

Promoting Health Prevention Behavior During the Coronavirus Disease 2019 (COVID-19) Outbreak in Saudi Arabia

Hassan A. Taibah, PhD

Assistant Professor

Department of Public Administration

King Abdulaziz University, Jeddah, KSA

hataibah@kau.edu.sa

Abstract

COVID-19 has attracted the attention of all. Millions were infected, hundreds of thousands died, and numerous human-centric issues were raised. However, the literature lacked details on testing public health behavior during such crisis, especially in the middle east. Therefore, this paper aims to use the Health Belief Model (HBM) to predict health-promoting behavior in Saudi Arabia. Its factors include perceived susceptibility, perceived benefits, and perceived barriers. The study also explores the relative contributions of certain demographic variables that affect public intention. The author approaches the subject by investigating health behavior through related news and literature that were published post COVID-19. The findings indicate that Saudi officials' efforts in educating people about the pandemic were fruitful, since the public was aware of how to cope with the outbreak and the national health system was resilient and successful. However, not all Saudis were on the same level of awareness and preparedness. Therefore, national and local health authorities must ensure that information is well-disseminated. Moreover, authorities should guarantee that they allocate sufficient resources and prepare healthcare facilities to meet any unexpected health and safety demands that caused by COVID-19.

Keywords: Health belief model, prevention behavior, COVID-19, Saudi Arabia.

مستخلص:

اجتذبت جائحة فيروس كورونا انتباه الجميع، حيث أصيب ملايين البشر وتوفى منهم مئات الآلاف. أثير نتيجة لذلك العديد من الأبحاث العلمية المتعلقة بتأثير الجائحة على أغلب الجوانب الاقتصادية والصحية. إلا أن الأدبيات افترقت إلى اختبار سلوك الشعوب تجاه الأزمة، وخاصة في منطقة الشرق الأوسط. لذلك، تهدف هذه الدراسة إلى استخدام نموذج المعتقد الصحي للتنبؤ بالسلوك المعزز للصحة في المملكة العربية السعودية، والتي تركز على تأثير الحساسية والفوائد والعوائق المتصورة. كما تستكشف الدراسة المساهمات النسبية لبعض المتغيرات الديموغرافية التي تؤثر على رأي عامة المجتمع. حقق المؤلف في السلوك الصحي من خلال رصد الأخبار والأدبيات ذات الصلة، والتي نشرت بعد الجائحة. تشير النتائج إلى أن جهود المسؤولين السعوديين في توعية الناس بالوباء كانت مثمرة، حيث كان الجمهور على دراية بكيفية التعامل مع تفشي المرض، وكان النظام الصحي الوطني مرناً وناجحاً في مواجهة الحدث. إلا أنه لم تكن بعض الفئات من السعوديين على نفس المستوى من الإدراك والاستعداد لمواجهة الخطر. لذلك، يجب على السلطات الصحية، الوطنية والمحلية، ضمان نشر المعلومات بشكل جيد، وتخصيص موارد كافية، وإعداد مرافق الرعاية الصحية لتلبية المتطلبات الغير متوقعة والناجمة عن الجائحة.

الكلمات المفتاحية: نموذج المعتقد الصحي، السلوك الوقائي، جائحة فيروس كورونا، المملكة العربية السعودية.

Introduction

Starting in December 2019, the Coronavirus disease (COVID-19) has spread rapidly around the world in a way that were never been expected for many years to come (van Staden, 2020; Adhikari et al., 2020). By March 11, 2020, the World Health Organization (WHO) labeled the respiratory disease as a global pandemic. The number of cases outside China has increased by a factor of 13 within two weeks (Takian et al., 2020; Mohamad & Azlan, 2020). As of March 19, 2020, the number of cases has exceeded 207,000 in 141 countries, and more than 3,000 people have died in China alone (WHO, 2020).

Researchers have excessively studied the outbreak, but the literature lacked details on major factors in health behavior during such crisis. The masses still struggle to understand the latest developments. Many of whom are unclear about how the virus spreads, what are the risks of infection, and what are the preventive measures that can be taken to stop the danger (Mohamad & Azlan, 2020). Even fewer studies explored health behavior in regions like the middle east.

Hence, this paper sheds light on efforts (practices) that has been taking by the Saudi government (administrative agencies) to control the COVID-19 pandemic and determine the challenges that Saudi government being encountered with. It aims at determining the current status of selected factors in the Health Belief Model (HBM), which are predictors of participating in COVID-19 health-promoting behavior. The study also explores the relative importance and condition of selected demographic variables (i.e., age, level of education, marital status, religion, and family history) to Saudis' intention regarding COVID-19 health-promoting behavior. The implications will help authorities to allocate sufficient resources and prepare healthcare facilities to meet any unpredicted health and safety demands in the country.

The COVID-19 Pandemic

Studies to date have shown that the origin of the virus is related to the seafood market in Wuhan, but no particular animal association has been determined. Reported symptoms include fever, cough, pneumonia, headache, fatigue, diarrhea, and difficult breathing, while the preventive measures to avoid transmission include masks, hand hygiene practices, case detection, avoidance of contact with the public, contact tracing and isolation. There is no effective antiviral treatment, so far, and infected people mainly rely on symptomatic and supportive treatment (Adhikari et al., 2020).

Ebrahim and Memish (2020) stated that the number of COVID-19 cases approximately doubles every 7.4 days, the basic reproduction rate is 2.2, and the median age of infected persons is 61 years. Moreover, transmission does not require exposure to animal sources, indicating human-to-human transmission.

Adhikari et al. (2020) presented a review based on the method framework proposed by Arksey and O'Malley. In this review, 65 research articles published before January 31, 2020 were analyzed to better understand the epidemiology, etiology, clinical diagnosis, prevention, and control of the virus. The analysis includes research fields, publication dates, periodical languages, author affiliations and methodological characteristics. The outcome of this review indicated that most publications were written in English (89.2%). The articles related to the cause are the largest (38.5%), while the majority of articles published by Chinese scholars (67.7%). Research articles at first focused on causes, but as time went on, articles on prevention and control increased.

In addition to Wuhan, the emergence of new epicenters such as Italy, Iran and South Korea should also concern the global public health. This raises the question whether national and international health systems can effectively respond to exponential growth rate in the number of patients who are infected and need intensive treatment.

Saudi Response to COVID-19

Since the disease first broke out earlier this year, Saudi Arabia has taken various measures to curb the spread of the COVID-19. The government has been taking several actions to control the disease. It also provided the essential equipment for diagnosing and treating cases free of charge (for both Saudi's and non-Saudi's), and free testing and contact tracing all over the Kingdom (UNDP, n.d).

The authorities worked collaboratively with private agencies to limit the spread of the virus. A national health awareness campaign has been established to encourage a healthy lifestyle practices that promote immunity, save the community from illnesses, and prevent transmission of the infection among community members. Policies, such as wearing masks and social distancing, have been implemented and borders and air trafficking has been disabled. In the workplace, regulation of protective standards was implemented to safe workers and beneficiaries. The government also diagnosed and tracked any potential infected COVID-19 cases and isolated them in certain hospitals and quarantine facilities. Moreover, school and universities were shot down and transfer to electronic learning (UNDP, n.d).

Most of Gulf Arab countries, including Saudi Arabia, have achieved relative success in containing the virus, but the number of infections has spiraled upward in countries like Iran, the United States and many European countries. Hence, Saudi Arabia held a virtual special summit on March 26, where leaders from 20 major economies (G20) gathered to discuss appropriate responses to the pandemic (Naar, 2020a).

The kingdom managed to keep the fatality rate below %1 of all coronavirus confirmed cases (about %0.66 died), which is among the lowest rates worldwide. A part of it due to effective social distancing measures (Arabnews, n.d.a). Authorities also valued and fostered the associated roles and responsibilities of the public in responding to the crisis, having in perspective the possibility of facing shortage of doctors and hospital beds. Therefore, they initiated a campaign with a slogan "We are all responsible" that citizens rallied behind. This is followed by quarantining entire cities and imposing local lockdowns (Farouk, 2020). Other preventive measures include prohibiting travel between provinces, imposing nationwide curfew restrictions, and enhancing digital services (Naar, 2020b).

Even though the decision-making process is centralized in KSA, the kingdom delegated its local government with the power to effectively respond to the pandemic threats (Farouk, 2020; Alrebh, 2020). Moreover, the Ministry of Education suspended student attendance in all schools and universities and implemented e-learning since the beginning of the outbreak until the seventh week of the 2020 fall semester. This suspension will later be reviewed and could be continued for the second half of the semester (Naar, 2020b).

Another challenge for the kingdom would be the entrance of millions of Muslims into the holy cities of Makkah and Madina from more than 180 countries to perform Umrah and Hajj pilgrimages annually. In 2018, Saudi Arabia's non-pilgrimage air traffic reached (39 million), while travelers with Umrah visa reached 7.5 million in 2019 (Ebrahim & Memish, 2020).

Therefore, officials in 2020 has decided to scale back the number of Hajj pilgrims from two million to 10 thousand or less, while allowing only people who resides within the country to perform the rituals (BBC, n.d.). The number later lessened to only about 1000 pilgrims. For those who attended, the government imposed strict precautionary and testing measures before and after their religious journey. The selection criteria for issuing their Hajj permit includes not having any pre-existing conditions, submitting a PCR test certificate with negative results, not previously performed Hajj, and committing to the required quarantine period before and after the pilgrimage. The government also signed a health leader for every 50 pilgrims to ensure safety measures, such as wearing masks and social distancing (Serrieh, 2020a; Serrieh, 2020b). Even though such measures harm the Hajj industry, the priority of controlling the outbreak surpassed any other considerations.

To mitigate the pandemic economic impact, the country launched 142 COVID-19 related initiatives that cost more than SR214 billion (\$57 billion), according to the Saudi Press Agency. It includes suspending several labor-related fines and custom duties on imports (Alzahrani, 2020) and covering 60% of private-sector salaries (Farouk, 2020).

HBM Theoretical framework

In order to investigate the factors that affects the adoption of COVID-19 preventive behaviors, many researchers used the HBM, which is one of the most well-known models in health education and promotion. HBM was originally proposed by a social psychologist in 1950s, with the goal of predicting the success of tuberculosis screening programs (Rosenstock, 1974).

The model was designed to explain the relationship between environmental health and safety education (Becker, 1974). It shows that increasing the community environmental health awareness will improve the community behavior on health and safety issues and ultimately lead to an ideal healthy environment.

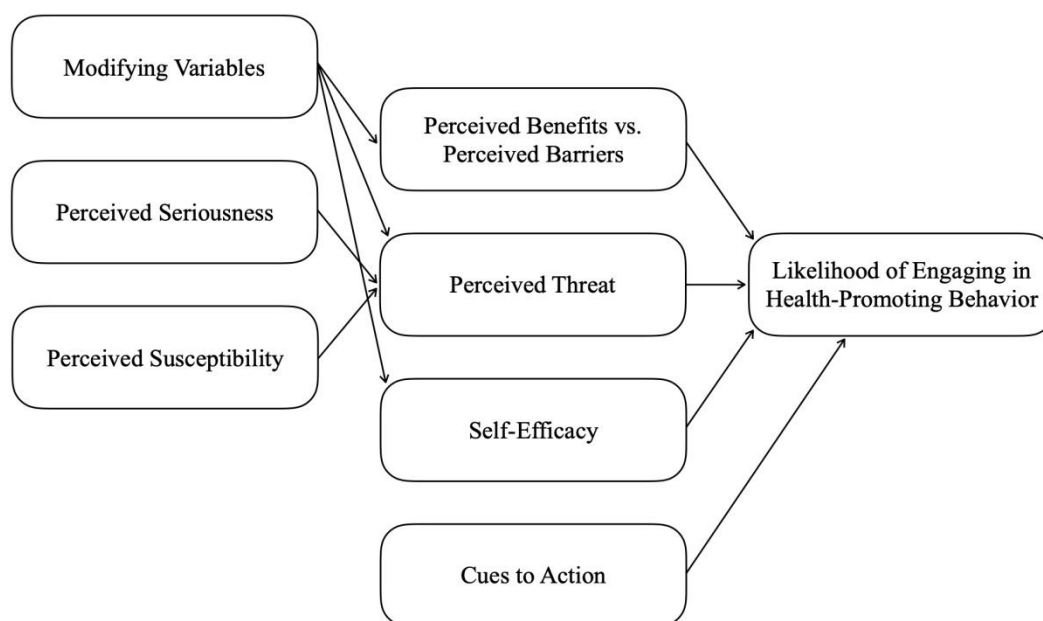


Figure1: HBM theoretical framework (Glanz, et. al., 2008)

Perceived threat is one of the variables that affected the likelihood of engaging in health-promoting behavior. It refers to factors that impacted by both perceived seriousness and perceived susceptibility. In this case, *perceived seriousness* means the threats or illnesses that will seriously affect personal health, while *perceived susceptibility* is a subjective assessment of the degree of inherent physical weakness caused by age or previous diseases and the degree to which individuals believe they are susceptible to certain diseases. Moreover, *perceived benefits* is also included in HBM, which refers to the value or efficacy of performing health promotion activities. Another factor in HMB is *perceived barriers*, which refers to obstacles that individuals may face when attempting to stop or lessen possible risks. Next, *self-efficacy* is the extent of self-confidence that people have in their capacity to take an efficient action. In addition, *cues to action* is people's perception of signals as sign of the onset of a danger. Finally, *modifying variables* affects the self-efficacy as well as the perceived threats, benefits, and barriers. Modifying variables usually refer to individuals' characteristics, mainly demographic, psychosocial, and structural characteristics (Rosenstock, 1974; Becker, 1974).

Investigating Health Behavior in Saudi Arabia Based on the HBM Theoretical Framework

Even though the COVID-19 information that were available in research is valuable among the scientific community, it is of little significance to the public. If anything, the technical terms used in journals will even scare people to look for information and learn about the disease. As a result, people may turn to other less credible sources for clarity to better understanding the situation. Unfortunately, easy-to-understand messages are not necessarily accurate, or worse, they can influence people to make inefficient health behavior decisions. The information provided also may not be understood or shared by a large population (Mohamad & Azlan, 2020).

Effective communication is critical in emergencies. Although WHO has conducted exchanges on COVID-19 on its website, the performance is commendable, and recently launched a large-scale online public course on COVID-19, but most countries directly affected by the disease are non-English speaking countries.

Therefore, the Saudi Ministry of Health (MOH) awareness campaign were administered in different languages besides Arabic, including Filipino, Urdu, English, French, Russian and Portuguese. It aims to raise public precautions to protect themselves from the virus (MOH, n.d.a). By 16 April, the ministry stated that they have sent over 3.6 billion educational text messages on COVID-19. The messages where are about tips and guidelines, ways of spread prevention, and avoiding rumors about the pandemic (MOH, n.d.b). However, no evidence was shown in academic public awareness literature in the region. Hence, the author investigates if these efforts to raise health-promoting behavior have reached the planned target through presented evidences in related news and literature that were published post COVID-19.

a. Risk perception

Risk perception of coronavirus is high in Saudi Arabia according to a public opinion survey that was conducted from March 18 to May 6 of 2020 and included 2002 people. In the beginning of the study, %64 of all Saudi participants were fearful of getting infected, and the percentage jumped in May 6 to %75 for those who participated.

While only %7 were not at all scared from the infection. The benefits of curfew in Saudi Arabia is trusted as social distancing is been adopted by a large portion of the population (Arabnews, n.d.a)

In many countries, the lack of medical, pharmaceutical and laboratory equipment (for example, wearing protective clothing and necessary medicines) has increased the burden of the virus (Takian et al., 2020). Moreover, Saqlain (2020) highlighted that the main barriers in responding to COVID-19 are overcrowded emergency rooms, limited infection prevention material, and the lack of information about COVID-19 and ways of preventing the infection. However, no sign of barriers was sighted, including overcrowding or shortage of infections prevention material in Saudi emergency rooms and departments.

b. Individual demographic characteristics

Vulnerable groups (including older people and women) comes to mind when we raise the effect of *individual demographic characteristics*. Al-Hanawi et al. (2020) stated that older population and women in Saudi Arabia were more knowledgeable about the pandemic and more optimistic than men and younger population. The authors first hypothesized that public compliance with strict preventive measures against COVID-19 is affected by their knowledge and attitude towards the disease. Then, they investigated the knowledge, attitudes and practices of Saudi citizens during the pandemic. The study used a cross-sectional method of 3388 participants through an online self-report questionnaire. The data were analyzed by univariate and multivariate regression analysis. The results indicated that most of the participants had high level of knowledge, optimistic attitude, and good practice. However, men and young participants had lower results in all of the three variables than women and older participants. The authors concluded that the risk communication efforts should be directed toward those who have less results (men and young people) in order to increase public COVID-19 awareness.

According to data that were presented by New York City Health as of May 13, 2020, there were no fatalities in the age range between 0 to 9 years old whereas the percentage increases with age until it reaches 14.8% in the death rate of all cases in the 80+ years old age group (worldometers, n.d.a). There was less detailed information about the death rate in different age groups, but the country has the advantage of having a high percentage of young population. The median age in Saudi Arabia is 29.9 years in 2018 (index mundi, n.d.), while the median age in the U.S. is 38.2 years (Statista, n.d.), for instance.

c. Psychosocial characteristics

As of psychosocial characteristics, a recent survey indicates that %98 of Saudis changed their behavior to avoid infection, such as “avoiding crowded places (78 percent), wearing a face mask (71 percent), improved personal hygiene (74 percent) and working from home (47 percent)” (Arabnews, n.d.a).

d. Structural variable

Saudi Arabians have former information and/or practical knowledge (structural variable) with the Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012 (WHO, n.d.). Such an outbreak led to a country that is more equipped and experienced in preventing similar incidents in the future.

e. Cues to action

Cues to action is significant in the COVID-19 case since the virus internal cues “such as fever or cough” directly trigger people’s health anxiety to check or obtain reassurance through COVID-19 testing. When it comes to external cues, such as risk information acquired through different channels, MOH regularly sent information about Coronavirus symptoms (MOH, n.d.a, MOH, n.d.b). In addition, 89.39% of Saudis are active internet users, while 66.95% are active social media users (Global Media Insight, n.d.), which enhances the effect of COVID-19 information that were posted and shared via these channels.

f. Self-efficacy

When considering self-efficacy, there is not enough information about it, but it is expected that MOH’s awareness campaigns and the country the population individual abilities may increase the self-efficacy of Saudis have in their capacity to fight the pandemic.

A survey by Snapchat firm stated that the social media platform users feel that Saudi Arabia is will prepared to respond to the pandemic. The participants knew about COVID-19 mostly from official government sources (67%), while (26%) looked for information about the outbreak from TV news and (30%) received information from other online news sources (Arabnews, n.d.b).

This is significant since misinformation, false information and the spread of false news on social networks has made the situation worse. It led to many health anxiety and panic behaviors, such as cancellation of travel plans, visits to hospitals and xenophobia (Mohamad & Azlan, 2020).

Table1: Investigating health behavior in Saudi Arabia using the HBM theoretical framework

-
1. Risk perception:
 - a. Risk perception of coronavirus is high in Saudi Arabia (Arabnews, n.d.a).
 - b. No sign of overcrowding or shortage of infections prevention material in Saudi emergency rooms and departments.
 2. Individual demographic characteristics:
 - a. Older population and women in Saudi Arabia were more knowledgeable about the pandemic and more optimistic than men and younger population (Al-Hanawi et al., 2020).
 - b. The country has the advantage of having a high percentage of young population. The median age in Saudi Arabia is 29.9 years in 2018 (index mundi, n.d.).
 3. Psychosocial characteristics
 - a. %98 of Saudis changed their behavior to avoid infection (Arabnews, n.d.a).
 4. Structural variable:
 - a. Saudi Arabians have former information and/or practical knowledge with an outbreak before the COVID-19 case (WHO, n.d.).
 5. Cues to action:
 - a. MOH regularly sent information about Coronavirus symptoms (MOH, n.d.a; MOH n.d.b).
 - b. 89.39% of Saudis are active internet users, while 66.95% are active social media users (Global Media Insight, n.d.).
 6. Self-efficacy
 - a. Saudi Arabia is will prepared to respond to the pandemic (Arabnews, n.d.b).
 - b. Saudis knew about COVID-19 mostly from official government sources (67%), while (26%) looked for information about the outbreak from TV news and (30%) received information from other online news sources (Arabnews, n.d.b).
-

Implications and Conclusion

Saudi Arabia officially announced the first death of COVID-19 on March 2, 2020 (Khalid, 2020). As of September 2020, more than 330 thousand people have been infected, and 4512 deceased, which led to major health and economic losses (Worldometer, n.d.b). Therefore, there is a need to analyze the individual behavior toward the aspects of prevention, diagnosis and treatment in responding to the pandemic.

MOH efforts in educating its people about the pandemic were fruitful, since the public was aware of how to cope in this crisis. 67% of Saudis knew about COVID-19 mostly from official government sources. On the psychosocial level, %98 of Saudis changed their behavior to avoid infection (Arabnews, n.d.a).

Hence, the Saudi health system was resilient and succeeded in dealing with coronavirus. Unlike other counties, Saudi emergency rooms and departments were not overcrowded in mid-2020. Some of the success could be due to the practical knowledge that the country has in dealing with MERS outbreak in 2012 (WHO, n.d.).

However, not all the Saudi population have the same level of awareness. For instance, young Saudis were less aware of this dangerous situation and they constitute the majority (median age in Saudi Arabia is 29.9 years in 2018) (index mundi, n.d.). Therefore, the government needs to tailor its efforts based on different demographic characteristics.

National and local health authorities must ensure that information is disseminated to more people. Communication strategies such as the use of lay terms, simple diagrams, storytelling and metaphors can also be used to explain terminology and the latest scientific discoveries, which helps calm the public and assure that steps are being taken to reduce COVID-19 (Mohamad & Azlan, 2020). A preferable and inexpensive channel to reach Saudi people is using the internet as 89.39% of Saudis are active internet users, while 66.95% are active social media users (Global Media Insight, n.d.).

In such emergency health events, it is necessary to work closely with journalists, social media influencers, and content producers to help bridge the gap between health officials and the public. Continuously writing clear and persuasive messages can help reduce public anxiety, reduce the spread of false information, and promote correct health prevention behaviors (Mohamad & Azlan, 2020).

References

- Adhikari, S. P., Meng, S., Wu, Y. J., Mao, Y. P., Ye, R. X., Wang, Q. Z., ... & Zhou, H. (2020). Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infectious Diseases of Poverty*, 9(1), 1-12.
- Al-Hanawi, M. K., Angawi, K., Alshareef, N., Qattan, A. M., Helmy, H. Z., Abudawood, Y., ... & Alsharqi, O. (2020). Knowledge, Attitude and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Frontiers in Public Health*, 8.
- Alrebh, A.F. (2020). Saudi Response to Coronavirus Seen as Emphasizing Public Health, Not Internal Politics. *The Arab Gulf States Institute in Washington*. Available at: <https://agsiw.org/saudi-response-to-coronavirus-seen-as-emphasizing-public-health-not-internal-politics/> (accessed 22 August 2020).
- Alzahrani, F. (2020). Saudi Arabia spends more than \$57 billion on coronavirus stimulus. Arab News. Available at: <https://www.arabnews.com/node/1701981/business-economy> (accessed 22 August 2020).
- Arabnews (n.d.a). Coronavirus crisis changing public attitudes in the Middle East, polls suggest. Available at: <https://www.arabnews.com/node/1672296/middle-east>, (accessed 1 September 2020).
- Arabnews (n.d.b). Saudis feel more prepared to prevent coronavirus spread, says Snapchat survey. Available at: <https://www.arabnews.com/node/1660681/saudi-arabia>, (accessed 1 September 2020).
- BBC. (n.d.). Coronavirus: Scaled back Hajj pilgrimage begins in Saudi Arabia. Available at: <https://www.bbc.com/news/world-middle-east-53571886> (accessed 22 August 2020).
- Becker, G.S. (1974). "A Theory of Social Interactions," *Journal of Political Economy*, 82(6), pp. 1063-1093.
- Ebrahim, S. H., & Memish, Z. A. (2020). COVID-19: preparing for superspreader potential among Umrah pilgrims to Saudi Arabia. *The Lancet*, 395(10227), e48.
- Khalid, T. (2020). Saudi Arabia reports first coronavirus case, a Saudi national coming from Iran. *Al Arabiya English*. Available at: <https://english.alarabiya.net/en/News/gulf/2020/03/02/Saudi-Arabia-reports-first-coronavirus-case-state-media> (accessed 22 August 2020).
- Farouk, Y. (2020). Updating Traditions: Saudi Arabia's Coronavirus Response. *Carnegie Endowment for International Peace*. Available at: <https://carnegieendowment.org/2020/04/07/updating-traditions-saudi-arabia-s-coronavirus-response-pub-81481> (accessed 22 August 2020).
- Glanz, K.; Rimer, B.; Viswanath, K. (2008) Eds. Health behavior and health education: theory, research, and practice, 4th ed. John Wiley & Sons: Hoboken, NJ, USA; ISBN-13: 978-0787996147.
- Global Media insight. (n.d.). Saudi Arabia Social Media Statistics 2019. Available at: <https://www.globalmediainsight.com/blog/saudi-arabia-social-media-statistics/> (accessed 1 September 2020).

- Index Mundi. (n.d.). Saudi Arabia Demographics Profile 2019. Available at: https://www.indexmundi.com/saudi_arabia/demographics_profile.html (accessed 1 September 2020).
- Ministry of Health. (n.d.a). MOH Issues COVID-19 Awareness Guidelines in Many Languages. Available at: <https://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/News-2020-03-17-001.aspx> (accessed 1 September 2020).
- Ministry of Health. (n.d.b). MOH Sends out Over 3 billion Educational Text Messages on Novel Coronavirus. Available at: <https://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/News-2020-04-16-006.aspx> (accessed 1 September 2020).
- Mohamad, E., & Azlan, A. A. (2020). COVID-19 and Communication Planning for Health Emergencies. *Jurnal Komunikasi: Malaysian Journal of Communication*, 36(1).
- Naar, I. (2020a). Timeline: Here are all the measures taken by Saudi Arabia to combat the coronavirus. *English Al Arabia*. Available at: <https://english.alarabiya.net/en/features/2020/03/28/Timeline-Saudi-Arabia-s-proactive-measures-to-combat-the-COVID-19-coronavirus>, accessed (accessed 4 April 2020).
- Naar, I. (2020b). Saudi Arabia coronavirus: Distance learning for first 7 weeks of new academic year. *English Al Arabia*. Available at: <https://english.alarabiya.net/en/coronavirus/2020/08/15/Saudi-Arabia-Distance-learning-for-first-7-weeks-of-new-academic-year-amid-COVID-19> (accessed 22 August 2020).
- Rosenstock, I. M., (1974). The health belief model and preventive health behavior. *Health Education Monographs*, 2, 354-386
- Serrieh, J. (2020a). Coronavirus: Saudi Arabia reveals selection process for 2020 Hajj participants. Available at: <https://english.alarabiya.net/en/coronavirus/2020/07/06/Coronavirus-Saudi-Arabia-reveals-selection-process-for-2020-Hajj-participants> (accessed 22 August 2020).
- Serrieh, J. (2020b). Hajj 2020 photos: A look back at the pilgrimage amid coronavirus pandemic. Available at: <https://english.alarabiya.net/en/coronavirus/2020/08/03/Hajj-2020-photos-A-look-back-at-the-pilgrimage-amid-coronavirus-pandemic-> (accessed 22 August 2020).
- Statista. (n.d.). Median age of the resident population of the United States from 1960 to 2019. Available at: <https://www.statista.com/statistics/241494/median-age-of-the-us-population/> (accessed 1 September 2020).
- Takian, Amirhossein, Azam Raoofi, and Sara Kazempour-Ardebili. "COVID-19 battle during the toughest sanctions against Iran." *Lancet (London, England)* 395.10229 (2020): 1035.
- UNDP. (n.d). Saudi Arabia's Ruthless Fight Against Coronavirus. Available at: https://www.sa.undp.org/content/saudi_arabia/en/home/library/saudi-arabia-s-ruthless-fight-against-coronavirus.html (accessed 22 August 2020).
- van Staden, C. (2020). COVID-19 and the crisis of national development. *Nature Human Behaviour*, 1-2.
- World Health Organization. Middle East respiratory syndrome coronavirus (MERS-CoV) – The Kingdom of Saudi Arabia. Available at: <https://www.who.int/csr/don/02-jul-2020-mers-saudi-arabia/en/> (accessed 22 September 2020).

Worldometer. (n.d.a). Age, Sex, Existing Conditions of COVID-19 Cases and Deaths. Available at: <https://www.worldometers.info/coronavirus/coronavirus-age-sex-demographics/> (accessed 1 September 2020).

Worldometer. (n.d.b). Saudi Arabia. Available at: <https://www.worldometers.info/coronavirus/country/saudi-arabia/> (accessed 22 September 2020).