REVIEW OF INTERNATIONAL GEOGRAPHICAL EDUCATION

ISSN: 2146-0353 ● © RIGEO ● 11(9), SPRING, 2021

www.rigeo.org

Research Article

Social Media Impact on Vaccine Hesitancy in Malaysia: A Structured Literature Review

Sharmini Gopinathan[1]
Faculty of Management, Multimedia University, Malaysia.
sharmini.gopinathan@mmu.edu.my

Anisha Haveena Kaur[2]
Faculty of Management, Multimedia University, Malaysia.
1112700541@student.mmu.edu.my

Murali Raman[3]
Post Graduate and Continuing Education, Asia Pacific University, Malaysia.
murali@apu.edu.my

Shubashini Rathinavelu[4]
Department of Business Administration, Prince Mohammad bin Fahd University, Saudi Arabia

Sivasutha Thanjappan[5]
Covid Unit, Hospital Ampang, Ministry of Health, Malaysia.

Abstract

Social media has played an evident role in mankind's day to day operations. The role of social media in vaccine hesitancy was an important area to examine due to the fact that Malaysians were generally influenced by the news that was populated by anti-vaccine agents. As people who want to be vaccinated find increasingly greater evidence about health through social media and the Internet, people become increasingly interested in the role of collaborative social media platforms in support of public health issues. Nevertheless, detrimental misrepresentation of facts also has the likelihood to spread across the Internet. This material may spread through the present anti-vaccine movements, impairing hesitation about vaccines. This paper aims to contribute to the understanding of social media impact on Covid-19 vaccine hesitancy by reviewing the existing body of research available on this topic.

Keywords

Covid-19, vaccine hesitancy, social media impact, intention, vaccine uptake, Malaysia, anti-vaccine efforts

To cite this article: Gopinathan, S, Kaur, A, H, Raman, M, Rathinavelu, S, and Thanjappan, S. (2021) Social Media Impact on Vaccine Hesitancy in Malaysia: A Structured Literature Review. *Review of International Geographical Education (RIGEO), 11*(9), 1669-1680. Doi: 10.48047/rigeo.11.09.144

Submitted: 10-10-2020 ● **Revised:** 15-12-2020 ● **Accepted:** 20-02-2021

Overview of the study

A new strain of coronavirus discovered in 2019 led to the coronavirus disease (Covid-19) outbreak. According to the World Health Organisation (WHO) (2019), this new virus is linked to the severe acute respiratory syndrome (SARS) family of viruses as well as certain types of common cold. The mild and severe symptoms of Covid-19 include fever, chills, shortness of breath, cough, body or muscle aches, fatigue, headache, sore throat, loss of taste or smell, nausea, runny nose and diarrhoea (Centres for Disease Control and Prevention, 2021). Since Covid-19 has similar symptoms as influenza (flu), testing is required to confirm whether a person is diagnosed with Covid-19. The symptoms of Covid-19 would typically appear 2 to 14 days after a person is exposed to the virus. Due to this pandemic, people are required to protect themselves from potential infection by frequently washing their hands, avoiding touching their face, wearing face masks outdoors and using alcohol-based sanitising products.

For the week ending 18 July 2021, Malaysia has recorded a total of 916,561 Covid-19 cases. There was a 39.2% increase in cases as compared to the previous week (World Health Organisation, 2021). The total number of deaths from Covid-19 in Malaysia since the pandemic started is 7,019 and is expected to increase due to the new Delta variant of the virus which has been discovered. The Ministry of Health's Director General mentioned that Malaysia will reach its peak number of daily cases in September, with the number being 24,000 positive cases per day (Iqhram, 2021). However, the Director General mentioned that the number of cases might drop below 1,000 cases daily by the end of October 2021 if the vaccination rate is maintained at 150,000 second doses daily (Santa Maria Chin, 2021). In addition, the desired results may be achievable as there is a vaccine efficacy averaging at 75% and a ramped-up inoculation. The country might see around 80% of its population to be vaccinated by that time period.

Problem Statement

Vaccines are one of the utmost known to be the most efficacious public health interventions which leads to the cornerstone of infectious disease prevention. In spite of developments in vaccines, continuous public acceptance is still desired to preserve herd immunity, avoid epidemics of vaccine-preventable illnesses, and in turn guarantee the usage of new vaccines. Regrettably, the use of numerous vaccines is not at its ideal position as yet. The current recovery from vaccine-preventable diseases such as Covid-19 has directed (WHO) to list vaccine hesitancy as one of the top ten threats to global health in 2019. Therefore, drawing on the current situation, views on immunisation range from recipients vigilant to complete denial.Some of the barriers to vaccination are the fabrication about the benefits of vaccination, ingredients of the drug or contents in the vaccine, and contrary feedback that limits general understanding and acknowledgement by the patients. As people who want to be vaccinated find increasingly greater evidence about health through social media and the Internet, people become increasingly interested in the role of collaborative social media platforms in support of public health issues. Nevertheless, detrimental misrepresentation of facts also has the likelihood to spread across the Internet. This material may spread through the present anti-vaccine movements, impairing hesitation about vaccines.

In the face of the current Covid-19 pandemic, these apprehensions may be augmented as the continuous progress and succeeding disposition of vaccines is predicted to play a significant part in subsequent international control efforts. Moreover, to slow down the spread of Covid-19, rigorous global efforts to preserve physical distance and seclusion can deepen the usage of social media as individuals attempt to stay in touch when being in isolation. Disturbingly, this misinformation in addition to unconfirmed stories about Covid-19 and the probable Covid-19 vaccine have been prompted to surface on social media platforms. This issue may wear down public trust extensively before effective vaccines are launched. Hence, we seek to review the position of anti-vaccination posts on social media platforms, and observe their role in vaccine hesitancy among the public. This paper aims to contribute to the understanding of social media impact on Covid-19 vaccine hesitancy by reviewing the existing body of research available on this topic.

Research Model/Design

A systematic literature review was conducted using the literature review methodology proposed by Tranfield, Denyer and Smart (2003). There are five stages in total. The first four stages will be discussed in one section of the review paper whereas the fifth stage will be discussed in the subsequent section of the paper. The fifth stage comprises of the literature review for this study. Below is the breakdown of the stages and their respective sections.
Stage 1: Planning the review (Research Model/Design section)
Stage 2: Identifying and evaluating studies (Research Model/Design section)
Stage 3: Extracting and synthesising data (Research Model/Design section)
Stage 4: Reporting descriptive findings (Findings section)
Stage 5: Utilising the findings to inform research and practice (Discussion section)

Stage 1: Planning the review

The emergence of Covid-19 has led to cases of vaccine hesitancy among people and one of the reasons is due to social media posts and social media sharing. The main goal of this review is to understand what has been explored so far when it comes to social media impact on vaccine hesitancy in the past and during the current Covid-19 pandemic. Social media has evolved over the years and its effect on vaccine hesitancy may have differed.

Stage 2: Identifying and evaluating studies

Inclusion and exclusion criteria

The inclusion criteria for this review are research articles and review papers published between 2010 to 2021. Only publications in the English language were chosen. The publications were mainly on Covid-19 related vaccines, with a few publications focusing on vaccines in general in order to get a clearer understanding of social media generally impacts vaccine hesitancy. This study excluded books, book chapters, book sections, dissertations and practitioner papers.

Keywords and Search Strategies

This review paper focuses on one main issue which is social media impact on vaccine hesitancy, particularly on the Covid-19 vaccine uptake. Therefore, the search terms included are "Covid-19", "vaccine hesitancy", "social media impact", "intention" and "Covid-19 vaccine uptake". The keywords "Covid-19" and "vaccine hesitancy" were searched individually to attain the number of papers which discussed about these issues in general. Subsequently, these words were also combined with the other keywords in order to attain more specific papers pertaining to the issue in hand. As for the search strategies, searches were conducted on three major online databases such as ScienceDirect, Emerald and Sage Publications. These three databases contained a vast range of research pertaining to Covid-19 and vaccine hesitancy in general. Table 1 shows the keyword sets used for this research alongside the number of papers selected from each online database. A total of XX papers were selected from the four databases.

Stage 3: Extracting and synthesising data

The selected papers were skimmed through by the authors and only a small portion of papers were relevant to the review as the Covid-19 vaccines are fairly new and there is limited research on social media impact on vaccine hesitancy. Additionally, no papers in the Malaysian context were found in the three databases. Thus, two additional steps were taken in order to attain more publications for this review. The authors skimmed through the publications and references used in the selected papers. From there, more research articles and review papers were attained. Additionally, searches were also conducted using Google Scholar in order to increase the number of publications to be reviewed in the Malaysian context

Table 1:
Keyword combination and online databases used for the review.

		Keyword Combination						
No	**Online Database**	Covid-19	Vaccine Hesitancy	Vaccine Hesitancy; Social Media Impact	Vaccine Hesitancy; Social Media Impact; Covid-19	Vaccine Hesitancy; Social Media Impact; Intention	Vaccine Hesitancy; Social Media Impact; Intention; Covid-19 Vaccine Uptake	**Number of Selected Papers**
1	ScienceDirect	42,377	1,543	501	201	156	60	15
2	Emerald	2,754	26	19	7	8	1	3
3	Sage Publications	11,493	648	282	116	190	25	3

FINDINGS

Stage 4: Reporting descriptive findings

Table 2 depicts the selected papers which were used for this review paper. Out of the 40 papers listed, 20 papers in total were from ScienceDirect, Emerald and Sage Publications. The remaining 14 papers were attained from the references of the selected papers as well as from Google Scholar. This was done as there were limited papers focusing on the social media impact of Covid-19 vaccine hesitancy. Majority of the papers selected were from the years 2020 and 2021 even though the inclusion criteria is between 2010 to 2021. This is due to the fact that Covid-19 is a new pandemic which came about towards the end of 2019.

Table 2:
Publications used for the review paper

No	Authors	Year	Description
1	Aldossari, Alharbi, Alkahtani, Alrowaily, Alshaikhi and Twair	2021	Covid-19 vaccine hesitancy
2	Mesch and Schwirian	2015	H1N1 vaccine hesitancy
3	Cascini, Pantovic, Al-Ajlouni, Failla and Ricciard	2021	Covid-19 vaccine hesitancy
4	Prickett, Habibi and Carr	2021	Covid-19 vaccine hesitancy
5	Argis, Kim, Roscizewski and Song	2021	HPV vaccine hesitancy and social media posts
6	Luo, Chen, Cui and Liao	2021	Public perception of Covid-19 vaccine online
7	Kang, Ewing-Nelson, Mackey, Schlitt, Marathe, Abbas, Swarup	2021	Vaccine sentiment on social media
8	Caserotti, Girardi, Rubaltelli, Tasso, Lotto, Gavaruzzi	2021	Covid-19 vaccine hesitancy
9	Jiang and Beaudoin	2016	Health literacy on the internet
10	Khanijahani, Calhoun and Kiel	2021	Internet habits and influenza vaccine uptake
11	Salmon, Dudley, Glanz and Omer	2015	Vaccine hesitancy
12	Ruiz and Bell	2021	Predictors of intention to vaccinate
13	Detoc, Bruel, Frappe, Tardy, Botelho-Nevers, Gagneux-Brunon	2020	Covid-19 vaccine hesitancy
14	Eberhardt ad Ling	2021	Covid-19 vaccination intention
15	Paul, Steptoe and Fancourt	2021	Covid-19 vaccination intention
16	Shaukat, Asghar and Naveed	2021	Health literacy on Covid-19
17	Varma, Verma, Vijayvargiya and Churi	2021	Covid-19 fake news detection
18	Sharma and Kapoor	2021	Covid-19 information on social media
19	Kennedy and Leask	2020	Vaccine hesitancy and misinformation
20	Gatwood, McKnight, Frederick, Hohmeier, Kapan, Chiu, Renfo and Hagemann	2021	Pneumococcal disease vaccine hesitancy
21	Simon and Camargo	2021	Infodemic
22	Slaoui and Hepburn	2020	Covid-19 vaccine
23	Sturm and Albrecht	2021	Covid-19 conspiracies in various media outlets
24	Hung, Lyons and Wu	2020	Health literacy on the internet
25	MacDonald	2015	Vaccine hesitancy scope and determinants
26	Li, Bailey, Huynh and Chan	2020	Vaccine misinformation in social media
27	Schmid, Rauber, Betsch, Lidolt and Denker	2017	Seasonal influenza vaccine hesitancy
28	Nuzhath, Tasnim, Sanjowal, Trisha, Rahman, Mahmud,Arman, Chakraborty, Hossain	2020	Vaccine misinformation in social media
29	Dube, Laberge, Guay, Bramadat, Roy and Bettinger	2013	Vaccine hesitancy

Table 2:
Publications used for the review paper (cont.)

No	Authors	Year	Description
31	Wong, Wong and AbuBakar	2020	Covid-19 vaccine hesitancy
32	Tasnim, Hossain and Mazumder	2020	Covid-19 misinformation in social media
33	Jolley and Douglas	2014	Vaccine intention
34	Syed Alwi, Rafidah, Zurraini, Juslina, Brohi and Lukas	2021	Covid-19 vaccine acceptance

Discussion

Stage 5: Utilising the findings to inform research and practice

The rapid spread of Covid-19 throughout the world has led to WHO declaring this outbreak as a pandemic on the 11th of March 2020 (World Health Organisation, 2020). The Covid-19 pandemic has devastated the worlds' economy and healthcare with 124,870,161 cases worldwide resulting in 2,747,933 fatalities (data up to 24th of March 2021). Out of the total number of cases, the highest numbers reported are in the United States of America (30,636,534 cases, 556,883 fatalities) followed by Brazil (12,136,615 cases, 298,843 fatalities) and India (11,734,058 cases, 160,477 fatalities). In Malaysia, there have been more than 300,000 reported cases with 1,246 fatalities reported as of 25th of March 2021 (Ministry of Health Malaysia, 2021). The fact that the Covid-19 virus is a respiratory virus that is airborne, makes it easy for the virus to be transmitted from person-to-person hence the almost uncontrollable spread that resulted in this pandemic that has lasted more than a year.

The development of the Covid-19 vaccine has been named "Operation Warp Speed" (OWS) solely due to plans to quicken control of the Covid-19 pandemic by propelling turn of events to develop, manufacture and distribute the vaccines, therapeutics and diagnostics (Slaoui & Hepburn, 2020). A total of six vaccines in the OWS program entered the clinical trial phase by mid-2020 and these included the following: Moderna and Pfizer/BioNTech (mRNA) (Jackson, et al., 2020; Mulligan, et al., 2020), AstraZeneca and Janssen (replication-defective live-vector) (Folegatti, et al., 2020; Keech, et al., 2020), and Novavax and Sanofi/Glaxo Smith Kline (recombinant-subunit-adjuvanted protein). Out of the six vaccines, Pfizer was the first to announce the launch of the first Covid-19 vaccine in November, 2020, followed by Moderna, both of which are mRNA-based vaccines.

There are several criteria to ensure the OWS vaccines including significant preclinical information or beginning phase clinical preliminary information supporting their potential for clinical wellbeing and viability, and be based on one of the four accepted vaccine platform technologies with sufficient manufacturing capabilities, yields, and consistency important to dependably create in excess of 100 million vaccine doses by mid-2021 (Slaoui & Hepburn, 2020). A high rate of vaccination is needed by the population in order to establish a herd immunity among the masses and to slow down or stop the spread of Covid-19. However, public perception on the Covid-19 vaccine exacerbated by negative social media reports is generating a significant vaccine hesitancy which would impact on the potential benefit of these vaccines and the combat against the Covid-19 pandemic (Tasnim, Hossain, & Mazumder, 2020). The internet is undoubtedly a good place to improve health literacy (Hung, Lyons, & Wu, 2020), however, it is also a source of detrimental information and provides wrong information (Jiang & Beaudoin, 2016).

Vaccine hesitancy is a phase between vaccine acceptance and refusal to be vaccinated whereby it is an individual's refusal to accept or delay in acceptance of a vaccination despite the availability of the vaccine (MacDonald, 2015). The high percentage of vaccine hesitancy has been linked to low vaccine demand, making this issue a real threat to the success of any vaccination program (Dube, et al., 2013). Vaccine hesitancy for Covid-19 was found to be caused by the relatively fast production of the vaccine, insufficient vaccine trial, uncertainty

of the genetic components in the vaccine, uncertainty of side effects and its effectiveness (Aldossari, et al., 2021; Cascini, Pantovic, Al-Ajlouni, Failla, & Ricciard, 2021; Prickett, Habibi, & Carr, 2021). The seriousness of vaccine hesitancy has led to the declaration by WHO that vaccine hesitancy was one of the top ten threats to human health in 2019. One of the impacts of vaccine hesitancy is lack of individuals willing to be immunized against diseases leading to the emergence of outbreaks such as measles in the United State of America and Canada (Sanyaolu, Okorie, Qi, Locke, & Rehman, 2019). Vaccine hesitancy is not something new and it has posed a major problem during the H1N1 pandemic in 2009 and even for seasonal influenza (Mesch & Schwirian, 2015; Schmid, Rauber, Betsch, Lidolt, & Denker, 2017; Paul, Stetoe, & Fancourt, 2021). Studies have shown that vaccine hesitancy will be a main barrier when it comes to Covid-19 vaccine uptake (Detoc, et al., 2020).

Social networks play a major role in disseminating information in a rapid, widespread manner to individuals. Current popular choices of social media include Facebook, YouTube, Instagram and Twitter. The internet is one of the modes through which social media can be accessed. This information which is not screened or edited for accuracy of content can then be spread rapidly through social media. This misinformation tends to lead to doubt among the masses. The more doubtful they are about the vaccine, the more likely they will be unwilling to get vaccinated, regardless of the vaccine (Caserotti, et al., 2021). The term 'infodemic' has also been used by researchers to describe the widespread of false information of the Covid-19 pandemic via social media and other media (Simon & Camargo, 2021). The term has also been used to describe vaccine hesitancy which is fuelled by the spread of vaccination fear or doubts on social media.

With the rapid development of the Covid-19 vaccine, there has been an overabundance of information related to the various vaccines available and the supposed side effects to these vaccines. There has been an increase of anti-vaccine information and vaccine injury claims being spread on social media during the Covid-19 pandemic (Salmon, Dudley, Glanz, & Omer, 2015; Pulido, Ruiz-Eugenio, Redondo-Sama, & Villarejo-Carballido, 2020). Research conducted by Aldossari, et al. (2021) revealed that people attained information about Covid-19 and the vaccines related to it from social media, television and ministry websites (Aldossari, et al., 2021). The authors agreed that social media circulated and provided misinformation pertaining to the Covid-19 vaccine and this has caused an increase in anxiety among participants as well as vaccine hesitancy. A study revealed that approximately 27.5% of the Covid-19 content on YouTube contained vaccine misinformation, non-factual vaccine information and anti-vaccine content (Li, Bailey, Huynh, & Chan, 2020). Researchers also believe that people who turn to social media as their source of pandemic-related information are less likely to anticipate getting vaccinated (Ruiz & Bell, 2021).

Anti-vaccine discourses were reported to be most prevalent on Twitter (Radzikowski, et al., 2016; Kang, et al., 2017; Luo, Chen, Cui, & Liao, 2021). A content analysis of Twitter data showed that the negative tweets were further assigned to a theme and subtheme based on the content (Nuzhath, et al., 2020). The negative tweets were further categorised into 7 major themes: "safety and effectiveness," "misinformation," "conspiracy theories," "mistrust of scientists and governments," "lack of intent to get a COVID-19 vaccine," "freedom of choice," and "religious beliefs. Negative tweets predominantly consisted of statements that immunization against coronavirus was unnecessary as the survival rate is high. The second most prevalent theme to emerge was tweets constituting safety and effectiveness related concerns regarding the side effects of a potential vaccine developed at an unprecedented speed. The increase in anti-vaccine tweets on Twitter is partly due to the high uncertainty avoidance characteristic of Americans on the platform (Kang, et al., 2017; Luo, Chen, Cui, & Liao, 2021).

Social media impact is not exclusive to Covid-19 vaccines as this issue can also be seen for the administration of other vaccines. A study done on HPV vaccine uptake showed that mothers that engage and read anti-vaccine posts are likely to have a high vaccine hesitancy and ultimately make a decision to not allow their children to take the HPV vaccine (Argris, Kim, Roscizewski, & Song, 2021). Another study pertaining to Hepatitis B and HPV vaccines showed that the respondents of the study have heard negative information regarding the vaccines on social media and that they do not know where else they could access reliable information (Gatwood, et al., 2021). Thus, it is important for us to address the adverse effects of vaccine

misinformation on social media when it comes to vaccine uptakes. As social media content is more accessible now than in the past decade, digital literacy and technical solutions are needed more than ever to curb anti-vaccine posts and vaccine misinformation. Studies have also shown that conspiracy theories surfacing on social media has caused hesitancy and disbelief for Covid-19 vaccine uptake (Sturm & Albrecht, 2021). The conspiracy theories and controversies surrounding the Covid-19 vaccine are deemed to be more intense as compared to the influenza vaccines (Khanijahani, Calhoun, & Kiel, 2021). Furthermore, these conspiracies being spread on social media has also played an important role in spreading and promoting fear of Covid-19 (Shaukat, Asghar, & Naveed, 2021).

People are inflicted with false or damaging claims on social media pertaining to the Covid-19 vaccine which might potentially harm the vaccination process as well as the vaccination uptake. A study showed that there is a serious need for developing automated strategies which are able to combat misinformation in social media platforms (Varma, Verma, Vijayvargiya, & Churi, 2021). Studies have also shown that sharing unverified information during a pandemic is very harmful and that the information being disseminated should be better managed and verified before being shared (Sharma & Kapoor, 2021). Furthermore, researchers have called out for the relevant parties to address Covid-19 conspiracy beliefs which have been circulating on social media as this has evidently played a role in vaccine hesitancy (Eberhardt & Ling, 2021).

Studies found that vaccine confidence has shown a decline in Malaysia and South Korea and this was caused by online mobilisation against vaccines (Kennedy & Leask, 2020). A study conducted on vaccine acceptance showed that out of a total of 1,411 Malaysian respondents, the acceptance rate of Covid-19 vaccine was computed to be 83.3% more higher than the resistance rate of 16.7% (Syed Alwi, et al., 2021). However, it is important to understand that perceptions can be changed especially when people are presented with misinformation pertaining to the Covid-19 vaccine on social media. About 97.4% of the respondents used social media to source for Covid-19 information. The study acknowledged the fact that the presence of anti-vaccine theories on the internet has reduced the vaccination intention of Malaysians. These theories and conspiracies bring about feelings of undue concerns, mistrust in authorities or the government and disillusionment (Jolley & Douglas, 2014). In a study where eight health professionals were interviewed regarding vaccine hesitancy, five broad themes emerged with one of them being the ban of spreading anti-vaccine information on social media platforms (Wong, Wong, & AbuBakar, 2020).

Conclusion

The review of various literature in both the fields of social media and vaccine hesitancy found that there are few areas that require exploration, predominantly in terms of exploratory studies. Social media plays a significant role in the dissemination of data. During the Covid-19 pandemic, it assists with advancing preventive practices but its job and the pathway is as yet muddled. That being said, some considerable uncertainties about what social media and vaccine hesitancy is and comprises of still exist as well. Consequently, building on past knowledge about the positive role of social media in order to further understand the phenomenon and give out informed advice to practice is problematic. Thus, this study set out to clarify the boundary conditions needed to investigate vaccine hesitancy from the perspective of social media as a means to disseminate information by conducting a systematic literature review of what is currently known about Covid-19 vaccines and relating these perceptions to the body of knowledge which has been established in this field.

References

Aldossari, K. K., Alharbi, M. B., Alkahtani, S. M., Alrowaily, T. Z., Alshaikhi, A. M., & Twair, A. A. (2021). COVID-19 vaccine hesitancy among patients with diabetes in Saudi Arabia. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 1-5.

Argris, Y. A., Kim, Y., Roscizewski, A., & Song, W. (2021). The Mediating Role of Vaccine Hesitancy between Maternal Engagement with Antiand Pro-vaccine Social Media Posts and Adolescent HPV-Vaccine Uptake Rates in. Social Science & Medicine, 282.

Cascini, F., Pantovic, A., Al-Ajlouni, Y., Failla, G., & Ricciard, W. (2021). Attitudes, acceptance and hesitancy among the general populationworldwide to receive the COVID-19 vaccines and their contributingfactors: A systematic review. EClinicalMedicine, 1-14`-.

Caserotti, M., Girardi, P., Rubaltelli, E., Tasso, A., Lotto, L., & Gavaruzzi, T. (2021). Associations of COVID-19 risk perception with vaccine hesitancy over time for Italian residents. Social Science & Medicine, 272.

Centres for Disease Control and Prevention. (2021, February 22). Symptoms of Covid-19. Retrieved August 10, 2021, from Centres for Disease Control and Prevention: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html

Detoc, M., Bruel, S., Frappe, P., Tardy, B., Botelho-Nevers, E., & Gagneux-Brunon, A. (2020). Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. Vaccine, 38(45), 7002-7006.

Dube, E., Laberge, C., Guay, M., Bramadat, P., Roy, R., & Bettinger, J. A. (2013). Vaccine hesitancy: an overview. Human Vaccines and Immunotherapeutics, 9(8), 1763-1773.

Eberhardt, J., & Ling, J. (2021). Predicting COVID-19 vaccination intention using protection motivation theory and conspiracy beliefs. Vaccine, 39(42), 6269-6275.

Folegatti, P. M., Ewer, K. J., Aley, P. K., Angus, B., Becker, S., Belij-Rammerstorfer, S., ... & Hamlyn, J. (2020). Safety and immunogenicity of the ChAdOx1 nCoV-19 vaccine against SARS-CoV-2: a preliminary report of a phase 1/2, single-blind, randomised controlled trial. The Lancet, 396(10249), 467-478.

Gatwood, J., McKnight, M., Frederick, K., Hohmeier, K., Kapan, S., Chiu, C.-Y., . . . Hagemann, T. (2021). Extent of and Reasons for Vaccine Hesitancy in Adults at High-Risk for Pneumococcal Disease. American Journal of Health Promotion, 35(7), 908-916.

Hung, L.-Y., Lyons, J. G., & Wu, C.-H. (2020). Health information technology use among older adults in the United States, 2009–2018. Current Medical Research and Opinion, 36(5), 789-797.

Iqhram, A. (2021, July 16). DG Hisham ramal Malaysia capai 24,000 kes positif sehari. Retrieved from Wacana: https://wacana.my/dg-hisham-ramal-malaysia-capai-24000-kes-positif-sehari/

Jackson, L. A., Anderson, E. J., Rouphael, N. G., Roberts, P. C., Makhene, M., Coler, R. N., ... & Beigel, J. H. (2020). An mRNA vaccine against SARS-CoV-2—preliminary report. New England Journal of Medicine.

Jiang, S., & Beaudoin, C. E. (2016). Health literacy and the internet: An exploratory study on the 2013 HINTS survey. Computers in Human Behavior, 58, 240-248.

Jolley D, Douglas KM. (2014). The effects of anti-vaccine conspiracy theories on vaccination intentions. PLoS One, 9(2).

Kang, G. J., Ewing-Nelson, S. R., Mackey, L., Schlitt, J. T., Marathe, A., Abbas, K. M., & Swarup, S. (2017). Semantic network analysis of vaccine sentiment in online social media. Vaccine, 35(29), 3621-3638.

Keech, C., Albert, G., Cho, I., Robertson, A., Reed, P., Neal, S., ... & Glenn, G. M. (2020). Phase 1–2 trial of a SARS-CoV-2 recombinant spike protein nanoparticle vaccine. New England Journal of Medicine, 383(24), 2320-2332.

Kennedy, J., & Leask, J. (2020). Social media platforms have a moral duty to ban misinformation about vaccines: Two leading thinkers on vaccine hesitancy and misinformation debate this crucial question. Index on Censorship, 49(4), 76-79.

Khanijahani, A., Calhoun, B., & Kiel, J. (2021). Internet use habits and influenza vaccine uptake among US adults: resultsfrom seven years (2012e2018) of the National Health Interview Survey. Public Health, 195, 76-82.

Li, H. O.-Y., Bailey, A., Huynh, D., & Chan, J. (2020). YouTube as a source of information on COVID-19: a pandemic of misinformation? BMJ Global Health, 5(5).

Luo, C., Chen, A., Cui, B., & Liao, W. (2021). Exploring public perceptions of the COVID-19 vaccine online from a cultural perspective: Semantic network analysis of two social media platforms in the United States and China. Telematics and Informatics, 65, 1-13.

MacDonald, N. E. (2015). Vaccine hesitancy: definition, scope and determinants. Vaccine, 33(34), 4161-4164.

Mesch, G. S., & Schwirian, K. P. (2015). Social and political determinants of vaccine hesitancy: Lessons learned from the H1N1 pandemic of 2009-2010. American Journal of Infection Control, 43(11), 1161-1165.

Mulligan, M. J., Lyke, K. E., Kitchin, N., Absalon, J., Gurtman, A., Lockhart, S., ... & Jansen, K. U. (2020). Phase I/II study of COVID-19 RNA vaccine BNT162b1 in adults. Nature, 586(7830), 589-593.

Nuzhath, T., Tasnim, S., Sanjowal, R. K., Trisha, N. F., Rahman, M., Mahmud, F., . . . Hossain, M. M. (2020). OVID-19 vaccination hesitancy, misinformation and conspiracy theories on social media: A content analysis of Twitter data .

Paul, E., Stetoe, A., & Fancourt, D. (2021). Attitudes towards vaccines and intention to vaccinate against COVID-19:Implications for public health communications. The Lancet Regional Health - Europe, 1, 1-10.

Portal Rasmi Kementerian Kesihatan Malaysia. (n.d.). Ministry of Health Malaysia. Retrieved September 15, 2021, from https://www.moh.gov.my/index.php?mid=5

Prickett, K. C., Habibi, H., & Carr, P. A. (2021). COVID-19 Vaccine Hesitancy and Acceptance in a Cohort of Diverse New Zealanders. The Lancet Regional Health - Western Pacific, 14.

Pulido, C. M., Ruiz-Eugenio, L., Redondo-Sama, G., & Villarejo-Carballido, B. (2020). A New Application of Social Impact in Social Media for Overcoming Fake News in Health. International Journal of Environmental Research and Public Health, 17(7).

Radzikowski, J., Stedanidis, A., Jacobsen, K. H., Croitoru, A., Crooks, A., & Delamater, P. L. (2016). The Measles Vaccination Narrative in Twitter: A Quantitative Analysis. JMIR public health and surveillance, 2(1).

Ruiz, J. B., & Bell, R. A. (2021). Predictors of intention to vaccinate against COVID-19: Results of a nationwide survey. Vaccine, 39, 1080-1086.

Salmon, D. A., Dudley, M. Z., Glanz, J. M., & Omer, S. B. (2015). Vaccine hesitancy: Causes, consequences, and a call to action. Vaccine, 33(4), 66-71.

Santa Maria Chin, E. (2021, July 16). Dr Noor Hisham: Covid-19 cases may drop below 1,000 daily by end of October with ramped up second-dose vaccinations. Retrieved from Malay Mail: https://www.malaymail.com/news/malaysia/2021/07/16/dr-noor-hisham-covid-19-cases-may-drop-below-1000-daily-by-end-of-october-w/1990277

Sanyaolu, A., Okorie, C., Qi, X., Locke, J., & Rehman, S. (2019). Childhood and adolescent obesity in the United States: a public health concern. Global pediatric health, 6, 2333794X19891305.

Schmid, P., Rauber, D., Betsch, C., Lidolt, G., & Denker, M.-L. (2017). Barriers of Influenza Vaccination Intention and Behavior – A Systematic Review of Influenza Vaccine Hesitancy, 2005 – 2016. PLoS ONE, 12(1).

Sharma, A., & Kapoor, P. S. (2021). Message sharing and verification behaviour on social media during the COVID-19 pandemic: a study in the context of India and the USA. Online Information Review.

Shaukat, R., Asghar, A., & Naveed, M. A. (2021). Impact of Health Literacy on Fear of Covid-19, Protective Behavior, and Conspiracy Beliefs: University Students' Perspective. Library Philosophy and Practice, 1-13.

Simon, F. M., & Camargo, C. Q. (2021). Autopsy of a metaphor: The origins, use and blind spots of the 'infodemic'. New Media and Society.

Slaoui, M., & Hepburn, M. (2020). Developing Safe and Effective Covid Vaccines — Operation Warp Speed's Strategy and Approach. The New England Journal of Medicine, 383(18), 1701-1703.

Sturm, T., & Albrecht, T. (2021). Constituent Covid-19 apocalypses: contagious conspiracism, 5G, and viral vaccinations. Anthropol Med, 28(1), 122-139.

Syed Alwi, S.A.R., Rafidah, E., Zurraini, A. et al. (2021). A survey on COVID-19 vaccine acceptance and concern among Malaysians. BMC Public Health **21,** 1129

Tasnim, S., Hossain, M. M., & Mazumder, H. (2020). Impact of rumors and misinformation on COVID-19 in social media. Journal of preventive medicine and public health, 53(3),

171-174.
Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. British Journal of Management, 14, 207-222.
Varma, R., Verma, Y., Vijayvargiya, P., & Churi, P. P. (2021). A systematic survey on deep learning and machine learning approaches of fake news detection in the pre- and post-COVID-19 pandemic. International Journal of Intelligent Computing and Cybernetics.
Wong, L. P., Wong, P. F., & AbuBakar, S. (2020). Vaccine hesitancy and the resurgence of vaccine preventable diseases: the way forward for Malaysia, a Southeast Asian country. Human Vaccines & Immunotherapeutics, 16(7).
World Health Organisation. (2020, 11 March). WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. Retrieved from World Health Organisation: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
World Health Organisation. (2021). Malaysia. Retrieved from World Health Organisation: https://covid19.who.int/region/wpro/country/my

Biographical Statements

Sharmini Gopinathan

is a Senior Lecturer at the Faculty of Management, Multimedia University, Malaysia and currently heads the Centre for Knowledge and Innovation Management (CEKIM). She has previously served Business School (a non-academic revenue generating arm of MMU) in the capacity of Head of Marketing and Operations. She is also an avid researcher in the field of 21st century learning, innovative teaching strategies, mental health, business psychology, work life balance and information systems. Having close to 26 years of experience in Lecturing, Training and Development along with highly rated management experience puts her in a position to understand the key role that various management skills play in helping organizations achieve their business objectives. Dr. Sharmini possesses an in-depth understanding of some of the best practices of academic business in Malaysia and how they can be applied in other global business environments. She has won several awards for best paper publications as well as presentations on effective teaching with blended learning tools.

Anisha Haveena Kaur

is a postgraduate student from the Faculty of Management, Multimedia University, Malaysia. She is currently working on her PhD. Her current research interests are on innovative teaching and learning.

Murali Raman

is the Director of Post Graduate and Continuing Education at Asia Pacific University, Malaysia. Prof Ts. Dr. Murali Raman is currently the Director in Asia Pacific University (APU). He is an experienced Professor with a demonstrated history of working in the higher education industry. Skilled in Design Thinking, Digital Leadership, and Mindset change. Trainer and coach for Corporations in Malaysia. Certified in Design Thinking by Stanford dSchool; Certified NLP Practitioner. Solid research achievements with numerous research accolades e.g., World Innovation Award (Korea), National Outstanding Award for Education Leadership and Gold Medallist at PECIPTA 2013. Published more than 85 papers in International Journals and Conferences. Invited Speaker at Conferences and Seminars on Digital Business Transformation. Rhodes Scholar and Fulbright Fellow with academic qualification from LSE, Imperial College and Claremont Graduate University, USA. Academic Leadership for various positions including Dean of Faculty, and Director of Business School. Avid Design Thinker.

Shubashini Rathinavelu

Dr. Shubashini is a Malaysian national, working as an Assistant Professor in the Department of Business Administration at Prince Mohammad Bin Fahd University, Saudi Arabia. She has a PhD Management from Multimedia University, Malaysia. She specializes in the field of MIS, Strategic Management, Operational excellence using Power BI, Data Analytics, Smart PLS Research Methodology. Her current research interest is Information System & Behavioural studies, Organizational Resilience and digital transformation in teaching and learning. She is a young researcher who is involved in journals, international conferences, project grants and an author of a book chaptered. Shuba hopes to stimulate ideas and teaching strategies that can enrich transformation efforts to shape the future generation at the workforce in KSA.

Sivasutha Thanjappan

Dr Sivasutha Thanjappan a Medical Officer in Emergency Department in Hospital Ampang Selangor, Malaysia. She obtained her Medical Degree from Universitas Gadjah Mada, Indonesia. She has served as Medical Doctor in Emergency department for more than 5 years. She is also actively engaged in Prehospital care services as a trained retrievalist for MEDEVACs in Malaysia especially Sabah. She has published couple of posters in international conferences and also in SCOPUS indexed journals. She is trained in all emergency life supports and a Basic Life Support Trainer. She is a GCP 2020 certified with area of expertise in Pre-Hospice Care, ED Clinical and Basic Retrieval Medicine.