Knowledge, Beliefs, and Intention to Vaccinate against COVID-19 among the Seventh Day Adventists in Southeast Asia Region

Mary Jane Botabara-Yap, RN, DrPH,[1] Maria Cecilia B. Torres, RND, MSCN,[1]
Yanna Yvonne C. Macayan, RMT, MSMT,[2] Ma. Lee L. Alpuerto, MN, MAN,[1] Cryslie L. Romero, RND, MPH,[1]
Lady Winderose V. Oliverio, RND, MBA[1] and Yakobus Lau De Yung Sinaga, BSND, MPH[3]

[1]Graduate Public Health Department, Adventist University of the Philippines
[2]Medical Laboratory Science Department, Adventist University of the Philippines
[3]Public Health Department, Bhakti Kencana University, Indonesia

ABSTRACT

Objective. The vaccine rollout in the Asian region was slower than in other countries. Factors such as lack of knowledge and skepticism towards the vaccine were noted. On the other hand, the influence of religious leaders on the congregation was enormous, including their intention to vaccinate. Guided by the Health Belief Model theory, this study aimed to explore the knowledge, belief and perceived susceptibility and severity of COVID, the perceived benefits and barriers of the vaccines, and the intention to vaccinate among the Seventh Day Adventists in Asia.

Methods. This was a descriptive study with respondents chosen through a multi-stage sampling method within the Asian region. A validated self-survey questionnaire, piloted among 40 respondents, was used using the Google online form. Data gathering was conducted for one month, from May until June 2021.

Results. Out of 400 questionnaires distributed, 396 responded with a return rate of 0.99%. The majority were aged 18–29 years (43.2%), men (61.4%), married (50.2%), completed a bachelors' degree (49.5%), currently working (65.4%), and have been a member of the church for 20 years (30.8%). The majority had excellent knowledge regarding the vaccine (mean 4.72, ± 1.33); despite having low belief in the vaccine (mean 2.18, ± 0.43), low perception of their susceptibility to acquiring COVID (mean 2.43, ± 0.34), low perception on the seriousness of COVID (mean 2.30, ±0.40), low perception on vaccine benefits (mean 2.27, ± 0.45), and perceived low barrier on being vaccinated (mean 2.27, ±.45). Most of them intend to vaccinate (67.3%).

Conclusion. The findings of this study suggest that the majority of Adventists intend to vaccinate. However, there is a need for health education to enhance their belief in the vaccine and change their negative perception about their susceptibility and severity of COVID.

Keywords: COVID-19 response, COVID vaccine, religion, Asian region, health belief model, belief, intention to vaccinate

eISSN 2094-9278 (Online)
Published: June 28, 2023
https://doi.org/10.47895/amp.vi0.4549

Corresponding author: Mary Jane Botabara-Yap, RN, DrPH
Graduate Public Health Department
Adventist University of the Philippines
Puting Kahoy, Silang, Cavite 4118, Philippines
Email: mjbbotabara@aup.edu.ph
ORCiD: https://orcid.org/0000-0002-1968-9165

What we already know

The COVID-19 response in most Asian countries was initially strong; however, the vaccine rollout was slower than its western counterparts. Religious organizations play a vital role in educating their congregation and influencing them toward the decision to vaccinate. The Southeast Asian region is multi-cultural and carries different beliefs and perceptions. The Seventh Day Adventist church has a strong presence in this region and, therefore, would be a good place to start this descriptive study.

What this article adds

On top of what we already know, this study further enhanced our understanding of the perception of the respondents towards the COVID-19 as a disease and the vaccines as a preventive measure. Further, we were able to identify the percentage of the Adventists who have the intention to take the vaccine. Utilizing the health belief model as a framework, we were able to understand the respondents' perceptions of their susceptibility and seriousness of COVID, as well as their beliefs, and perceptions of the benefits and barriers of taking the COVID-19 vaccine.

INTRODUCTION

The current pandemic inflicting havoc worldwide has shown that religion plays a major role in mitigating coronavirus disease (COVID-19).[1] The influence of religious leaders, their stance, and pronouncements to the congregation is enormous, including their intention to vaccinate. Vaccines were developed as a preventive measure against COVID-19. As of this writing, 94 vaccines are undergoing human clinical trials, while 31 of these have reached the final stages of testing.[2] Out of these, eight have been approved by the World Health Organization (WHO) for full use as emergency vaccines; these are: Pfizer-BioNtech, Moderna, AstraZeneca, Convidecia (CanSino), Johnson & Johnson, Coronava, Sinopharm, and Sinovac.[3] Countries have launched their vaccine rollout since December 2020, with the United Kingdom being the first country to start administering the emergency vaccine to their population. The government has vaccinated 47% of its total population, while the United States recorded that 42% of the population has been vaccinated.[4]

In Asia, despite the initial positive emergency response of mitigating the COVID community transmissions in early 2020, the vaccine rollout started rather late compared to Western countries.[5,6] Several reasons were mentioned: the lack of pharmaceutical companies that would become the leader in vaccine production, and another was skepticism and weak public demand for vaccines.[5-7] In the Philippines, for example, only 19% of the population were willing to be inoculated with a vaccine, and this was because of fear and misinformation from the recent Dengavaxia scare.[8]

The religious community has a major role in disarming the COVID-19 vaccine hesitancy. Recently, of the 5,600 surveys of adults in the United States, 44% of the population are hesitant about the vaccine, regardless of religious affiliations. However, 26% of these noted that faith-based vaccination campaigns would make them likely to decide to vaccinate, especially if the church leaders become proactive in advocating the vaccine.[9] Each religious organization has its stand on vaccines.

The Seventh Day Adventist church belongs to a worldwide denomination with its main office in the United States. It is one of the major denominational churches in the Southern Asia Pacific region, with almost 1.5 million members hailing from countries like the Philippines, Indonesia, Malaysia, Singapore, Vietnam, Cambodia, Thailand, Bangladesh, and Sri Lanka.[10] The church firmly believes that the coming of Jesus Christ will bring an end to the people's suffering. Moreover, the church also believes in keeping the body healthy and strongly advocates for maintaining a healthy immune system.[10] The Adventists are well studied in the scientific community and influence the health community, including their take on vaccines and vaccination.[11] As a church, much as they respect the individual choice of their members, however, it supports the evidence-based public health recommendations and the authorizations of the WHO to use the emergency COVID-19 vaccines.

Despite this supportive stand, however, Adventists within the Asia Pacific region, with its multi-cultural backgrounds, were observed to be displaying a somewhat passive attitude towards the vaccine. For this reason, there is a need to understand better the apprehension of the said population towards the COVID-19 vaccine. Utilizing the Health Belief Model as a theoretical framework, this study aims to explore the determinants (knowledge and belief), perceptions (susceptibility to COVID, severity of COVID, benefits of COVID-19 vaccination, and barriers to vaccination), and intention to vaccinate among the Seventh Day Adventists within the Asia Pacific Region.

METHODS

Research Design and Participants

This was a cross-sectional observational study using a multi-stage sampling of 396 adults who are active Seventh Day Adventist members of the Southern Asia Pacific Division from seven countries: Philippines, Indonesia, Malaysia, Thailand, Vietnam, Bangladesh, and Sri Lanka. The sample size was determined using the Raosoft software in computing for the actual sample, which was 380 (Confidence Level at 95%, CI=5.0). However, considering that some will not reply to the questionnaire, we sent out 450 and yielded 396 results.

Instrumentation and Data Collection

The participants were chosen through a multi-stage sampling method. Inclusive criteria include: a. active member of Seventh Day Adventist, b. between 18-70 years old, c. church membership is within the Asian region.

Participants were chosen randomly through two stages: 1. From the list of churches within the Asian territory of the Seventh Day Adventist, namely, the Philippines, Indonesia, Malaysia, Thailand, Vietnam, Bangladesh, and Sri Lanka; 2. From the list of members' names from the chosen church. A self-administered, structured online questionnaire was administered to 396 who agreed to participate. The questionnaire had four parts: a. Demographic information about the participants; b. Determinants included knowledge (a six-item true or false question), and beliefs of the participants regarding the vaccine, a 12-item 4-point Likert scale, c. Perceptions based on the health belief model (perceived susceptibility, severity, benefits, and barriers), consisted of six items and a 4-point Likert scale, and d. Intention to vaccinate. The statements in the questionnaire were captured from a literature review, initial interviews with constituents, the WHO Vaccine Hesitancy study, and from the Center for Disease Control. The instrument underwent content validation and pilot testing to determine its validity and reliability. The questionnaire was distributed online, and data collection was initiated on 25th May until 25th June 2021.

Statistical Analysis

Data analysis was performed using the Statistical Package for Social sciences (SPSS) program version 23. Data were further analyzed using descriptive statistics of mean, frequency, and percentage. To determine the relationships of each variable, logistic regression was employed and adjusted odds ratio (AOR) with 95% confidence interval. A p-value of less than 0.05 was considered significant.

Ethical Consideration

This research complied with the declaration of Helsinki's ethical principles for medical research involving human subjects. Before the study, we sought approval from the Adventist University of the Philippines' Ethical Review Board with Approval Number 2021-ERB-AUP-104, which was approved on 24th May 2021. Consent was included in the google form and was thoroughly explained to the respondents; this was done on the day of data gathering. Through the help of the coordinators from each country, the respondents were asked to join a Zoom meeting to explain the study's details. Questions were entertained, and it was explained further that they have a choice at any moment not to participate if they feel not comfortable, and it will not be held against them. Further, emails of each respondent were collected through coordinators from each region.

RESULTS

Demographic Information of the Participants

There were 396 who participated in the study. Of this, 43.2% were the highest group belonging to ages 18–29 yrs., followed by 40–49 years (20.5%) and the lowest being 60–70 years (3.3%). Majority of the population were men, 61.4% while 50.2% were unmarried. Most of the respondents completed a bachelors' degree (49.5%), and 17.5% have postgraduate degrees. Majority of the respondents have worked at 65.4%. Considering the number of years that they have been members of the church, most of them were members for 20 to 30+ years, 30.8% and 22.2%, respectively. Table 1 reflects the demographic information.

Table 1. Demographic information

		Frequency	%	Valid %	Cumulative %
***Age** (yrs.)*	18-29	169	42.7	43.2	43.2
	30-39	70	17.7	17.9	61.1
	40-49	80	20.2	20.5	81.6
	50-59	59	14.9	15.1	96.7
	60-70	13	3.3	3.3	100.0
Occupation	With Work	259	65.4	66.3	
	No Work	132	34.9	33.7	
Sex	Male	243	61.4	62.1	62.1
	Female	148	37.4	37.9	100.0
Marital Status	Married	192	48.5	49.1	98.0
	Not Married	199	50.2	50.8	48.8
Education	Basic Ed	77	19.4	19.7	20.7
	Vocational	49	12.4	12.5	32.2
	Bachelor's	196	49.5	50.1	82.4
	Post Grad	69	17.5	17.6	100
***Duration of church membership** (yrs.)*	0-5	31	7.9	7.9	9.2
	6-10	34	8.6	8.7	16.6
	11-20	116	29.3	29.7	46.3
	21-30	88	22.2	22.5	68.8
	31 and above	122	30.8	31.2	100.0
Total		391	98.7	100.0	

Determinants and Perceptions of COVID-19 Vaccines

The determinants included in the study were knowledge related to COVID-19 vaccines and beliefs about the vaccines. The perceptions were patterned from the health belief model, such as perceived susceptibility, severity of COVID-19, benefits, and barriers to getting the vaccine.

Knowledge of COVID-19 vaccines as determinant showed the highest mean of 4.72, ± 1.33; however, most respondents have *low belief* in COVID-19 vaccines (mean 2.18, ± 0.43). Although respondents do not believe that the vaccine is a deliberate attempt by a group of powerful people to make money (mean 2.43, ± 0.93), however, respondents *agree* that their strong religious beliefs will protect them against the severe impact of COVID (mean 2.74, ± 0.98). Moreover, they *disagree* that the Experts behind the vaccines are trustworthy (mean 2.06, ±.73) and *agree* that the vaccine is unnecessary to stop the pandemic (mean 2.08, ± 0.86). Further, they believe that practicing a healthy lifestyle is not enough (mean 1.82, ± 0.85) and that the vaccine is not an initial move for them to have the mark of the beast (mean-1.89, ±.86).

In considering the perceptions regarding COVID-19, respondents perceived a *low susceptibility* to the disease (mean 2.43, ± 0.34) and *low perception of the seriousness* (severity) of contracting COVID-19 (mean 2.30, ± 0.40). Further, the majority *agree* that since they are doing the preventive protocols for the pandemic, therefore, they are not worried about getting COVID (mean 3.02, ± 0.73); they also *disagree* that the government is doing their best to reduce our risk of COVID (mean 1.90, ± 0.86). The majority of them *disagree* that COVID-19 is very serious (mean 1.60, ± 0.75) and that they are more concerned about the issues of vaccines than COVID as a disease (mean 2.81, ± 1.0).

The perception of the COVID-19 vaccine showed that respondents perceived *low benefits* in taking the vaccine (mean 2.27, ± 0.45) and a *low barrier* in acquiring it (mean 2.27, ± 0.45). Respondents *disagree* that the vaccine effectively prevents COVID (mean 2.15, ± 0.77). Despite the low perceived benefits of the vaccine, however, respondents *agree* that it has larger benefits than risks (mean 2.87, ± 0.76). These results are reflected in Table 2.

Intention to Vaccinate and Result of Logistic Regression

Majority of the respondents (67.3%) intend to be vaccinated, while 32.7% do not intend to do so. The variables that entered the logistic regression were current occupation, belief, perceived susceptibility, and perceived benefits of the COVID-19 vaccine. Table 3 depicts this result.

Results showed that currently working respondents have a 2-fold increase in the intention to vaccinate than those who are not working (Adjusted OR 2.45, p-value = 0.01). Moreover, belief showed a 10-fold increase in the intention to vaccinate, which further implied that respondents who have strong beliefs have ten times the intention to vaccinate (AOR 10.37, p-value = 0.01). The respondents' perception of the susceptibility to COVID-19 and the perception of the vaccine's benefits yielded twice and eight times increase in the intention to vaccinate, respectively (AOR 2.94, p-value = 0.02; AOR 8.16, p-value = 0.01). This further implies that respondents who feel that they have a strong perception of getting the disease and think that the vaccine has benefits are more likely to be decided to get vaccinated.

Table 2. Determinants and perceptions of COVID-19 and COVID vaccines

Variables	N	Min	Max	Mean	Std Deviation
Knowledge	392	0.00	6.00	4.7296	1.33355
Beliefs	392	1.13	3.38	2.1878	0.43632
Susceptibility	392	1.33	3.50	2.4315	0.34802
Severity	392	1.20	3.40	2.3000	0.40026
Benefits	392	1.17	4.00	2.2776	0.45851
Barriers	392	1.17	4.00	2.2776	0.45851
Valid N *(listwise)*	392				

Table 3. Intention to Vaccinate and Result of Logistic Regression

Variables	B	S. E.	Sig	Odds Ratio	95% CI Lower/Upper
Current Occupation	.898	.298	003	2.454	1.368/4.403
Beliefs	2.339	.454	.000	10.373	4.259/25.265
Susceptibility	1.079	.473	.022	2.942	1.165/7.430
Benefits	2.099	.462	.000	8.160	3.299/20.183
Constant	-14.775	1.657	.000	.000	
Intention to Vaccinate	Intend to Vaccinate		67.3%		
	Don't Intend to Vaccinate		32.7%		

DISCUSSION

While recent studies have shown high knowledge of respondents regarding COVID-19 vaccines, vaccine hesitancy is still rampant.[12] For example, the working population is concerned about the lack of vaccine research, while some are worried about the safety or side effects of the vaccination.[13-15] These are valid concerns as the Food and Drug Administration (FDA) agreed on Emergency Use Authorization (EUA) to allow the use of unapproved medical products in an emergency to diagnose, treat, or prevent serious or life-threatening diseases or conditions when specific statutory criteria have been met, including that there are no adequate, approved, and available alternatives.[16] Unfortunately, experts believe that some of the time-consuming administration work was bypassed due to the urgent need for vaccines during the pandemic and that despite the rapid development, the vaccines still need to be subjected to rounds of clinical trials, patient follow-up reports, and intense FDA review for safety and effectiveness before being made available to the public.[17,18]

Some Christians widely believe that the pandemic, as revealed in the book of Revelation, signifies the end of the world and that Christ's second coming is at hand.[19] Also, among religious folks, the COVID-19 vaccine has been interpreted as the "mark of the beast," and others believe that the COVID-19 vaccine is a way to implant microchips into people to control them (n = 947, 27.7%).[20,21] The Seventh Day Adventist church has a firm lifestyle belief and practices. It is embedded in their faith, supported by science, and they are well studied in health and longevity. It may perhaps be why the respondents of this study believe that their practice of a healthy lifestyle is enough to prevent them from being inflicted with COVID-19. The fact that the church leaders advocate a holistic lifestyle, especially in the area of eating healthy food, regular exercise, having a good sleep, abstinence from cigarette smoking and alcohol drinking, and almost 92% adherence to these lifestyle practices, the respondents of this study may feel that they are not highly susceptible to many diseases, including COVID. Moreover, Adventists are highly knowledgeable in preventing and mitigating infections. It is taught in the church, and members are given medical missionary training in taking care of the sick.

This study showed that respondents feel a low perception of the vaccine's benefits, although it can provide some natural defense in the form of immunity.[22] For example, in the 90 days following initial infection, evidence indicates that reinfection with the virus that triggers COVID-19 is rare. The likelihood of severe illness and death from COVID-19 greatly outweighs the benefits of natural immunity.[23] The FDA has made the safety requirements and approval process even more stringent than normal. The FDA established minimum product efficacy criteria to authorize only vaccines that could protect the majority of the population.[22] However, the fact that current vaccines are only approved for use by the FDA if they are safe and effective in many people, respondents feel that there are low benefits of said vaccine.

The study has shown that perceived benefits and barriers to vaccination of the health belief model constructs were significant predictors of COVID-19 vaccination intent.[24] Similarly, this study has shown that beliefs, perceived susceptibility, benefits, and barriers to getting the vaccine were predictors of the intent to vaccinate. Despite the respondents' perceived low belief in vaccines, perceived low susceptibility to the disease, and low perceived benefits of the vaccine, they have low barriers to getting vaccinated. It is perhaps this reason why the intention to vaccinate was high (as compared to those who do not wish to vaccinate).

CONCLUSION AND RECOMMENDATIONS

This study aimed to determine the COVID-19 vaccine determinants, perceptions, and intention to vaccinate among a religious group. As a conceptual framework, we utilized the Health Belief Model as a tool for decision-making. While most Adventists intend to vaccinate and have excellent knowledge regarding the vaccine, it was surprising that the majority have low belief in the vaccine; they have low perceptions that they will acquire COVID and have a low perception of the severity of COVID. Further, they perceived that they would not benefit much from the vaccine, although there are no barriers to getting the vaccine.

Hesitancy in the compliance to vaccination among the members of a religious group due to low belief in vaccines needs to be addressed. The findings of this study suggest that majority of Adventists intend to vaccinate. However, there is a need for health education to enhance their belief in the vaccine and change their negative perception about their susceptibility and severity of COVID. Further study is needed to explore the reasons behind the respondents' low perceived belief in the vaccine, their low perceptions of acquiring COVID, and the low perception of the severity of COVID.

Statement of Authorship

All authors contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising and approved the final version submitted.

Author Disclosure

All authors declared no conflicts of interest.

Funding Source

This study has no funding support.

REFERENCES

1. Tan MM, Musa AF, Su TT. The Role of Religion in Mitigating the COVID-19 Pandemic: The Malaysian Multi-Faith Perspectives. Health Promot Int. 2022; 37(1).
2. Zimmer C, Corum J, Wee SL. Coronavirus Vaccine Tracker. The New York Times. [Internet]. 2021 [cited 2021 Jun]. Available from: https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html.
3. World Health Organization. Sputnik V EUL Update. World Health Organization. [Internet]. 2021 [cited 2021 Jun]. Available from: https://www.who.int/news-room/news-updates
4. Mayo Clinic. U.S. COVID-19 vaccine tracker: see your state's progress. [Internet]. 2021 [cited 2021 Jun]. Available from: https://www.mayoclinic.org/coronavirus-covid-19/vaccine-tracker
5. Pater J, Sridhar D. We Should Learn from the Asia–Pacific Responses to COVID-19. Lancet Reg Health West Pac. 2020; 5(100062).
6. Harding R, Findlay S. Asia, the 'factory of the world,' struggles to roll out Covid-19 vaccines. The Irish Times. [Internet]. 2021 [cited 2021 May]. Available from: https://www.irishtimes.com/news/world/asia-pacific/asia-the-factory-of-the-world-struggles-to-roll-out-covid-19-vaccines-1.4574989
7. Lee WN. Charts show Asia is far behind the U.S. and Europe in Covid vaccinations. CNBC. [Internet]. 2021 [cited 2021 Jun]. Available from: https://www.cnbc.com/2021/06/04/covid-vaccine-hesitancy-in-asia-which-lags-us-europe-as-cases-surge.html.
8. Calonzo A. Nearly half in Philippines don't want Covid vaccine, survey says. Bloomberg. [Internet]. 2021 [cited 2021 Jan]. Available from: https://www.bloomberg.com/news/articles/2021-01-07/nearly-half-in-philippines-don-t-want-covid-vaccine-survey-says.
9. Carlisle M. Survey: 'faith-based approaches' could help convince millions of Americans to get Covid-19 vaccines. Time. [Internet]. 2021 [cited 2021 Apr]. Available from: https://time.com/5957032/religion-covid-19-vaccine-hesitancy-survey/?msclkid=fa80f06cc56911ecae7408364b717eeb
10. Loma Linda University. Adventist Health Study. [Internet]. 2021 [cited 2021 Jan]. Available from: https://adventisthealthstudy.org/
11. Seventh Day Adventist Church. COVID-19 vaccines: addressing concerns, offering counsel. [Internet]. 2021 [cited 2021 May]. Available from: https://www.nadadventist.org/news/covid-19-vaccines-addressing-concerns-offering-counsel
12. Ikiisik H, Sezerol M, Tasci Y, Maral I. COVID-19 Vaccine hesitancy: a community-based research in Turkey. Int J Clin Pract Suppl. 2021; 75(8).
13. Alabdulla M, Reagu SM, Al-Khal A, Elzain M, Jones R. Covid-19 Vaccine hesitancy and attitudes in Qatar: a national cross-sectional survey of a migrant-majority population. Influenza Other Respir Viruses. 2021; 15(3): 361-70.
14. Wang K, Wong EL, Ho K, Cheung AW, Yau PS, Dong D, et al. Change of willingness to accept COVID-19 vaccine and reasons of vaccine hesitancy of working people at different waves of local epidemic in Hong Kong, China: repeated cross-sectional surveys. Vaccines. 2021; 9(1):62.
15. de Vrieze J. Pfizer's Vaccine Raises Allergy Concerns. Science. 2021.1; 371(6524):10-11.
16. Glover RE, Urquhart R, Lukawska J, Blumenthal, J. Vaccinating against COVID-19 in people who report allergies. BMJ. 2021. 18; 372: n120.
17. United States Food and Drug Administration. Emergency Use Authorization for Vaccines Explained. [Internet]. 2020 [cited 2020 Nov]. Available from: https://www.fda.gov/vaccines-blood-biologics/vaccines/emergency-use-authorization-vaccines-explained
18. Zarefsky M. 8 things physicians and patients need to know about the Pfizer vaccine. American Medical Association. [Internet]. 2020 [cited 2020 Dec]. Available from: https://www.ama-assn.org/delivering-care/public-health/8-things-physicians-and-patients-need-know-about-pfizer-vaccine
19. Cleveland Clinic. COVID-19: what you need to know about the vaccine. [Internet]. 2021 [cited 2021 Jan]. Available from: https://my.clevelandclinic.org/landing/covid-19-vaccine
20. Simon D. COVID-19 and the apocalypse: religious and secular perspectives. Journal on Religious Perspectives. 2021; 60(1): 5-15.
21. Bohlinger T. The COVID-19 vaccine has 666 written all over it and why that doesn't matter according to Revelation. The Logos Academic Blog. [Internet]. 2020 [cited 2020 Dec]. Available from: https://www.cosmosdawn.net/forum/threads/the-covid-vaccine-has-666-written-all-over-it%E2%80%A6and-why-that-doesn%E2%80%99t-matter-according-to-revelation.9355/
22. McBride DC, Bailey KG, Landless PN, Baltazar AM, Trim DJ, Stele G. Health beliefs, behavior, spiritual growth, and salvation in a global population of Seventh-day Adventists. Rev Relig Res. 2021: 63(4):535-57.
23. National Institutes of Health. NIH COVID-19 Research. Which COVID-19 vaccines are available in the United States? [Internet]. 2020 [cited 2020 Dec]. Available from: https://covid19.nih.gov/treatments-and-vaccines/vaccines
24. Lin Y, Hu Z, Zhao Q, Alias H, Danaee M, Wong LP. Understanding COVID-19 vaccine demand and hesitancy: a nationwide online survey in China. PLoS Negl Trop Dis. 2020;14(12):e0008961.