

Effectiveness of not Quarantining Passengers after Having a Negative COVID-19 PCR Test at Arrival to Dubai Airports

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ABSTRACT

Since March 11th 2020 as the World Health Organization (WHO) has proclaimed Coronavirus Disease 2019 a pandemic, governments have had to implement regulations and policies to prevent the spread of a deadly disease such as hand hygiene practices, wearing masks in public areas, maintaining social distance as well as quarantine or isolation. Current evidence on the 14-days quarantine which is obtained post-travelling is very limited, and this raises some critical questions about the effectiveness of its implementation in the rising COVID-19 infection trend. This study aims to assess the current non-quarantine practice in Dubai for passengers returning from travel, which is expected to enhance tourism in the emirate of Dubai and boost the economy while maintaining community safety and preventing imported transmission of COVID-19. The study adopts a quantitative method using a survey design to accomplish its objectives. A questionnaire is performed as the main quantitative instrument to collect data from passengers who arrived at Dubai airports with negative Polymerase Chain Reaction (PCR) test at arrival (day 0) and repeated the PCR test on day 5- day 10 from arrival. In this study, all relevant data were accessed using the Dubai airport database, a sample of 574 passengers have been surveyed using a systematic random sampling method. The study findings indicated that the proportion of positive cases on day 5 - day10 from arrival was significantly less than 1% (0.00017) with a p-value of 0.0234. Therefore, it can be concluded that the objectives of implementing a 14-day quarantine post-travel were not met when passengers tested negative for COVID-19 PCR upon arrival at Dubai airports. This study contributes to the literature concerning the effectiveness of implementing a 14-day quarantine strategy on passengers who arrive at airports with a negative PCR test result. Accordingly, it progresses on building theory relating to infectious diseases in the healthcare setting. Furthermore, the study assured what are the best preventive measures to be implemented for travelers coming to Dubai airports.

Keywords: COVID-19, Post-Travel Quarantine, Polymerase Chain Reaction Test, World Health Organization, Dubai Health Authority, Primary Health Care Sector, Dubai Airports Health Services.

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INTRODUCTION

The end of December 2019 has grown very rapidly in the development of respiratory infections caused by the novel coronavirus that originated in Wuhan, Hubei province in China. To date, more than 55,228,631 cases have been registered and more than 1,299,989 people have been reported worldwide as a result of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov2).^{1,2} Coronavirus Disease 2019 (COVID-19) has been impressively expanded to many nations outside China, for instance, the United States of America (USA), Europe, South Korea and the Middle East.³ At the time when COVID-19 became a pandemic, governments worldwide were implementing several rules and protocols to control the spread of the disease, for instance, hand hygiene, use of masks in public areas, social distancing, and quarantine. The outbreak of the plague in 1377 arose with the emergence of the concept of segregation and was first imposed on 30 days for ships and 40 days for world travelers.⁴ To indicate the identified incubation period of the virus, quarantine time has recently been adjusted. The

first recent reports of COVID-19 established the quarantine period at 14 days.⁵ Globally, all nations have implemented quarantine as precautionary measures and put a restriction on travelling on an unprecedented scale as well. For instance, China put whole cities under lockdown, while Italy sanctioned imposition of draconian restriction across the country. In a number of countries, millions of individuals have been obliged to legitimately mandatory quarantine or are in "self-quarantine". For example, the United States government has banned the entrance of non-US nationals coming from China, Iran, and most of the European nationals and have been screening passengers returning from the infected countries. Yet there has been a continuous growth in the number of infected patients and deaths.¹ Particularly, quarantine and travel ban are often the first level response measures against the new infectious disease. Nevertheless, quarantine and travel ban are old tools having restricted efficacy for this immensely contagious diseases and can prove counterproductive if used with too heavy a hand, or in too haphazard a manner.⁶ These measures are not

sufficient response against a virus such as SARS-CoV2. In regards to the public health, practices like “quarantine” refer to the segregation of individuals or groups imperiled to the infectious disease from the masses. However, “Isolation” on the other hand, deploys to the segregation of peoples who are known to be infected.⁷

COVID-19 has been affecting people worldwide and has taken its place as a pandemic on a global scale. Due to potential threats, and prevailing conditions, COVID-19 effects on business in the United Arab Emirates (UAE) are negative. Moreover, investment and business growth in Dubai has suffered extensively.⁸ According to the country's central bank, UAE's economy will face an immense shrinkage this year than previously thought, undermining the disruption caused by the coronavirus epidemic. It also said the Great Gross Domestic Product (GDP) would fall by 6 percent by 2020, compared to the previous forecast of a 3.6 percent decline in its quarterly review. The central bank also said non-oil GDP declined by an estimated 9.3 percent in the second quarter, compared with a 2.7 percent decline in the previous quarter, and year-on-year, the non-oil economy is expected to operate 4.5 percent due to the outbreak. The forecast predicts an increase in government spending that will be estimated at about 28 percent by 2020, the central bank said, adding that it expects to see a revival in employment levels. The practice of quarantine is currently causing a great deal of economic disruption. There may seem to be no obstacle to the operation of industrial and non-industrial organizations. Though, indirect effects should be considered. For instance, the International Monetary Fund (IMF) is expecting Dubai's economy to contract 5.2 percent in 2020 due to the impact of the pandemic. Furthermore, before the pandemic struck, the emirate of Dubai expected 20 million visitors in 2020.⁸ Notably, tourism accounts for 11.5% of Dubai's GDP.^{9,10} The intensification of quarantine measures in one manufacturing sector will lead to disruptions in other sectors of the economy.

The timing, accuracy and ability of individuals and health care providers to adhere to isolation procedures throughout isolation is critical to its effectiveness during an outbreak.¹ Current evidence is not enough to inform quarantine, and the rising COVID-19 infection raises some vital questions about the efficacy of its implementation. . In particular, since travel restrictions had a substantial economic and social impact, travel bans had to be eased by the governments. As noted by the American Control Disease Center (CDC) (2020), a ban on visits from people affected by the affected areas usually does not work to prevent the introduction of cases but can have a significant economic and social impact. In a trial to seek the return to the new normal, Dubai is becoming more flexible in travel restrictions. With Dubai being a popular tourist destination, travel limitations had to be eased. Therefore, Dubai started welcoming the tourists again on 7th July 2020 while maintaining the highest standards of health and safety in accordance with WHO international conventions. Under such circumstances, it is vital to manage cases and control the increasing death rate, as this can have a detrimental impact. More than 14 million Covid-19 tests have been carried out in the country to date, 166,502 cases and more than 569 deaths have been reported so far.¹ Based on WHO protocols which don't recommend travel restrictions such as quarantine on international traffic, Dubai started welcoming the tourists without a 14-day quarantine post-travel, in addition to

implementing extremely strict preventive measures, with easy access to the PCR testing at any time with rapid results that take less than 24 hours. As a result, tourists started pouring in and a protocol had to be put in place. Exit screening was in the form of temperature measurement and a questionnaire, as well as a PCR test that needs to be done within 96 hours prior to departure for the timely identification of infected cases. On the other hand, entry screening includes temperature screening along with a primary questionnaire in which information on symptoms, history of exposure and contact information was collected. The Tourists should provide the proof of PCR screening test done at the country of origin which has been done within 96 hours of travel and must undergo a second PCR at the airport before disembarking. If both tests are found negative then quarantine period of 14 days was not needed. Indeed, it is wise for sick travelers to delay or avoid visiting affected areas, especially for elderly travelers and people with chronic illnesses or lower health conditions. With this intention, this study examined the current practice in Dubai without the 14-days quarantine post-travel, which is expected to support the emirates effort towards recovery from the pandemic and enhancing traveling and tourism as well as boosting the economy at the same time while maintaining community safety. Therefore, this study aims to assess the need for 14-days quarantine of passengers post-travel with negative COVID-19 PCR test upon arrival at Dubai airports. The literature review indicates that there is a shortage of information on the effectiveness of quarantine in the Gulfstream region and especially in the UAE. This shortage has prompted researchers to conduct scientific and practical research in the field of Covid-19. From the detailed review of existing literature and the objectives of this study, it can be considered as the first study in Gulfstream region and especially in UAE that assessed the efficacy of non-quarantine passengers with negative COVID-19 PCR test at arrival to airports and set out a full understanding of the association between quarantine efficacy and its impact on reducing the spread of infected cases. For Dubai Health Authority (DHA), the study will assure what are the best preventive measures to be implemented for travelers coming to Dubai through its airports.

Literature Review

Just seven decades after oil was discovered in the UAE in the 1950s, the country has transformed itself from a group of seven Trucks with a very limited economic activity that relied heavily on fishing and the pearl industry to a major regional and international player economic activity.¹¹⁻¹³ Significant growth in social, economic and politics puts the UAE among the richest economies in the world.^{14,15} Today, UAE is a global economic hub, with businesses operating in diverse sectors.^{16,17} In the eastern hemisphere, UAE is an important business hub.^{11,18} The country holds 10% of the world's known crude oil reserves. Also, the country has built huge sovereign wealth funds, has a booming economy and the investments in tourism and infrastructure are growing exponentially.^{11,19} At the time of the founding of the UAE, healthcare was limited.^{20,21} For example, the country only had seven hospitals and 12 health centres providing primary care. However, investment in health care over the decades has seen the country change dramatically.²²⁻²⁴ For example, the number of hospitals and primary healthcare centres has grown dramatically increasing from 19 to 800, both public and private.^{20,22} In the recent past, the focus has been on

expanding the healthcare infrastructure and bringing it at par with international standards.²⁵

UAE has put health as a priority in its development agenda. For example, the country's vision for 2021 stresses the need for enhancing the capacity of the healthcare professionals and expanding the infrastructure to fulfil the growing healthcare needs and demands of the citizens. In this endeavour, the government has roped in private players to execute joint projects through the framework of a public-private partnership. The approach will see the government bring healthcare in the UAE to the best international standards by 2021. The training of healthcare professionals to meet the national and international standards is a key aspect of the health reform agenda. The other aspects include expanding and improving the healthcare facilities so that they can meet international standards and keeping a focus on the reduction of the incidences of infectious and lifestyle diseases to improve the quality of life of the citizens. Moreover, emphasis on preventative health is a key agenda of vision 2021 healthcare reforms. In Dubai, healthcare services are mainly delivered by DHA. In Dubai, DHA is responsible for regulating the sector, policy and strategy development.^{9,10} Besides this the DHA oversees education and research institutions and owns four hospitals, with a capacity of more than 2,500 beds, 14 primary healthcare centres and 7 specialized care centres. Policy regulation is overseen by the Ministry of Health (MOH) on a national level. Notably, the health ministry ensures standardisation of the services across the federal provinces. It also facilitates healthcare access to all citizens across the nation.¹⁰ In 2002, the government launched Dubai Health Care City (DHCC) to provide patient-centric care that meets international standards. Moreover, the launch of the DHCC was part of the government's effort to make Dubai a medical tourism destination. During the crisis, DHA launched several innovative initiatives to help promote the healthcare system in Dubai which were expedited to fill a newly found gap. One of the most important innovative technologies was the smart application which helped the community receive important guidelines and information regarding the way to access medical facilities, an example of that is the telemedicine that can be accessed at any time and place by the user in the luxury of their homes.

The healthcare system deals with two types of diseases, namely communicable and non-communicable diseases. Communicable diseases are infectious. In essence, several infectious sources have been identified in the past. For instance, infections can be caused by multiple agents such as viruses, bacteria, fungi, and parasites. The most common type is transmitted through humans, nonetheless, in a minority of cases, infectious agents are transmitted from animals to humans in a case called zoonotic infections or zoonotic diseases.¹ Primarily, some infectious agents live inside a human body without causing any symptoms, they are naturally harmless, while other organisms can be extremely dangerous and aggressive. Depending on the attacking organism, signs and symptoms can vary. But frequently the symptoms are the same, most commonly a person infected can have fatigue and fever. Some mild illnesses can respond to natural remedies while others may require hospitalization and can be life-threatening.^{1,2} Indeed, vaccines can prevent many serious infections. Also, other types of preventive measures include hand hygiene, wearing masks, and social distance was found to be extremely effective.⁶

Coronaviruses are a large family of Ribonucleic Acid (RNA) viruses that are known to infect humans as well as animals.^{1,2} Throughout history, coronavirus was known to be transmitted from human to human, but in recent years some incidents happened where coronavirus was transmitted from animals to humans. For instance, SARS-CoV, MERS-CoV, and COVID-19. According to WHO, after the infection from animal to human was established, consequently, the disease was transmitted from human to human causing the first outbreak. COVID-19 is an infectious disease caused by a virus that has been lately discovered at the end of December 2019 in the city of Wuhan, China. The most common symptom of this virus include respiratory illness, in most cases, it is a mild disease but in a minority of cases it could be very severe and life-threatening especially in immunocompromised patients.¹ Besides, COVID-19 spreads very easily via small droplets. Especially, the transmission is usually very common in close contact with an infected person, the probability of getting infected can increase if the infected person coughs or sneezes causing an aerosol spread. Contaminated surfaces also do transmit the infection, since the droplets can fall on surfaces and stay there if the place is not sanitized. Even if the infected person does not display any symptoms infection can be transmitted.^{1,2} According to WHO, the best diagnostic tool for a definitive identification of the COVID-19 infection is the Real-Time Reverse Transcription Polymerase Chain Reaction (RT-PCR) using a nasopharyngeal swab.

Since the COVID-19 became a pandemic, governments have had to implement regulations and policies to prevent the spread of a deadly disease. According to WHO's published guidelines, it is mandatory to adopt hand hygiene practices, wearing masks in public areas, social distancing as well as quarantining to avert contamination.¹ In essence, there is no current proven treatment in the management of COVID-19 infection, while most treatments are aimed at the control of symptoms. Currently, countries around the world are working day and night to produce a vaccine that can control this pandemic which caused massive damage to the economic fabric of the nations worldwide.⁶ The most significant negative impacts were on healthcare systems. The pandemic gravely affected the healthcare system and was a huge burden which exhausted the healthcare systems worldwide.⁴ It was a challenge for the healthcare system to fight against this pandemic. Despite the UAE being a small country, it proved itself worthy by combating this pandemic and addressing main challenges like the low bed capacity and the low physician to patient ratio.²⁶ In the challenge of containing this pandemic, the UAE government spent huge efforts to prevent the advancement of this disease even in the early phase of the pandemic. For instance, the UAE government took some early decisions and imposed regulations to stop the spread of infection by closing the schools, workplaces, extending its healthcare facilities, asking healthcare providers to work round the clock and temporary travel bans.²⁶ Moreover, a command and control centre was created at the beginning of the pandemic. The main role of this centre was to implement a strategic plan to combat the pandemic under the follow up of Dubai Crown Prince His Highness Sheikh Hamdan bin Mohammad bin Rashid Al Maktoum.²⁶ On the 30th of January 2020, WHO declared the outbreak of coronavirus 2019 and announced it as a pandemic on the 11th of March 2020. Governments around the world proclaimed partial and complete lockdowns. UAE was in

line with this decision and consequently, the National Sterilization Program (NSP) was started in which sterilization was done and a curfew was put in place. Indeed, many regulations were changing daily depending on the COVID-19 situation. For instance, fever clinics were opened, field hospital started to be built and hospitals around the city started emptying beds to receive COVID-19 patients, and non-COVID patients were safely transferred to other safer places.²⁶

Dubai is a well-known tourist destination worldwide because of it being 8 hours away from most destinations around the world. In 2018, a total of 15 million tourists visited Dubai.²⁷ Dubai poses as a hub for transit and connecting flights around the world. The tourism industry was faced by a threat amid this pandemic because the spread of infection was inevitable. Since Dubai depends mostly on tourism as a major economical source, this pandemic turned into a great threat to the economy. As a response to this pandemic, Dubai had to stop the spread of the infection and therefore the government decided to stop the international traffic temporarily.²⁶ During the crisis many organizations such as the WHO, CDC and International Civil Aviation (ICA) worked individually and continuously to prevent disease transmission and spread through air travel. To contain the spread of the SARS-Covid-19, most of the countries across the globe have issued travel advisory or outright bans.⁶ Even though certain countries eased their travel restrictions in August 2020 to cope with the new normal, they still mandated that passengers self-quarantine themselves upon arrival. In line with the WHO recommendation, Dubai had a temporary shutdown of commercial flights only until they could provide a suitable travel protocol to the COVID19 pandemic situation. In particular, high precautions had to be used to address the seriousness of the condition. PCR testing before 72 -96 hours before the flight became law and then depending on the country of origin the test may be repeated at Dubai airports. Furthermore, Dubai had to implement strict guidelines to prevent transmission of the virus. Many rules were put in place; for example, strict use of masks at all times as well as social distancing with the advice of hand hygiene whenever a surface is touched. Authorities at the Dubai airports monitored the people in the terminal via thermal cameras all around the airport at all times. One of the measures included the process of quarantining the arriving travellers in Dubai for 14 days, and then they were allowed to commence normal tourism. Quarantine is one of the oldest tools used to prevent transmission of infection as well as to stop the advancement of the infectious disease. Quarantine defined as the separation of the person who was not ill and exposed to an infected agent to restrict movement and monitor his condition for any symptoms that may develop, which helps in early detection of the disease during the incubation period.²⁸ On the other hand, isolation is described as sorting out infected persons with a contagious disease from healthy people.⁷ The term quarantine is extracted from Italian "Quaranta Giorni" which means 40 days. The technique was first used when ships arrived at Venice port in the 14th century coming from plague-infected ports where all the passengers and crew had to isolate themselves for 40 days before disembarking.⁴ In the 7th century, infected people were used to be separated from healthy people to prevent the spread of leprosy. In 1350, one-third of the European population passed away from the spread of plague, so in 1374, Italy announced that any person infected with the

plague had to be transferred out of the city.⁴ In 1377, the isolation period was reduced to only 30 days to prevent the spread of the Black Death in Raguse (now Dubrovnik in Croatia).⁴ Arrivals to the city used to be isolated for 30 days on a deserted island in front of the city. People at the city used to wait for the patients to develop the Black Death symptoms, if they were infected then they wouldn't be allowed to enter the city unless they undergo 30 days of isolation. Worldwide, the quarantine system was nationalized between 1918 and 1921 due to recurrent outbreaks such as influenza pandemic and Diphtheria epidemic.⁴

During COVID-19 pandemic in 2020 in Dubai, the government recommended that people go for 14-days quarantine if they were exposed to confirmed cases of COVID-19 which should be ended after 14 days from the last day of contact to a confirmed case. Atlanta's Centre for Disease Control has updated its travel recommendations on 6th of October 2020 to drop the quarantine process for travellers upon arrival from the travel rule. It advises travellers to follow preventive measures such as practising social distancing, wearing a mask, washing hands, and monitoring one's health for any symptoms that may develop.²⁹ In essence, government recommendations in Dubai were in line with WHO protocols which don't recommend travel restrictions such as quarantine on international traffic to reduce COVID-19 effects on the economy. Also, the recommendations were in line with views that implementing preventive measures such as practice social distancing, wear a mask and wash hands could be more effective than quarantining passengers who arrived at airports with a negative PCR test. In a related study, Denes and Gumel introduced a model which is deterministic in nature. This model assessed how the quarantine impacted on the people who were under suspicion of being exposed to the disease Ebola during its outbreak in the year 2014-15.³⁰ In regards to their study they collected data which is pertinent, which showed transmission dynamics of Ebola virus. The data was collected from three nations based in west of Africa, the name of the nations are Guinea, Liberia and Sierra Leone. The uncertainty analysis was used on the model which showed that, though quarantine can reduce the burden of the disease significantly still it fails to bring the reproduction number less than unity (this is necessary to control the disease effectively or making the disease elimination feasible). They suggested that the modified transmission rate and contact rate factors for quarantine of vulnerable people revealed an important significant effect, rather than the average duration effect. In another study, Lagier *et al.* investigated 337 asymptomatic repatriated passengers from Wuhan to France. Notably, they probed all the repatriated patients within the first 24 hours upon their arrival in France for the presence of SARS-CoV-19 in asymptomatic carriers till the 5th day. The study findings revealed that out of 337 individuals who are repatriated, only 23 were found to be symptomatic, 336 people were tested at least one time, one refused to take the test, 328 individuals were tested twice on the first and the fifth day, and they were all negative for SARS-CoV-2. Therefore, the study results indicate that 0% COVID-19 positive cases were found among passengers who arrived at the military airport in France with negative PCR test and repeated PCR test on day 5.⁵ Another study on Saudi healthcare context by Al-Tawfiq *et al.*, examined the incidence of positive SARS-CoV2 as detected by PCR for arriving travellers to quarantine facilities. The study

findings show that of the total number of 1928 returning travellers, 1.2% tested positive for SARS-CoV-2. The study results indicate that there was no statistical difference in the positivity rates between the first and second swab. They concluded that the low rate of positive SARS-CoV-2 tests of returning travellers suggests that the practice of 14-days post-travel quarantine requires to be revised.⁶ As per the research made by the university Johns Hopkins of public health, they estimated that if 10,000 individuals are quarantined for 14 days, at least 1% would develop symptoms of SARS-CoV-2 as they are released from quarantine. A most recent study published in March 2020 stated that a median incubation period of 5.1 days is needed for SARS-CoV2.³¹ In February 2020, over 3000 passengers were quarantined aboard the cruise ship Diamond Princess. Among them, 218 tested positive for SARS-CoV2. It was concluded that the ship quarantine has led to a major escalation of the new coronavirus.³² The basic underlying theme of the above studies is that they have raised some pertinent questions associated with the effectiveness of quarantine. In essence, their findings indicated that the low rate of positive COVID-19 tests of returning travellers and the low percentage of difference in the positivity rates between first and second swab suggest that the strategy of 14-days of quarantine post-travel needs to be revisited. The objective of this study is to test the percentage of positive PCR within 5 to 10 days from arrival when negative PCR is < 1%. Therefore, the following hypotheses were proposed:

H0: There is more than 1% COVID-19 positive cases among non-quarantined passengers who arrived at Dubai airports with a negative PCR test and repeated PCR test on day5- day10.

Ha: There is less than 1% COVID-19 positive cases among non-quarantined passengers who arrived at Dubai airports with a negative PCR test and repeated PCR test on day5- day10.

Methodology

Nowadays, the failure to think through such philosophical issues can have a detrimental impact on the quality of management research. There are numerous reasons concerning the importance of understanding philosophical issues in the field of management. Easterby-Smith *et al.* noted that it could help in clarifying research design as well as making it clear through the provision of appropriate answers to basic research questions under investigations. Moreover, it enables the researcher to develop a research design that can either be outside his or her knowledge.³³ Based on the nature of the research objectives investigated in this study, the distinctive paradigm in line with positivism is adopted. In this study, the researcher focuses on facts to seek causality is in line with the belief that the researcher is independent of that which is being researched, and the researcher methods are in line with excluding subjective interpretations. This study aims to assess the current practice of not quarantining passengers arriving at Dubai airports which adopted by the emirate of Dubai to explore the need for 14-days quarantine post-travel of passengers with negative COVID-19 PCR test on arrival at Dubai airports. In this regard, the study used a quantitative approach based on a survey study designed to attain its objectives. A questionnaire was used as the prime quantitative tool to gather data from passengers who arrived at Dubai airports (with negative PCR test at arrival, day 0) from the countries which require their citizens to do the PCR test upon arrival based on the current protocol of the emirate

of Dubai. Moreover, the study involved passengers who repeated the PCR test on day 5-day 10 from arrival. In essence, it was found by several statistical reports conducted at the DHA that around 10% of passengers who arrived at Dubai airports with negative PCR test were repeating the test for many reasons such as work requirements, permission to enter Abu Dhabi and having COVID-19 symptoms. Particularly, this has been surveyed to explore if there is a significant increase in the number (More than 1%) of infected cases among the mentioned group. Consequently, determining the need for quarantining passengers. It has been noted that 7720 passengers who arrived at Dubai airports with negative PCR test were included in this study where all of them were tested for COVID-19 PCR at day 0, among them, 574 repeated the PCR test at day 5-day 10. After getting the sample frame from Dubai airport database, the study used a systematic random sampling method in which 574 passengers came with a negative PCR test and were subjected to a retest at day5-day10. Particularly, the study will rely on passengers' information that is saved on Dubai's airport database from 6th July 2020 to 5th November 2020. Passengers who arrived at the targeted airport during the study period were included in the study except for those who have a positive PCR test result upon arrival to the airports, passengers who are less than 12 years old and those who repeated the PCR test after day 10 from arrival. However, passengers who have repeated the PCR test during the targeted period were asked to send their PCR results to assure the reliability of study outcomes. Concerning the confounding factors, the targeted group is subject to community transmission. However, there are certain challenges associated with this study such as a false negative report, community transmission which is already declared by the UAE (WHO situation report) and non-adherence with the national guideline. In essence, the above-mentioned challenges are acceptable risks since the primary objective of this study is to explore if there is an increase in infected cases among the test group. In this study, all relevant data will be accessed using Dubai airport database (as permitted), a sample of 574 passengers have been surveyed using a telephonic method, where all of their responses were recorded in a planned questionnaire sheet. The targeted passengers were asked questions related to their demographical information (Age, Gender, Nationality and Flight Destination). The second part of the questionnaire has 5 questions, namely, having COVID-19 signs & symptoms, if any of passengers contacts have COVID-19 signs & symptoms, repeating PCR test on day5-day10, reasons for repeating PCR test, and the PCR test result. Primarily, the researchers need to gain ethical approval before conducting any primary research (e.g., interviews or surveys), by completing an ethics application, consent form, participant information sheets. Importantly, these targeted passengers whose information are saved on Dubai airport database (6th July- 5th November) have been surveyed after getting the ethical approval letter stating that DHA agrees to study surveys being conducted in its workplace was issued by Dubai Scientific Research Ethics Committee (DSREC). In this study, respondents were informed about the purpose of the research before they participated in the survey. They were briefed about the objective of the research. Moreover, they were assured that any information they provided throughout the research would be handled anonymously. Furthermore, data would be checked to ensure that participants could

not be identified. All raw data were stored securely, password-protected, and destroyed following the completion of the study. In this study, the agreement of a completed questionnaire will be understood as willingness on the part of the individual to provide consent for the participation in the survey. Furthermore, participation required the submission of a signed consent form, which confirmed informed comprehension about the research. Every respondent was provided with a copy of a consent form and requested to send it back along with their PCR test result using the quality and excellence office email.

As this study is considered as quantitative research, the Statistical Package of Social Sciences (SPSS) version 25, which is extensively employed in quantitative studies, was used to process the data. After completing the collection process of the sample data, the researcher proceeded to the process of data coding using SPSS 25. In SPSS data editor, data were coded. In this study, all the variables were identified and labelled in the SPSS data editor, and it is important to ensure that the process of coding is completed before the process of data entry, as a result, a data matrix was produced. Descriptive analysis will be performed using the frequency distributions statistical method, including, percentage frequencies, frequency tables, and bar charts. The inferential analysis concludes a population from quantitative data. In terms of 'quantitative analysis', many statistical methods are employed to test the proposed hypotheses. To test the assumed hypotheses in this study, the one-sample proportion test (Z test) was used. The study estimated that the proportion of positive cases at day 5 - day10 at 95% confidence interval to explore if there is a difference

between the sample proportion and the hypothesized proportion in terms of infected cases. It must be noted that the critical value which is the p-value for the sample proportion test will help us determine whether the sample data provides sufficient evidence to accept the alternative hypothesis and reject the null hypothesis. In this study, if the p-value will be less than 5%, then it will be considered significant that the analysis is providing sufficient evidence to reject the null hypothesis and to accept the claim that there is less than 1% COVID-19 positive cases among non-quarantined passengers who arrived at Dubai airports with negative PCR test and repeated PCR test on day5- day10. Therefore, meeting the research objective and it can be concluded that the objectives of implementing a 14-day quarantine post-travel were not met when passengers tested negative for COVID-19 PCR upon arrival at Dubai airports.

Data Analysis

Analysis of Passengers Related to COVID-19 Disease

A total of 574 passengers were included in this study. The sample included both males and females. Fig. 1 shows that 31% of passengers were female while 69% were male. In essence, the population of UAE was estimated at 9, 121, 167 with 69% being men and 31% as women.³⁴ The reason for the higher percentages of men than women is due to the high flow of expatriates. Majority of the expatriates are men who do not bring their spouses or families along.³⁵

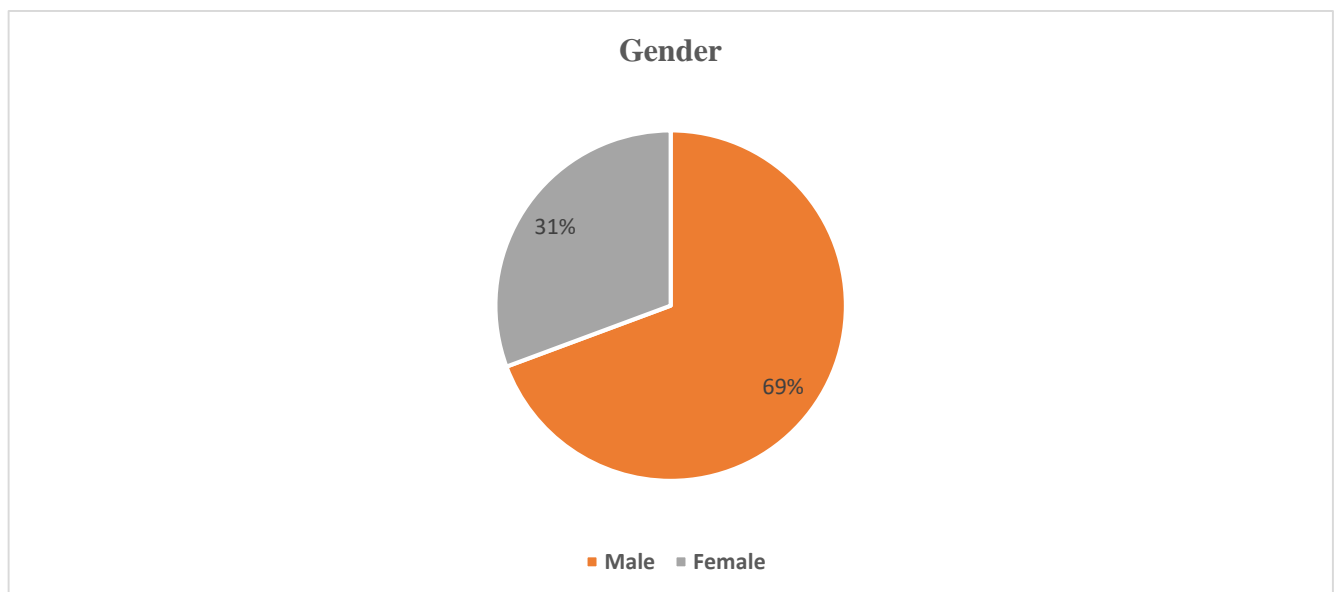


Figure 1 Gender.

The demography of the passengers also shows that more than 97% of passengers were less than 60 years old. Fig. 2 shows that (30-39) and (40-49) age groups accounted for approximately two-thirds of the test sample i.e., 63%. The higher percentage of young passengers was ascribed to the fact that the population of UAE is young, with two-thirds of the population being in the 20-39 age category.³⁴

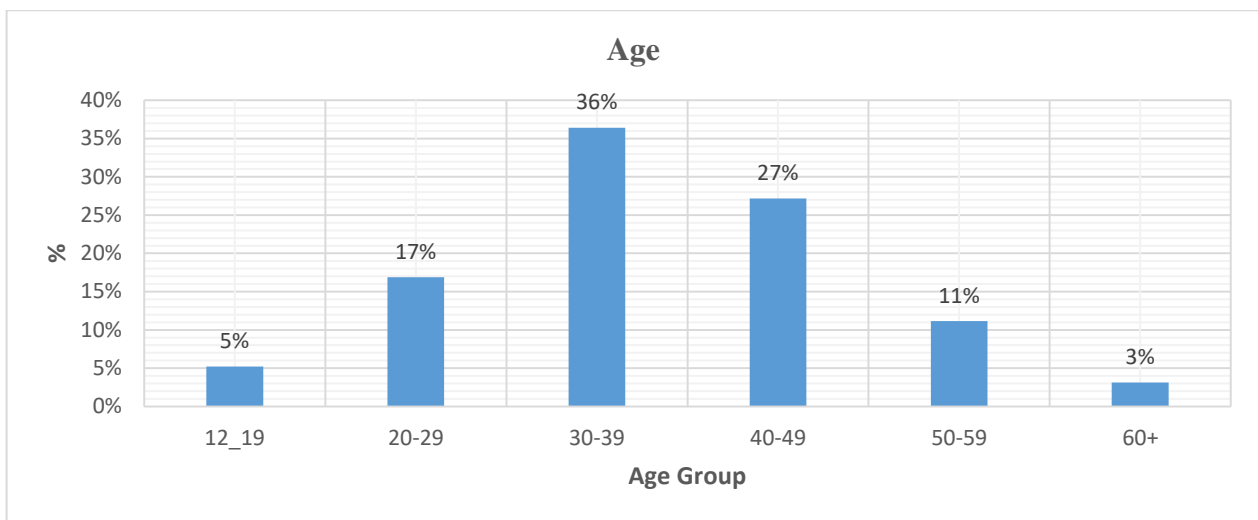


Figure 2. Age (Years)

The composition of the passengers according to nationality was Indian 48%, Pakistani 22%, Egyptian 11% and Sudanese 10%, while only 9% were from other nationalities such as Jordanians, Syrians, Lebanese, Filipinos, German, Brits, Canadians and Americans (Figure 3). Concerning the distribution of passengers by country of departure, Fig. 4 shows that the majority of the passengers, about 45%, arrived in Dubai airport from India, while 22% of them arrived from Pakistan. Unlike other oil-rich GCC nations, the UAE has greatly relied on overseas labours to shape its fundamental infrastructure and assist economic development.³⁶ The vast invasion of overseas labours to compensate for the lack in the local labour force has contributed to the enormous population growth in the UAE. Expatriates signify 87% of the UAE population and account for 85% to 90% of its labour market. Citizens signify 13% of total the population, who make up only 10 to 15 percent of the labour market.³⁵ Countries in the Asian continent account for the majority of the foreign workers working in UAE. The largest group is the Indians and Pakistanis accounting for 29.2% and 20% respectively. The other major migrant workers come from Bangladesh. Migrant workers from countries such as Afghanistan and Iran account for 16.6% of the total population of foreign workers. The percentage of foreign workers from North Africa, Australia, the United States, and Europe is 8.3%.³⁴

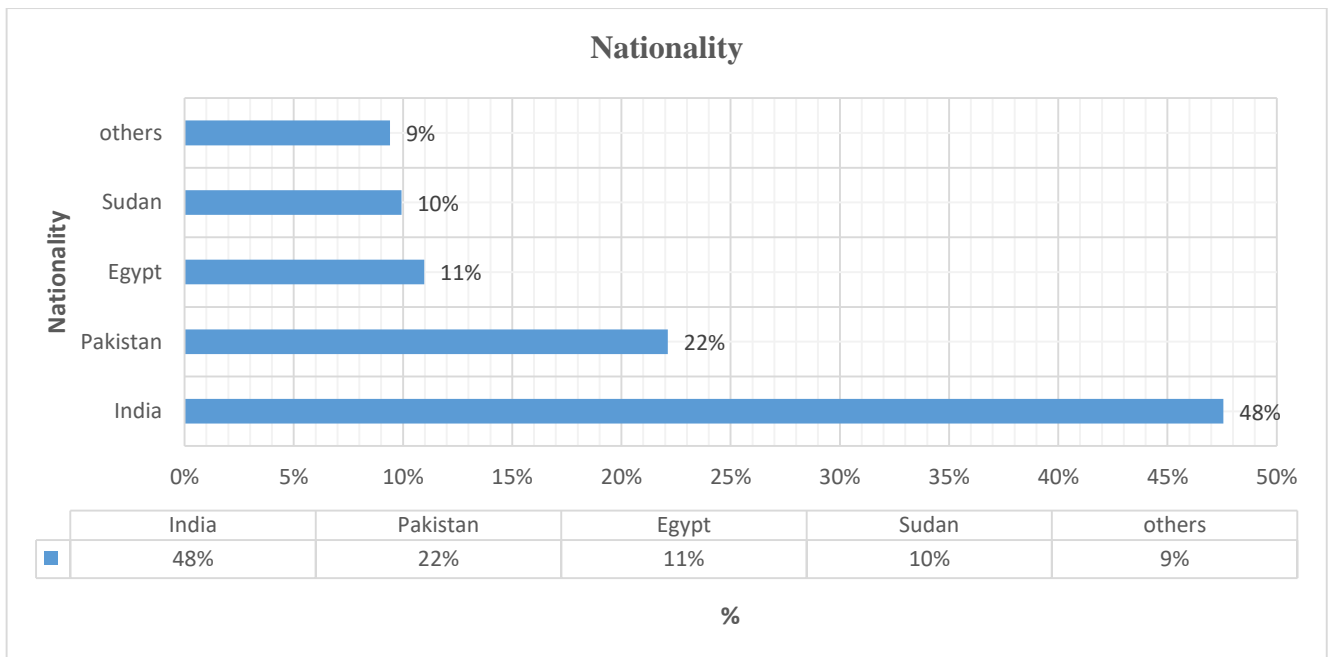


Figure 3 Nationality.

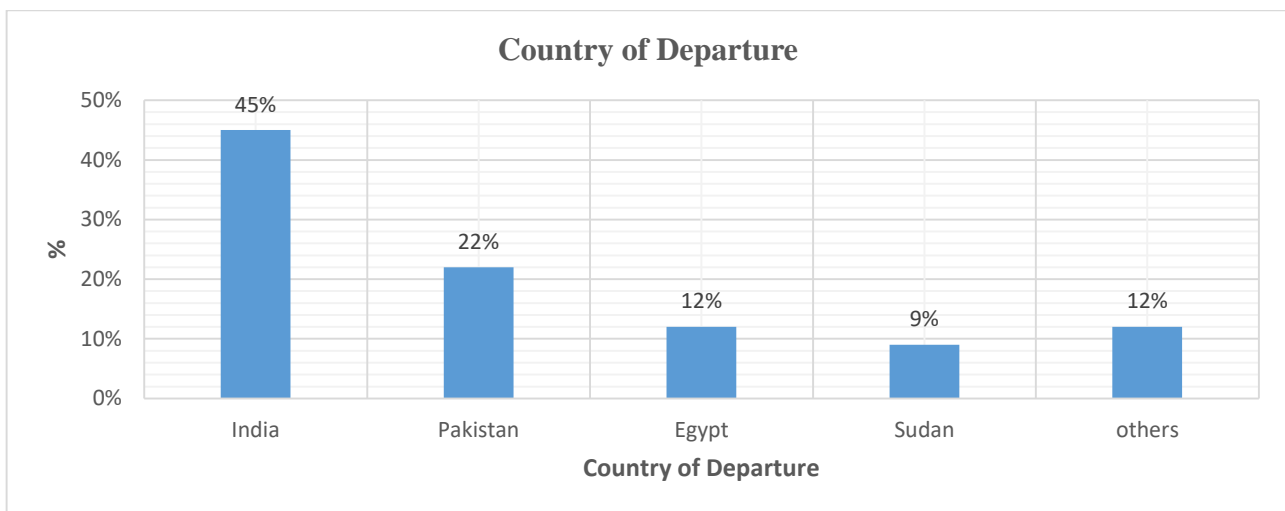


Figure 4 Country of Departure.

In this study, 574 passengers were surveyed who arrived at Dubai airports (day 0) with a negative PCR test and repeated the PCR test at day5-day10. Table 1 provides a summary of the results of COVID-19 signs and symptoms present among passengers and their contacts. Besides, it provides their second PCR test results on day5-day10. Table 1 shows that only 0.87% of passengers with negative PCR test upon arrival at Dubai airports were reported to

having COVID-19 signs and symptoms within 5-10 days from arrival such fever, dry cough, tiredness, loss of taste or smell, shortness of breath, chest pain or pressure, loss of speech or movement, while 0.52% of their contacts were reportedly having COVID-19 signs and symptoms. Furthermore, table 1 indicates that among 574 passengers only 0.17% of them tested positive for COVID-19 PCR test within 5-10 days from arrival at Dubai airports.

Table 1 A summary of COVID-19 Signs & Symptoms among Passengers and their Contacts with Positivity Rate on second PCR Test

Items	N	Frequency	%
COVID-19 signs and symptoms presence among passengers	574	5	0.87%
COVID-19 signs and symptoms presence among passengers' contacts	574	3	0.52%
Positive second PCR test result " day 5- day 10"	574	1	0.17%

Finally, the results indicate that the majority of passengers who arrived at Dubai airports with negative PCR test repeated the PCR test due to work requirements and as permission to enter Abu Dhabi yielding 33% and 34%,

respectively (Figure 5). Fig. 5 further shows that 23% of passengers repeated their PCR test due to travelling requirements, while 10% of them repeated the PCR test for a personal checkup and other reasons.

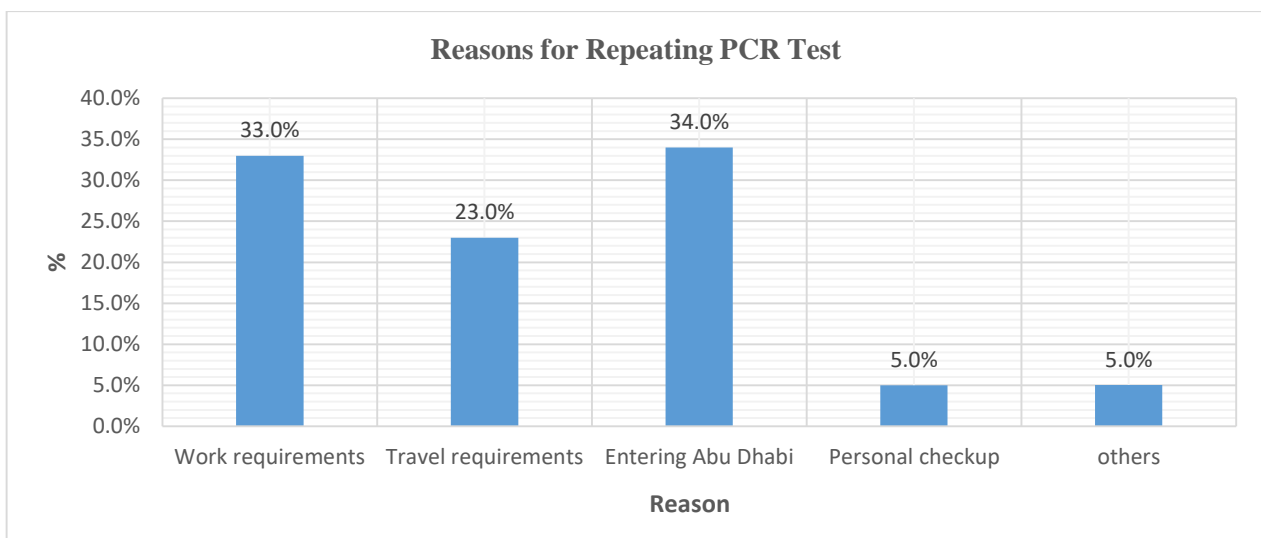


Figure 5 Reasons for Repeating PCR Test.

Testing Study Hypotheses

The one-sample proportion test (Z test) has been used to check the assumed hypotheses in this study, which seeks to test that the percentage of positive PCR within 5 to 10

days from arrival negative PCR is < 1%. The study estimated the proportion of positive cases at day 5 - day10 at a 95% confidence interval to explore if there is a difference between the sample proportion and the

hypothesized proportion in terms of infected cases. Therefore, the following information is provided: the sample size is $N=574$, the number of infected cases among passengers (second swab) is $X=1$, the sample proportion is $\bar{p}=X/N$ ($1/574=0.00174$), and the significance level is $\alpha=.05$.

- (1) **Null and Alternative Hypotheses:** The following null and alternative hypotheses need to be tested:
 $H_0: p \geq .01$.
 $H_a: p < .01$.
 This corresponds to a left-tailed test, for which a z-test for one population proportion needs to be used.
- (2) **Rejection Region:** Based on the information provided, the significance level is $\alpha=.05$, and the critical value for a left-tailed test is $z_c = -1.64$. The rejection region for this left-tailed test is $R = \{z: z < -1.64\}$.

- (3) **Test Statistics:**
 The z-statistic is computed as follows:

$$z = \frac{\bar{p} - p_0}{\sqrt{p_0(1 - p_0)/n}} = \frac{0.0017 - .01}{\sqrt{.01(1 - .01)/574}} = -1.988$$

- (4) **Decision about the null hypothesis:**
 Since it is observed that $z = -1.988 < z_c = -1.64$, it can be concluded that the null hypothesis is rejected. Using the P-value approach; The p-value is $p = 0.0234$, and since $p = 0.0234 < .05$, it is concluded that the null hypothesis is rejected.
- (5) **Confidence Interval:**
 The 95% confidence interval for p is: $-0.002 < p < 0.005$ (Figure 6).

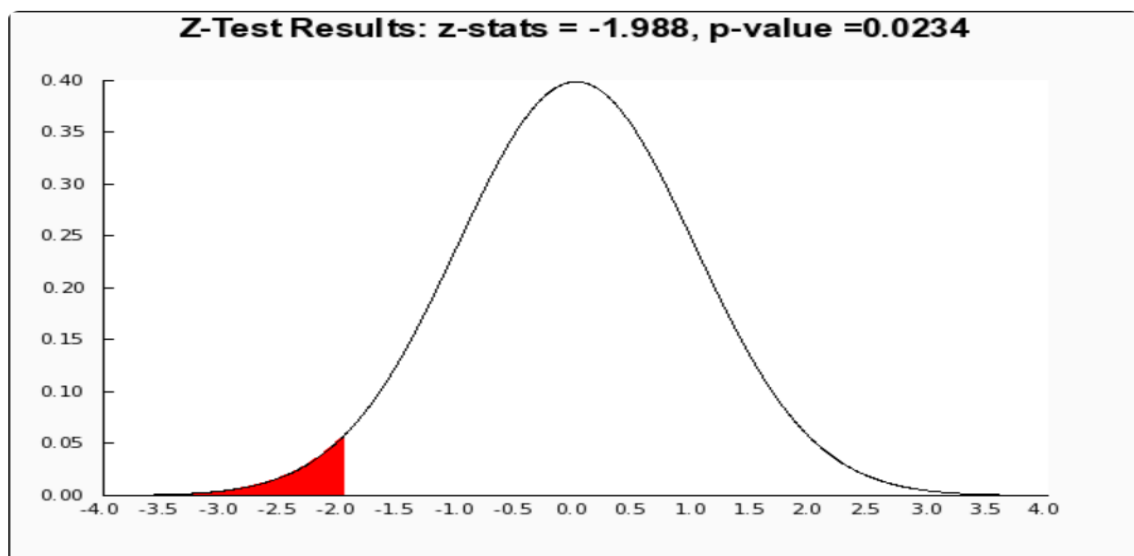


Figure 6 Z-Test and P-value Results.

Based on the above, it is concluded that the null hypothesis H_0 is rejected. Therefore, there is enough evidence to claim that there is less than 1% COVID-19 positive cases among non-quarantined passengers who arrived at Dubai airports with negative PCR test and repeated PCR test on day 5- day 10.

DISCUSSION AND CONCLUSION

This study aimed to assess the current non-14-days quarantine post-travel practice in Dubai for travellers, which is expected to enhance tourism in the emirate of Dubai and boost the economy while maintaining community safety. Therefore, the study examined the current practice of not quarantining passengers arriving at Dubai airports which adopted by the emirate of Dubai to explore the need of quarantining passengers after having a negative COVID-19 PCR test at arrival to Dubai airports. The questionnaire which is being used as the main quantitative tool, which is used to gather data of the passengers who arrived at Dubai airports (with negative PCR test at arrival, day 0) from the countries which their people are required to do the PCR test at arrival depending on the current protocol of the emirate of Dubai. Also, the study involved passengers who repeated the PCR test on day 5- day 10 from arrival. In other words, this has been

surveyed to explore if there is a significant increasing (More than 1%) of infected cases among passengers who arrived at Dubai airports with negative PCR test at arrival (day 0) and repeated the PCR test on day 5- day 10. Consequently, detecting the need for quarantining passengers with negative COVID-19 PCR test at arrival to Dubai airports. In this study, 7720 passengers arrived at Dubai airports with negative PCR test were included where all of them tested for COVID-19 PCR at day 0, among them, 574 repeated the PCR test at day 5- day 10. The study found that the proportion of positive cases on day 5 - day 10 from arrival was significantly less than 1% (0.00017) with a p-value of 0.0234. Therefore, concluded that the objectives of implementing a 14-day quarantine post-travel were not met when passengers test negative for COVID-19 PCR at arrival to Dubai airports. Since the COVID-19 became a pandemic, governments had to implement rules in order to reduce the spread of the disease. According to WHO, it is recommended to adopt hand hygiene practices, wearing masks in public areas, social distancing as well as quarantining to prevent the spread of the infection.¹ In essence, there is no current proven treatment in the management of COVID-19 infection, while most treatments are aimed at the control of symptoms.³⁷ Currently, countries around the world are

working day and night to produce a vaccine that can control this pandemic since it caused serious negative impacts on nations worldwide.^{6,37} The most significant negative impacts were on healthcare systems as well as the economy worldwide. Notably, how effective quarantine will be upon outbreak of viral disease will depend on how accurately it is done and timing will also play a vital role. It will also rely on the individual and providers of healthcare on their ability on how systematically they are following the procedures of quarantine.¹ Current evidence is not enough to inform quarantine, and the rising COVID-19 infection raises some vital questions about the efficacy of its implementation. In particular, since travel restrictions had a substantial economic and social impact, travel bans had to be eased by the governments. As noted by the American CDC (2020), a ban on visits from people affected by the affected areas usually does not work to prevent the introduction of cases but can have a significant economic and social impact.²⁹ In this regard, Dubai is becoming more flexible in travel restrictions. With Dubai being a popular tourist destination, travel limitations had to be eased. Therefore, Dubai started welcoming the tourists again on 7th July 2020 while adhering to the highest standards of health and safety in line with the international WHO protocols. In such epidemics, the most important thing is to manage cases and death increasing, as this in itself can have a significant effect. Based on WHO protocols which don't recommend travel restrictions such as quarantine on international traffic, Dubai started welcoming the tourists without a 14-day quarantine post-travel, in addition to implementing extremely strict preventive measures, with easy access to the PCR testing at any time with rapid results that take less than 24 hours.

This study's view is in line with views that implementing preventive measures such as practice social distancing, wear a mask and wash hands could be more effective than quarantining passengers who arrived at airports with a negative PCR test. The study findings indicated that only 0.87% of passengers with negative PCR test at arrival to Dubai airports were reported having COVID-19 signs and symptoms within 5-10 days from arrival, while only 0.52% of their contacts were reported having COVID-19 signs and symptoms. Moreover, findings indicated that among 574 passengers only 0.17% of them tested positive for COVID-19 PCR test within 5-10 days from arrival to Dubai airports. Also, findings revealed that there was no significant increasing (More than 1%) of infected cases among passengers who arrived at Dubai airports with negative PCR test at arrival (day 0) and repeated the PCR test on day5- day 10 (p-value= 0.0234). Therefore, the study concluded that there is no need for quarantining passengers with negative COVID-19 PCR test at arrival to Dubai airports while implementing preventive measures such as practice social distancing, wear a mask and wash hands must be put in place. For instance, the CDC has updated its travel recommendations on 6th of October 2020 to drop the quarantine upon arrival rule. It advises travellers to follow preventive measures such as practice social distancing, wear a mask, wash hands, and monitor one's health for any symptoms that may develop.²⁹ In essence, government recommendations in Dubai were in line with WHO and CDC protocols which don't recommend travel restrictions such as quarantine on international traffic to reduce COVID-19 effects on the economy. Several studies in COVID-19 literature match the current study results. Denes and Gumel study presented a new model

which can determine and assess the population-level and also the impact of the quarantine of the individuals who are suspected that they have been exposed to the disease and spread of Ebola which happened in the year 2014-2015. The study shows that quarantine can reduce the spread of the disease. But they fail to bring the reproduction number less than unity (which is necessary to control diseases effectively) They suggested that the modified transmission rate and contact rate factors for quarantine of susceptible individuals revealed an important significant effect, rather than the average duration effect.³⁰ In another study, Lagier *et al.*, investigated 337 asymptomatic repatriated passengers from Wuhan China to France. the study results indicate that 0% COVID-19 positive cases were found among passengers who arrived at the military airport in France with negative PCR test and repeated PCR test on day 5.⁵ Another study on Saudi healthcare context by Al-Tawfiq *et al.*, examined the prevalence of positive SARS-CoV2 as detected by PCR for arriving travellers to quarantine facilities. The study findings show that of the total number of 1928 returning travellers, 1.2% tested positive for SARS-CoV-2. The study results indicate that there was no statistical difference in the positivity rates between the first and second swab. They concluded that the low rate of positive SARS-CoV-2 tests of returning travellers suggests that the practice of 14-days post-travel quarantine requires to be revised.⁶ As per the research made by the university Johns Hopkins of public health, they estimated that if 10,000 individuals are quarantined for 14 days, at least 1% would develop symptoms of SARS-CoV-2 as they are released from quarantine. A most recent study published in March 2020 stated that a median incubation period of 5.1 days is needed for SARS-CoV2.³¹ In February 2020, over 3000 passengers were quarantined aboard the cruise ship Diamond Princess. Among them, 218 tested positive for SARS-CoV2. It was concluded that the ship quarantine has led to a major escalation of the new coronavirus.³² Dr Amesh Adalja, an infectious-disease specialist and a senior scholar at the Johns Hopkins Centre for Health Security in Baltimore said to live science "The ship quarantine, which has been going on for over a week, has already led to a major increase in the spread of the virus, even extending to a quarantine officer".³² The basic underlying theme of the above studies is that they have raised questions related to the effectiveness of quarantine. Fundamentally, as per their findings, it is indicated that there is a low rate amongst the COVID-19 positive travellers returning and there is a low difference in the rate of positivity between the first and the second swab taken. It suggested that the strategy of the quarantine for 14 days needs to be revised. This study contributes to the literature concerning the effectiveness of implementing a quarantine strategy on passengers who arriving at airports with the negative PCR test result. Accordingly, its progress theory-building relating to infectious diseases in the healthcare setting. Furthermore, the study provides prospect studies with an extensive understanding of preventive measures strategy related to COVID-19, which can advise the expansion of more effective and empirically grounded models that explicitly address the effectiveness of implementing quarantine strategy on passengers. Furthermore, the study assured what are the best preventive measures to be implemented for travelers coming to Dubai airports, which is expected to enhance tourism in the emirate of Dubai and boost the economy while maintaining community safety. There are challenges

for this study such as a false-negative report, community transmission and non-adhering with the national guideline. In essence, the above-mentioned challenges are acceptable risks since the primary objective of this study is to explore if there is an increase in infected cases among the test group.

Abbreviations

COVID-19, Coronavirus Disease 19; PCR, Polymerase Chain Reaction; SARS-Cov2, Severe Acute Respiratory Syndrome Coronavirus 2; WHO, World Health Organization; CDC, Control Disease Center; UAE, United Arab Emirates; DHA, Dubai Health Authority; NSP, National Sterilization Program; IMF, International Monetary Fund.

Ethics Approval and Informed Consent

Ethics approval was issued by Dubai Scientific Research Ethics Committee, Dubai Health Authority, Dubai, United Arab Emirates (DSREC-08/2020_11). Respondents were informed about the purpose of the research before they participated in the survey. In addition, they were assured that any information they provided throughout the research would be handled anonymously. In this study, participation required submission of a signed consent form, which confirmed informed comprehension about the research. Every respondent was provided with a copy of consent form and requested to send it back along with their PCR test result using the quality and excellence office email.

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DISCLOSURE

The authors declare that they have no competing interests.

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