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Abstract

This study discusses the COVID-19 vaccination program in Singapore including the policies implemented by the government and how its residents react to these actions. We aim to determine the impact of the perception of government policies, personal beliefs, and awareness of vaccine efficacy rates on the willingness to take vaccination, the source of COVID-19 information, holding demographic variables such as age and gender constant. Surveys will be conducted for Singapore residents eligible for the vaccine, consisting of two groups of strata: vaccinated and unvaccinated. The use of statistics and regression analysis for the data collected would help the research to conclude on the relationships between the factors and vaccination willingness. Our preliminary survey, consisting of 19 responses, suggests that information from informal channels such as messaging applications, notably Whatsapp and Telegram, negatively affects their vaccination willingness, but no relationship was identified between the respondents' perception of the government policies and their willingness to take vaccination. The statistically insignificant results may be due to the small number of respondents suggesting the need for further studies. This study will help identify key factors that encourage or deter peoples' decision to take vaccination. As a result, we hope to provide insights for future studies and policymakers on how to promote protection policies in times of outbreaks and pandemics.

Keywords: COVID-19, vaccination, Singapore, perception of government policies, vaccination willingness

COVID-19 Vaccination Woes in Singapore

The creation of vaccines against COVID-19 has been a significant action in reducing the further damage of the ongoing pandemic. Vaccination programs, for example, in Singapore, have been conducted to further implement community immunization against the virus. With many policies, rules, and regulations being put in place by the government with regard to vaccination (Ministry of Health, 2021), people are having mixed feelings about this approach. Vaccine hesitancy, as defined by Macdonald (2015), is "to delay in acceptance or refusal of vaccination despite the availability of vaccination services". Widespread among many nations, Singapore is no stranger to this challenge. Vaccine hesitancy is one of the many struggles that countries must face to achieve herd immunity. Although it could be reasonably understood that the vaccination policies are for the better of the nation, un-vaccinated and anti-vaccination residents feel the discrimination on these policies. How do the residents of Singapore view the vaccination program in Singapore? Do they feel forced? Or do they feel as though they are doing their part to keep themselves and their loved ones safe and healthy?

The motivation of our study is due to the amount of misinformation the general public is exposed to and would like to know if government policies, personal beliefs, and the awareness of the efficacy play a role in the willingness of residents to take the COVID-19 vaccination. According to the Singapore Government Agency (2021), "there are local websites that frequently post unverified and potentially misleading information on COVID-19 and vaccines," which addresses the misleading information of taking Ivermectin. Furthermore, according to Saifudeen & Ng (2021), although the vaccine-hesitants are not completely engulfed in a misinformation bubble, changing the anti-vaccine narrative that took them in is a difficult challenge, especially when exacerbated by dissatisfaction with Singapore's long-term domestic limitations.

Our research aims to identify the factors and possible relationships among the factors that affect people's decision to take the vaccine. Identifying any underlying factors and relationships among them could help provide insights on planning the appropriate strategy to engage, educate and approach Singapore residents with regards to both vaccinations and managing the COVID-19 situation.

Literature Review

Similar studies have been conducted on determining the reasons behind the hesitancy of taking the vaccine and its significance in different countries such as the US, the UK, and Canada. These studies identified factors such as basic demographics, community identification, education level, and trust in the government as the determinants of an individual's decision on whether or not to take the vaccine.

Willingness to Get Vaccinated

A study by Guidry et al. (2021) did a survey of 778 U.S adults about their willingness to be vaccinated. It was conducted before the release of the COVID-19 vaccine. The study consisted of half male and female participants, of whom 34% were Caucasian, 33.4% were African American and the remaining 32.6% were Hispanic. The average age of the participants was 45.9. Moreover, this study also had the participants indicate how religious they were. 21.3% of the participants indicated that they were very pious, 31.1% indicated that they were moderately pious, 23.1% slightly pious, and the remaining 24.5% indicated that they were not pious. The results showed that 30.7% of the participants were without question planning on receiving the vaccine, 29.2% were maybe planning, 18.8% were neutral on getting vaccinated, 9.4% not planning and 11.9% would certainly not be planning on getting vaccinated. The study showed that 21.3% of the participants were not willing to get vaccinated. This could have been

due to the lack of scientific research on the vaccines at that point in time, and as a result, many may have been worried about the possible side effects.

Community Identification

A study conducted by Wakefield and Khauser (2021) wanted to see if there is a link between strong community identification and people's desire to acquire the Covid-19 vaccination in a community-related environment. The study was largely based on two earlier studies conducted known as the Social Identity Approach (Tajfel & Turner, 1979, 1986), and they applied principles from the two studies to understand health-related behaviors among social groups. Wakefield and Khauser (2021) sampled 133 British adults to survey the COVID-19 Vaccination Programme, which occurred in late December 2020 and Early January 2021. The survey participants were required to rank on a scale of 1 to 7, with 1 being strongly disagreed and 7 being they strongly agreed, 4 variables (Community Identification, Duty to Get Vaccinated, Willingness to get Vaccinated, and their Neighborhood's Socio-Economic status). The study identified a positive correlation between vaccination willingness and how people identified themselves with the community. The findings of the study support the existing literature, Social Identity Approach (Tajfel & Turner, 1979, 1986), that social identification was a key predictor in health-related behaviors. Given Singapore's small population with many communities based on religions, or even the neighborhood they stay in, this might be a factor in how they perceive taking the vaccine and how information spreads among the communities, influencing their decisions. Singapore's approach to managing the COVID-19 situation includes encouraging work from home, and restricting allowable group dining sizes, limiting the number of interactions among the community. What this means is that it could increase the reliance on social media to contact others from the same community.

Additionally, social media could also act as a possible medium to spread misinformation. Enders et al. (2021) concluded that social media itself is incapable of generating beliefs of conspiracies, but rather the community on the social media. This was shown in one Singapore's case whereby a grandmother was influenced by her church group that vaccines and work science were "satanic", and it was recommended by her church member to consume Ivermectin, resulting in the hospitalization of the grandmother. This live example supports the claims of both Enders et al. (2021) and Wakefield and Khauser (2021) that the identification of oneself to the community, be it online or physically, is a key predictor variable to vaccination willingness. This topic allows us to further our research to identify if religions and beliefs affect one's vaccination decision and if the community identification, both in the physical world and on social media, could actually influence their decision as well.

Education Level

Another variable identified was education level. A study done by Humer et al. (2021) was done to increase the willingness to take the vaccine of youth with lower educational levels, migrants, and females. They concluded that a relationship exists between education level and willingness to take the vaccine. Comparing students and adolescents, students were more likely to take the vaccine. However, in another study on vaccine hesitancy, Saied et al. (2021) noted that among the medical students in the study, the majority of them had their concerns regarding the potential side effects and effectiveness of the vaccine, resulting in a 46% of the respondents being hesitant on the vaccination, although most of them understood the importance of the vaccine. Education could be a double-edged sword in both studies because it may allow the person to identify their sources of information and be able to comprehend the necessary actions to contribute to the safety of society. But it may also result in doubt; being knowledgeable may

result in more questions being asked, such as "what are the potential long-term effects of taking the vaccine". This variable will also be helpful in our research; whether a relationship exists between their education levels and awareness of vaccine information (efficacy, side effects, and brands), and if having such knowledge could affect their decision in taking the vaccine.

Trust in Government

Trust in government and public health officials are considered factors in an individual's decision in taking the vaccine. According to Crawshaw et al. (2021), these two are related to the hesitancy in vaccination. Also, according to Norris et al. (2021), overall trust in government alongside self-reported compliance and self-reported behavior are important drivers in giving an individual a drive to willingly accept the vaccine. This correlation recommends that health authorities should earn the public trust and credibly and regularly inform about the vaccine including new information. This statement is also confirmed by Soveri et al. (2021) stating that how people respond to guidelines is related to the degree of trust they feel, which means governments and health authorities must create communication strategies to build public trust. According to Hildreth and Alcendor (2021), the level of public trust in vaccines and the government correlates with their experiences with vaccines. A high level of acceptance is essential in mitigating immunization from the virus, so the government must lead the way in providing the COVID-19 vaccine to the public alongside earning their trust of its benefits and effectiveness. Meanwhile in Singapore, many are doubting the government's efforts in the vaccination program, policies, and restrictions. Overall, the studies did not indicate the policies implemented by their government, only about how people rely on their government and their decision to take the vaccine. Then, the key variable in our own study is the government policies of Singapore and how it affects the residents' decision to take the vaccine.

Research Question

The research primarily aims to determine why or why not people should take the vaccine. The main research question is: What are the factors that affect an individual's decision in getting the vaccination for Covid-19 in Singapore?

In addition, the study also wants to know the answers to the following questions with regards to the factors affecting an individual's decision in getting the vaccine:

- Do the respondents have specific beliefs with regards to the vaccine?

- How do the respondents feel about the government's action on COVID-19 and the Vaccination Program and Policies?

- Are the respondents willing, forced, or remain unconvinced to take the vaccine?

Theoretical Framework

From the review, many variables can influence one's decision to take a vaccine in the current pandemic, such as basic demographics like education levels. Although trust in the government is a key variable in willingness to take the vaccine, it is important to identify the motivation behind the people's decision to take the vaccine.

The research would use primary data from a survey conducted for residents of Singapore who are eligible to take the vaccine. Our objective is to understand the various factors that affect an individual's decision to take the Covid-19 vaccine in Singapore. The survey would be conducted online as well as interviews to cater to the elderly as they might not be technologically inclined. In addition, the use of secondary data for the overall vaccination status of Singapore can be obtained from the Ministry Of Health (MOH) website.

Through the collection of data from the survey, the key independent variables we are interested in looking at are reasons for getting vaccinated (influence of government policies,

personal beliefs, and health reasons), awareness of vaccines (efficacy rates, side effects, and preferred brands), religions and beliefs (does it affect their decision in taking the vaccine), and source of COVID-19 information (do the sources affect their knowledge and willingness to be vaccinated). In addition, the control independent variables for the study include the basic demographics such as age, gender, occupation, education level, race, religion, vaccination status, and income. Based on these independent variables, the decision of the respondent on whether or not to take the vaccine and the booster shot will be the dependent variable of the study.

Hypothesis

With the mentioned variables, the hypothesis of the research is to figure out the various factors such as government policies, lack of awareness of the effectiveness of the vaccine, religious beliefs, source of COVID-19 information, education level, and an individual understanding of COVID-19, for their benefit, or any other factors that could potentially affect the individual's decision to take the vaccine. Hence, the research null hypothesis is these factors do not affect the individual's decision to take the vaccine. Meanwhile, the alternate hypothesis is these factors do affect the individual's decision to take the vaccine.

Study Design

Having the population vaccinated is one of the main goals of the Singapore government towards the new normal lifestyle. However, some Singapore residents remain hesitant about taking the vaccine. This reason pushed the government to implement policies that aim to protect the unvaccinated from the virus, resulting in residents having mixed feelings towards taking the vaccine and the policies regarding vaccination status.

The study aims to determine what are the factors that affect an individual's decision in getting the vaccination for COVID-19 in Singapore. It will also provide a basic understanding of

why Singapore residents took the vaccine. The government could also gain insight on how to further improve the vaccination program and policies to achieve herd immunity. Through the use of a survey questionnaire, data such as basic demographics, vaccination status, and reasons for vaccination, will be collected from Singapore residents for approximately two months to collect as many surveys as possible. The survey will also find out if the respondents have specific vaccine beliefs and thoughts about the government's action on COVID-19 and vaccination. Hence, some of the potential factors that affect an individual's decision in getting the vaccine are government policies, individual understanding of COVID-19, awareness of vaccine efficacy, and personal beliefs. We will use different statistical tools on the data collected, such as ANOVA and regression analysis, to determine if any of these factors have a significant impact. Otherwise, if it is not significant, it is relevant to say that these factors do not affect an individual's decision to take the vaccine.

Population and Sample

The participants of the study are residents of Singapore eligible to take the vaccine. This means that the target population of this research is about 5 million as of June 2021 (Singapore Department of Statistics, n.d.). All eligible residents have to be included as we need a representation of two groups, vaccinated and unvaccinated so that we understand their reasons for taking or not taking the COVID-19 vaccine. The ideal sample that we are looking for is a proportionate demographic of Singapore's residential population and the vaccination status of the residents of Singapore. The stratified sampling method is the most appropriate method to use for the study as it allows for an even sample from both vaccinated and unvaccinated participants, which would decrease the chances of a biased result (Guthrie, 2010). Alternatively, snowball or convenience sampling may be also used for practical consideration as it allows the researchers to

have easy access to larger sample sizes. However, these methods have higher chances to have biased results, so it is not considered the most appropriate method to use.

In short, stratified sampling is the method to use in getting the number of relevant data to be collected for the study. Through the use of this method, it replicates the total population of the residents of Singapore. In this study, 85% of the population is vaccinated while 15% of the population are not vaccinated according to MOH (2021). Hence the minimum number of surveys we need is at least but not limited to 30 participants and should represent a sample of 96% from vaccinated and 4% from the unvaccinated.

<div align="center">**Variables and Measures**</div>

Key Independent Variables

The key independent variables that we are interested in looking at are reasons for getting vaccinated (influence of government policies, personal or religious beliefs, source of COVID-19 information, and health reasons), and the awareness of the use of COVID-19 vaccination and its efficacy rates. These are some of the few variables that are not widely studied that we would like to further research on. The influence of government policy was measured with the participants rating the policies on a scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). For the awareness of efficacy rates, participants would have two options to choose from. The options are: well-informed and ill-informed. Another key independent variable for the study is the main reason why the participant took the vaccine. The main reason why the participant got vaccinated would have five options, and they are: government policies; self-protection; traveling; job requirement; 'others'. Meanwhile, for the unvaccinated participants, the options for them will be: religion; health; personal beliefs; conspiracy theories; 'others'.

Control Independent Variables

The independent demographic variables that the research will be collecting are basic demographics such as age; gender; occupation; education level; race; religion; income. With these independent variables, we can consider them as common factors for taking the vaccination in Singapore. To collect data for the age of the participants, we would segment the age groups into: 12 - 19 years old; 20 - 39 years old; 40 - 59 years old; 60 - 69 years old; 70 years old and above. For occupation, we would segment the occupation options into: education; business; frontline/healthcare; government; 'others'. For education level, the participants have nine options to choose from. The nine options are: PSLE; O-Level/N-Level; Nitec/Higher Nitec; A-Level; Diploma/Higher Diploma; Undergraduate; Masters; Ph.D.; 'others'. To identify the racial demographic of the participants, the options given to them are: Chinese; Indian; Malay; Eurasian; Caucasian; 'others'. For gender, four options are given: male; female; non-binary/third gender; prefer not to say. For religion, seven options will be given to the participants. They are: Buddhism; Judaism; Christianity; Catholicism; Islam; Hinduism; 'others'. Lastly, the options given for vaccination status are: fully vaccinated with two doses; first dose; unvaccinated; boosted.

Dependent Variable

Lastly, the dependent variable of the study will be the decision of the participant on whether or not the vaccine and booster shot should be taken based on the independent variables, and the main reason as to why the participants take the COVID-19 vaccine. The measure of whether or not the vaccine should be taken would be a yes or no answer.

Data Collection Methods

The study proposes to use primary data collected through a survey that will be distributed across Singapore in an estimate of two months. It is also recommended to use secondary data from the Ministry of Health for their statistics on the percentage rate of vaccinated residents of Singapore.

Primary Data

The primary data for the study will be gathered from respondents through a survey questionnaire (see Appendix A - G, pp. 26-32). The collection period will be approximately one to two months to give the researchers appropriate time to collect enough responses that will represent the sample. The survey is recommended to be administered online to maintain social distancing. However, actual interviews around Singapore could also be conducted to cater to the elderly as they might not be technologically inclined. The data that would be collected is a good representation of the population which can be classified into different age groups and the actual vaccination status of the residents.

Secondary Data

The research will also use secondary data from the MOH website as a reference for the percentage rate of vaccinated residents of Singapore and policies implemented by the government. This information will be useful for the analysis of accuracy between the study and the government's own statistics during this period of time. It will also provide more insight into Singapore's current situation with regards to the vaccination program and implementation of the policies. Using this secondary data (see Appendix H, pp.33-34), which is a literature review, could help support the theory that government policies, willingness to take vaccines are factors that affect an individual's decision.

Data Analysis Methods

After a successful collection of data, the next step is analyzing the data to determine the factors that affect an individual's decision in taking the vaccine and to statistically prove that these factors do affect one's decision. A common method used in every research is descriptive statistics, a method used to describe the basic features of the data such as the mean, standard deviation, and the number of observations (Trochim, n.d.). However, this tool will only be used for the study to give a brief description of the basic demographics collected from the survey such as age, gender, religion, occupation, education level, race, and vaccine status.

Inferential Statistics

Inferential statistics is another method in determining the cause and effect relationship of two variables. It is also used to test hypotheses instead of answering the research questions. (Greener & Martelli, 2020). This type of statistics will be used for the study to determine the statistical significance of rejecting or not rejecting the null hypothesis. A specific type of inferential statistics that is appropriate to use for the study is the analysis of variance or ANOVA test.

ANOVA Test

ANOVA is a technique that determines the means of two or more groups and compares it with other groups to see if they have an impact or interaction with other factors (Singh, 2018). It is a data analysis tool available in common applications such as Excel and R, so the researchers will be able to use it as needed. In addition, most of the measures of the variables stated in the survey are nominal data. Since ANOVA requires numerical data, the use of a dummy variable, a numerical variable used to represent subgroups with "0" and "1", is recommended when analyzing the data gathered. (Trochim, n.d.). Furthermore, the test would be specifically used to determine if there is an impact and interaction with the key independent variables: influence on

government policies, and awareness of vaccine efficacy on the willingness of the respondents to take the vaccine.

Regression Analysis

A regression analysis will be run to identify the correlations among the various independent variables, with the outcome being the participants' decision to whether to take the vaccine. Gender will be a control variable that will be included in this test, given that it does have a substantial influence on attitudes towards vaccination (Galasso et al., 2020). This analysis could help to identify the relative impact and strength of the variables and their influence on the dependent variables (Sarstedt & Mooi, 2014). Additionally, more accurate predictions could be made upon running the regression model and identifying the most impactful variables on the outcome.

In view of collinearity in the model, Variance Inflation Factor (VIF) and tolerance will be used to identify if they exist among the variables. VIF values above 10 and/or tolerance values below 2.5 shall indicate collinearity exists and remedy actions are required (Sarstedt & Mooi, 2014). In the case of collinearity, highly correlated variables will be removed and re-tested on a separate model.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where Y refers to the decision to take the COVID-19 vaccination, X_1 is the influence of government policies, X_2 is the influence of personal beliefs, X_3 is the respondents' awareness of the efficacy rates of the COVID-19 vaccination, X_4 is the source of COVID-19 related information, and ε is the independent control variables such as age; gender; education level; occupation; race; religion; income.

Preliminary Results

An initial survey was conducted in November 2021 with a sample of 19 respondents using convenience sampling. This section discusses the preliminary results of the survey using the proposed data analysis methods: descriptive statistics, ANOVA, and regression analysis.

Table 1

Descriptive Statistics of Respondents

```
> describe(control)
                             vars  n  mean   sd median trimmed  mad min max range  skew kurtosis   se
Respondents                     1 19 10.00 5.63     10   10.00 7.41   1  19    18  0.00    -1.39 1.29
Age.Group*                      2 19  1.21 0.54      1    1.12 0.00   1   3     2  2.25     4.09 0.12
Gender*                         3 19  1.84 0.50      2    1.82 0.00   1   3     2 -0.33     0.18 0.12
Religion*                       4 19  2.32 1.49      2    2.24 1.48   1   5     4  0.72    -1.00 0.34
Education.Level*                5 19  3.37 1.54      3    3.41 1.48   1   5     4  0.02    -1.90 0.35
Occupation.Industry*            6 19  2.37 0.96      2    2.35 1.48   1   4     3  0.36    -0.94 0.22
Race*                           7 19  1.84 1.21      1    1.76 0.00   1   4     3  0.81    -1.15 0.28
Vaccination.Status*             8 19  2.74 0.65      3    2.82 0.00   1   3     2 -2.00     2.36 0.15
Vaccine.Type.Preference*        9 19  2.32 0.82      3    2.35 0.00   1   3     2 -0.58    -1.34 0.19
Willingness.to.take.vaccine*   10 19  2.84 0.50      3    2.94 0.00   1   3     2 -2.83     7.01 0.12
Yes                            11 19  0.89 0.32      1    0.94 0.00   0   1     1 -2.37     3.84 0.07
Taking_Booster.Shot*           12 19  2.53 0.77      3    2.59 0.00   1   3     2 -1.11    -0.46 0.18
```

The descriptive statistics that we are focused on are the mean which measures the average of the respondents, SD also known as standard deviation which measures the dispersion of the dataset from the mean, n which is the amount of respondents, and the minimum and maximum range of the variables. We used "R software" as a tool to measure the descriptive statistics of the basic demographics of the respondents. The results stated that most of the respondents are in the age group of 20-39; male (gender); undergraduates or with diploma/higher diploma (education level); education (occupation); Chinese (race); religion is Buddhism; and vaccinated (vaccine status).

Table 2

ANOVA: Two-Factor with Replication

Anova: Two-Factor With Replication							
SUMMARY	Boosted	Vaccinated	Unvaccinated	Total			
Support Policies							
Count	5	5	5	15			
Sum	0	5	0	5			
Average	0	1	0	0.333333			
Variance	0	0	0	0.238095			
Don't Support Policies							
Count	5	5	5	15			
Sum	2	5	0	7			
Average	0.4	1	0	0.466667			
Variance	0.3	0	0	0.266667			
Total							
Count	10	10	10				
Sum	2	10	0				
Average	0.2	1	0				
Variance	0.177778	0	0				
ANOVA							
Source of Variation	SS	df	MS	F	P-value	F crit	
Sample	0.133333	1	0.13333333	2.666667	0.115523	4.259677	
Columns	5.6	2	2.8	56	9.12E-10	3.402826	
Interaction	0.266667	2	0.13333333	2.666667	0.089991	3.402826	
Within	1.2	24	0.05				
Total	7.2	29					

ANOVA: Two-factor with replication was run on the model to identify the interaction and impacts of the key independent variable on the willingness to be vaccinated. The independent variables used are vaccine status, with groups: boosted, vaccinated, and unvaccinated, and support on government policies, with groups: support and do not support. For the variables to have a numerical value, dummy variables are used.

The model concluded that between the respondents who support and do not support government policies, there is no statistical difference ($p = 0.12$), however, there is a significant

difference among vaccinated, boosted, and unvaccinated respondents ($p < 0.05$). Lastly, the

model suggests that there is an interaction between respondents supporting the government

policies and their vaccination willingness ($p = 0.089991$).

Table 3

Regression Analysis

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.597933017
R Square	0.357523893
Adjusted R Square	-0.05132454
Standard Error	0.323291887
Observations	19

ANOVA

	df	SS	MS	F	gnificance F
Regression	7	0.63978	0.0914	0.87447	0.55501
Residual	11	1.14969	0.10452		
Total	18	1.78947			

	Coefficients	andard Err	t Stat	P-value	Lower 95%	Upper 95%	ower 95.0%	pper 95.0%
Intercept	0.787219579	0.17058	4.61509	0.00075	0.41179	1.16265	0.41179	1.16265
Support the Policies	0.151733515	0.19393	0.78242	0.45048	-0.2751	0.57857	-0.2751	0.57857
Gov	0.007613868	0.20462	0.03721	0.97099	-0.44276	0.45799	-0.44276	0.45799
Social Media	0.154996601	0.23572	0.65755	0.52435	-0.36381	0.67381	-0.36381	0.67381
Whatsapp/Telegram	-0.43235894	0.2435	-1.77559	0.10344	-0.9683	0.10358	-0.9683	0.10358
Newspaper/Channels	0.119782461	0.17085	0.70112	0.49779	-0.25625	0.49581	-0.25625	0.49581
Science Articles/Journals	0.00774983	0.24965	0.03104	0.97579	-0.54173	0.55723	-0.54173	0.55723
Friends and Family	0.241332427	0.32258	0.74814	0.47007	-0.46865	0.95132	-0.46865	0.95132

A linear regression model was run to identify the interaction of the key independent

variables, the influence of government policies, and source of COVID-19 related information ,

on the respondent's willingness to be vaccinated.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

Where Y refers to the decision to take the COVID-19 vaccination, X_1 is the influence of

government policies, and X_2 is the source of COVID-19 related information.

The results currently suggest that informal sources of information, spread through Whatsapp and telegram, negatively impact the respondents' willingness to be vaccinated. However, the results are statistically insignificant, with an adjusted R Square = - 0.05132454. This can be attributed to the small number of respondents. Further studies are required to prove the above relationship of the key independent variables on the dependent variable. We propose that we would require the use of a non-linear regression model when factoring in more variables.

Conclusion

The research question aims to identify what are the factors that affect an individual's decision in getting the vaccination for Covid-19 in Singapore. The research will retrieve data in the form of both primary data from a survey questionnaire (see Appendix A-G, pp.26-32), and secondary data regarding the COVID-19 vaccination numbers and regulatory policies. The survey data will be analyzed through ANOVA to identify interactions between the independent variables on the dependent variable, and the non-linear regression model to identify the impact and values of the key independent variables on the dependent variable, holding the control variables constant.

The preliminary results suggest that informal sources of information, spread through Whatsapp and telegram, negatively impact the respondents' willingness to be vaccinated as well as the interaction of the willingness to vaccinate with the support of government policies. However, there is a need to increase the number of respondents as required before coming to a conclusion.

Research Contributions

The COVID-19 pandemic is a worldwide recent extremity and the development of the vaccines are relatively in the early stages, unlike other vaccines such as the measles, mumps, and

rubella (MMR) vaccine which took eight years to be fully developed from 1963 to 1971 (Ross, 2017). The COVID-19 vaccine is relatively new and people may doubt the actual efficacy rates of the vaccine as it was a rushed development to help cope with the pandemic. Our study covers the people's source of COVID-19 information and the knowledge of the vaccine efficacy rates, which can allow us to understand the general relationship between how people would respond to the vaccine if they are aware of the efficacy rates.

Overall, this study will help identify key factors such as government policies and knowledge in vaccine efficacy that encourage or deter peoples' decision to take the COVID-19 vaccination. As a result, the research aims to provide insights for future studies and policymakers on how to promote protection policies in times of outbreaks and pandemics.

Limitations

The COVID-19 pandemic affected every country around the world. Given its large-scale impact, one limitation of this study is collecting sufficiently large samples that are representative of the general population. The use of snowball sampling may allow us to reach the larger population in the least amount of time, but it could lead to possible biases in the results. However, we have identified stratified sampling to be the optimal form of sampling that allows for results to be objective and also the ability to collect samples from the vaccinated and unvaccinated population.

Recommendations

Also, the use of a cohort study could be a viable option to study how different people react differently towards the changing policies and COVID-19 mutations over the period of time, and this could prove to be a more accurate form of analysis. It has been reported that the COVID-19 virus has been evolving into multiple variants over the course of the research

proposal (WHO, n.d.), and government policies are constantly changing in response to these variants. This study may not be able to identify the changing responses and perspectives of both the evolving variants of COVID-19 and government policies. Furthermore, there is minimal literature on the impacts of government policies on people's willingness to be vaccinated. Our study allows us to identify how people react and feel about the government policies in Singapore that are applied to manage the COVID-19 situation at bay. The ever-changing policies regarding vaccination may encourage or even "force" people to take the vaccine. Understanding what drives people to vaccinate or not allows for us to contribute to the pool of COVID-19 related studies which can allow for further studies and policymakers on developing effective strategies that encourage people to make the right decision in pandemics such as COVID-19. Early response and action can be key to a country's survival, politically and economically.

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Appendix A: Survey Questionnaire Page 1

We are JERDX, a research team consisting of students from Embry-Riddle Aeronautical University - Asia. We are conducting a study to identify the key drivers of vaccination here in our sunny island of Singapore. We appreciate you taking time off to participate in the survey and contribute to our findings.

Please select your age group.

0 - 11 Years Old

12 - 19 Years Old

20 - 39 Years Old

40 - 59 Years Old

60 - 69 Years Old

70 Years Old & Above

Please select your gender.

Male

Female

Non-binary / third gender

Prefer not to say

→

Appendix B: Survey Questionnaire Page 2

Please select your religion

- Buddhism

- Judaism

- Christian

- Catholic

- Islam

- Hindu

- Others
  [_____]

Please select your education level

- PSLE

- O-Level / N-Level

- ITE/Higher Nitec

- A-Level

- Diploma/Higher Diploma

- Undergrad

- Masters

- PhD

- Others
  [_____]

Appendix C: Survey Questionnaire Page 3

Occupation Industry

Education

Business

Frontline/Healthcare

Government

Others

Please select your race.

Chinese

Indian

Malay

Eurasian

Caucasian

Others

→

Appendix D: Survey Questionnaire Page 4

Vaccination Status.

Fully vaccinated with two doses

1st Dose

Unvaccinated

Boosted

Willingness to take vaccine

Yes

Maybe

No

Appendix E: Survey Questionnaire Page 5

Vaccination Type Preference (only if vaccinated or boosted)

Sinovac

Pfizer BioNTech

Moderna

No Preference

Other

Main Reason for Vaccination

Government Policies

Self-Protection

Travelling

Job Requirement

Other

→

Appendix F: Survey Questionnaire Page 6

On a scale of 1(Strongly disagree) to 5 (Strongly agree), how do you feel about the government policies on vaccination?

5. Strongly agree

4. Agree

3. Neutral

2. Disagree

1. Strongly disagree

What are your sources of COVID-19 Vaccination Information?

Government Flyers and Websites

Social Media

Whatsapp/Telegram

Newspaper/Channels

Scientific Journals

Family and Friends

→

Appendix G: Survey Questionnaire Page 7

Are you aware of the efficacy of the vaccinations?

Well-informed

Unaware

If you are unvaccinated, what is your main reason?

Religion

Health

Personal Beliefs

Conspiracy Theories

Others

Appendix H: Secondary Data

The study's purpose is to investigate the relationship between vaccination status, willingness to be vaccinated, and government policies and programs. It will also evaluate the moderating role of the government policies, including (a) encouraging and (b) deterring, on the citizens' willingness and reasons to be vaccinated.

COVID-19 Vaccination Program in Singapore

Through the gradual re-opening of Singapore, the Ministry of Health (MOH) COVID-19 immunization program aims to protect Singaporeans against COVID-19, as well as organizations and livelihoods. Vaccination in Singapore is provided by the government to all Singaporeans as well as long-term residents (Ministry of Health, 2021).

Willingness to be Vaccinated

One of the key factors to determine why people would reject taking the vaccination when it is provided for free in Singapore is the people's willingness to vaccinate. The reason behind their motivation to take part in the vaccination program. According to a study by Guidry et al. (2021) before the release of the COVID-19 vaccine, they did a survey of 778 U.S adults about their willingness to be vaccinated. The study showed that 21.3% of the participants were not willing to get vaccinated. This could have been due to the lack of scientific research on the vaccines at that point in time, and as a result, the participants may have been worried about the possible side effects.

Government Policies in Singapore

In Singapore, there is a constant change in government policies regarding COVID-19. Currently, as of 10 November 2021, unvaccinated personnel by choice will not receive free COVID-19 treatment. They are not allowed to dine in hawker centers, restaurants, shopping

malls, as well as various establishments. Singapore has also increased the number of Vaccinated Travel Lanes (VTL) to more countries. VTL is only available for the vaccinated as the name implies (Goh, 2021). These policies could be the reason why many residents are inclined to take the vaccine in Singapore. Thus, in this research, it is one of the key factors.