shops) are subject to specific national regulations	√	
Strengthening Health Measures	Install hand sanitizer dispensers at the museum entrance and provide warning signs to encourage visitors to respect the health measures in force.		√
	Ensure that visitors have access to toilets (allowing them to wash their hands with soap) and adapt this access to the rules of social distancing in force (safe distances).	√	
	Ensure that devices such as audio guides, headphones, and similar equipment are systematically disinfected after each use.	√	
	Disability-assisted facilities and exposed devices with control buttons for educational purposes should be cleaned frequently with disinfectants.	√	
	Interior doors will remain open (if possible). Otherwise, they must be disinfected each time they are used.	√	

Restricting Some Access If Necessary	Restricting access to rooms and facilities that cannot be thoroughly cleaned or disinfected	√	
	Lifts must be reserved for persons with reduced mobility, ensuring that the distance of 1.5 m is respected between users. The control buttons must be disinfected after each use.	√	
	If the common areas do not allow the application of the rules of social distancing, an adjustment of timetables and traffic could be considered.	√	
Reception and Security Staff	Security personnel must be present at the reception desk and in the museum rooms to ensure sufficient distance between the visitor and the works on display and between the visitors themselves.		√
	Provide staff with adequate protective devices (masks, disinfectants) and mandatory public opening conditions.		√
In work and storage areas	Ensure all staff have easy access to hand wash facilities with hot water, soap, disinfection gel, and disposable gloves.	√	
	Museums should have a quarantine area for things. This area should contain empty shelves, cabinets, and boxes.		√
	Meetings, takeover committees, group activities, arenas, rallies, or other activities should be postponed.	√	
	Wash and disinfect hard surfaces, handles, door knobs, light switches, coffee machines, and the like frequently.	√	
	Masks, even homemade cloth masks, should be worn.	√	
	Ensure that only a limited number of people work in the same room; 1.5 – 2 m is recommended for distance between individuals.	√	
	Consider changing filters in HVAC systems—another type of regular, controlled ventilation for collection and storage areas.		√

5- Conclusion

Improving museum preparedness for epidemics refers to strengthening museums' ability to deal with pandemic-related health challenges in order to preserve museums as a source of community culture. The study examined the epidemics that Egypt has faced throughout history, and the results showed a clear table of the most recommended precautionary measures to make the museum adaptable to epidemic crises.

Through the field visit to the museum and applying the table to the Royal Carriages Museum, it was found that there is a weakness in a number of points, including the lack of a ticket reservation system before going to the museum to determine the number of individuals and their visiting time to maintain the recommended social distancing. Weak cleaning and disinfection mechanisms were also observed, and there was no place to isolate exhibits or suspected cases.

Recommendation

We recommend implementing the points that have been neglected at the Royal Carriages Museum to make it more adaptable to crises and epidemics. This, in turn, could lead to an increase in the number of visitors due to their sense of security. These recommendations include:

- Providing hand sanitizing stations throughout the museum.
- Updating ventilation and air conditioning systems to provide a healthy and safe environment.
- Training museum staff on infection prevention procedures.

We also recommend visiting and analyzing the implementation of pandemic precautionary measures in other Egyptian museums to identify areas of weakness and address them.

6. References

[1] S. Saraoui, A. Attar, and A. Belakehal, "Redesigning the Museum Route for Effective Flow Management During and after the Pandemic," *New Design Ideas*, vol. Special Issue, no. ICCAUA2022, pp. 1–26, Sep. 2022, doi: 10.21278/ndi.2022.23.2.1.

[2] N. K. S. Morsi, "Utilizing Algorithms in Designing Museums," Master of Science, Ain Shams University, Egypt, 2010. [Online]. Available: https://cpas-egypt.com/publication/journal_article/utilizing-algorithms-in-designing-museums/

[3] Y. Li, J. Huang, and L. Yang, "From functional space to experience space: Applying space syntax analysis to a museum in China," *International Review for Spatial Planning and Sustainable Development*, vol. 8, pp. 86–99, Apr. 2020, doi: 10.14246/irspsda.8.2_86.

[4] International Council of Museums, "Follow-up survey: the impact of COVID-19 on the museum sector." Accessed: Dec. 11, 2022. [Online]. Available: https://icom.museum/en/covid-19/surveys-and-data/follow-up-survey-the-impact-of-covid-19-on-the-museum-sector/

[5] "The Royal Carriages Museum." Accessed: Jun. 26, 2024. [Online]. Available: https://egymonuments.gov.eg/en/museums/the-royal-carriages-museum/

[6] سمير حامد محمد and عبد الرحيم, "طاعون عام 749هـ/ 1348م وأثره على مصر خلال عصر السلطان الناصر حسن," *مجلة العمارة والفنون والعلوم الإنسانية*, vol. 7, no. 32, pp. 695–709, Mar. 2022, doi: 10.21608/mjaf.2020.45055.1893.

[7] ع. طنطاوى, "وباء الكوليرا 1947م : دراسة تاريخية، اجتماعية، وتأثيره على النشاط الاقتصادي والسياحة," *المجلة الدولية للتراث والسياحة والضيافة*, vol. 15, no. 3, pp. 341–369, Dec. 2021, doi: 10.21608/jihtha.2021.280448.

[8] أ. محمدين and د. النميري, "وباء الكوليرا في مصر عام 1902م," *مجلة كلية الآداب*, vol. 66, no. 66, pp. 329–378, Jan. 2023, doi: 10.21608/bfa.2023.183102.1142.

[9] منظمة الصحة العالمية, "https://www.who.int/ar/news-room/fact-sheets/detail/cholera." Accessed: May 20, 2023. [Online]. Available: https://www.who.int/ar/news-room/fact-sheets/detail/cholera

[10] ص. السيد عبد العال, "جهود الحكومة والهيئات والمؤسسات الأهلية لمكافحة وباء الملاريا في جنوب صعيد مصر (1942- 1945م)," *مجلة كلية اللغة العربية بأسيوط*, vol. 40, no. 2, pp. 1149–1248, Jun. 2021, doi: 10.21608/jfla.2021.178418.

[11] منظمة الصحة العالمية, "https://www.who.int," الملاريا. Accessed: May 20, 2023. [Online]. Available: https://www.who.int/ar/news-room/fact-sheets/detail/malaria

[12] World Health Organization, "http://www.emro.who.int," World Health Organization - Regional Office for the Eastern Mediterranean. Accessed: May 21, 2023. [Online]. Available: http://www.emro.who.int/egy/programmes/influenza.html

[13] فايد ا. الزرقاء, ز. and احسان م., "Rural Women S Adoption of Safety Home Breeding Recommendations of Chickens to Limit Birds Flu Spread In Two Villages in El Behira Governorat تبنى الريفيات للتوصيات الإرشادية للتربية المنزلية السليمة للدجاج للحد من انتشار أنفلونزا الطيور بقريتين بمحافظة البحيرة," *Journal of Agricultural Economics and Social Sciences*, vol. 3, no. 2, pp. 183–203, Feb. 2012, doi: 10.21608/jaess.2012.45002.

[14] عطية عبد المقصود م. and انفلونزا الطيور بمحافظة القليوبية," *Annals of Agricultural Science, Moshtohor*, vol. 54, no. 3, pp. 763–780, Sep. 2016, doi: 10.21608/assjm.2016.112644.

[15] عباس ع. ح. and محمد جابر لفته, "دراسة الوعي الصحي والعلمي لمرض إنفلونزا الخنازير أحمد يوسف حنون, في المجتمع," *Journal of the College of Basic Education*, vol. 19, no. 79, pp. 65–75, 2013, doi: 10.35950/cbej.v19i79.7165.

[16] S. Seef and A. Jeppsson, "Is it a policy crisis or it is a health crisis? The Egyptian context - Analysis of the Egyptian health policy for the H1N1 flu pandemic control," *Pan Afr Med J*, vol. 14, p. 59, Feb. 2013, doi: 10.11604/pamj.2013.14.59.1631.

[17] care.gov, "https://www.care.gov.eg," نظام Care.gov.eg | مكتبة الوثائق. Accessed: May 21, 2023. [Online]. Available: https://www.care.gov.eg/EgyptCare/StaticContent/About.aspx

[18] R. Mohamed, "The Positive and Negative Impacts of the Novel Coronavirus (COVID-19) on the Egyptian Intangible Cultural Heritage Social Practices, Religious Rituals and Cultural Expressions.," *International Academic Journal Faculty of Tourism and Hotel Management*, vol. 6, no. 1, pp. 32–65, Mar. 2020, doi: 10.21608/ijaf.2020.34030.1001.

[19] H. Mikkel, "THE COVID-19 CRISIS IN EGYPT," 2020.

[20] cdc, "https://www.cdc.gov," Centers for Disease Control and Prevention. Accessed: May 21, 2023. [Online]. Available: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html