Vaccination Acceptance among Indigenous Community: The Moderating Role of Tribal Leader Endorsement

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Abstract: Coronavirus disease 2019 cases are showing a downward trend in Malaysia but with active cases still present, the virus remains a persistent public health threat. Amid vaccination at no cost, some of the populace is refusing to get vaccinated. As getting indigenous communities vaccinated are much more difficult due to contextual and cultural difference, this study investigated whether tribal leader endorsement moderates the relationship between attitude and intention towards vaccination. Drawing from a survey of 312 indigenous from various generations of Millennials, Generation X and Generation Z, this study found that endorsement of tribal leaders does not act as a moderating factor in the association between attitude and intention to accept vaccination across generations. This study contributes to understanding whether indigenous communities require cultural-based approaches to support vaccination uptake. This study would be beneficial in supporting initiatives to curb COVID-19 disease and the right to good health among indigenous communities.

Keywords: *COVID-19, Indigenous, Vaccination Acceptance, Perceived Usefulness, Perceived Enjoyment*

1. Introduction

In December 2019, the world was surprised that people around the globe were sick with Coronavirus disease (COVID-19). COVID-19 is a contagious illness caused by infection with a coronavirus named SARS-CoV-2 (WHO, 2023). People infected with the COVID-19 virus were reported experiencing a wide range of illnesses, from mild to severe illness. One bearing mild symptoms typically cures without requiring special treatment but one developing serious illness usually calls for medical attention, and the one becoming seriously ill will die (WHO, 2023). Anyone who gets sick with COVID-19 is suffering symptoms of cough, fever, tiredness, and dyspnoea (Alimohamadi et al., 2020) along with other illnesses of loss of taste and smell, sore throat, runny nose, muscle aches and many more. The number of people infected with COVID-19 and death continues to vary considerably between countries. According to Worldometers (2023), 696,869,880 Coronavirus cases with 6,928,708 deaths were recorded globally on October 21, 2023. In Malaysia, a total case of 5,128,668 and a death of 37,179 were reported (Worldometers, 2023). Malaysia's population is made up of different types of ethnic groups, namely Malay, Chinese, Indian and Native people each with their own language, values, culture, and faith. Having realized the suboptimal trends in COVID-19 vaccine hesitancy amongst indigenous peoples in Peninsular Malaysia (Khalid, 2021) along with the time condition of "poor access to healthcare and significantly higher rates of communicable and non-communicable diseases" among indigenous people (United Nations, 2020), triggering the importance to extend solution for COVID-19 vaccination uptake among indigenous community by considering cultural-related factors.

Vaccination program in Malaysia: During the outbreak, the Government of Malaysia was foreseeing that anyone who received a vaccine would be protected better against illness and hospitalization than anyone who did not receive a vaccine. The Government was hoping that all Malaysians would get vaccinated with a COVID-19 vaccine. In February 2022, Former Malaysian Prime Minister Muhyiddin Yassin was the first person in Malaysia to get vaccinated alongside frontliners during the first round of the national COVID-19 Immunization Program–PICK (Yusof, 2021). The program will take place nationwide to break the chain of COVID-19 infections with the second round involving high-risk groups of the elderly, disabled and ones with chronic conditions and the third round involving remaining adults aged 18 and above (JKJAV, 2021). In Malaysia, vaccination with Pfizer-BioNTech, AstraZeneca and Sinovac has been greatly effective in putting a stop to infection, symptomatic, ICU hospitalization, and death toll caused by COVID-19 (Suah et al., 2021). Malaysia Ministry of Health is focusing on vaccinating as many people as possible to curb the spread

of COVID-19. According to Fine et al. (2011), satisfactory herd immunity is necessary to prevent the person-to-person transmission of infectious diseases. To combat COVID-19 at full scale, the Malaysia Ministry of Health (MOH) makes vaccination activities the main agenda across the country. The public is requested to find nearby vaccination centers to receive free COVID-19 vaccines. In the course of the outbreak, whether one is vaccinated or not vaccinated is prominent that people without vaccination records are not getting access to public facilities (Bardosh et al., 2022). To date, on 21 October 2023, 28,115,723 people in Malaysia have received a COVID-19 vaccine (KKMNOW, 2023). However, despite the availability of vaccination services and positive outcomes, studies by Azizi et al. (2017) and Jafar et al. (2022) report delays in the acceptance or refusal of vaccines from the populace. Such hesitancy will hold back the government's agenda for adequate vaccination rates towards achieving herd immunity among the Malaysian population.

Vaccination Uptake among Indigenous Populace: COVID-19 is a highly contagious disease. Alike to the rest of humanity, the virus also poses a threat to the indigenous population of Malaysia. According to the Jabatan Kemajuan Orang Asli website, there are 209,575 indigenous nationwide up to June 2022 (JAKOA, 2023). In the course of the outbreak, many indigenous in Malaysia became severely ill and died from COVID-19 diseases with the numbers of cases varied by state. A total of 457 COVID-19 infections occurred among Indigenous people from 24 Indigenous villages in Selangor (Dewan Negeri Selangor, 2021). Amid pandemic outbreaks, indigenous perceived that their villages were no longer safe. Due to fear of infections, indigenous people flee into forests to escape coronavirus (United Nations, 2020). The Indigenous also sealed their territories by blocking the entrance to their village (The Straits Times, 2020) and setting up barricades and checkpoints (Idrus et al., 2021). According to Idrus et al. (2021), Pfizer-BioNTech, AstraZeneca and Sinovac were the three most administered vaccines to protect against COVID-19 in Malaysia (Suah et al., 2021). However, there have been isolated cases of villages refusing vaccinations (Nordin, 2021) evidenced by The Penan in Sarawak being reluctant to receive immunizations (Donald, 2021) and Sabah has insufficient PICK registrations (Jafar, Mapa, et al., 2022).

2. Research Framework

The Theory of Planned Behavior (Ajzen, 1991) has been used to predict the indigenous communities' intention to adopt vaccination as illustrated in Figure 1. In this study, Attitude towards Vaccination refers to the degree to which an indigenous person has a favorable or unfavorable evaluation of vaccination. Meanwhile, the Intention to Adopt Vaccination refers to an indigenous person's plan to get vaccinated. Tribal Leader Endorsement refers to the action shown by tribal leaders in supporting or rejecting vaccination. Tribal Leader Endorsement is added to the framework to explain the moderation effect on the relationship between attitude and intention toward vaccination among indigenous communities.

Figure 1: Research Framework
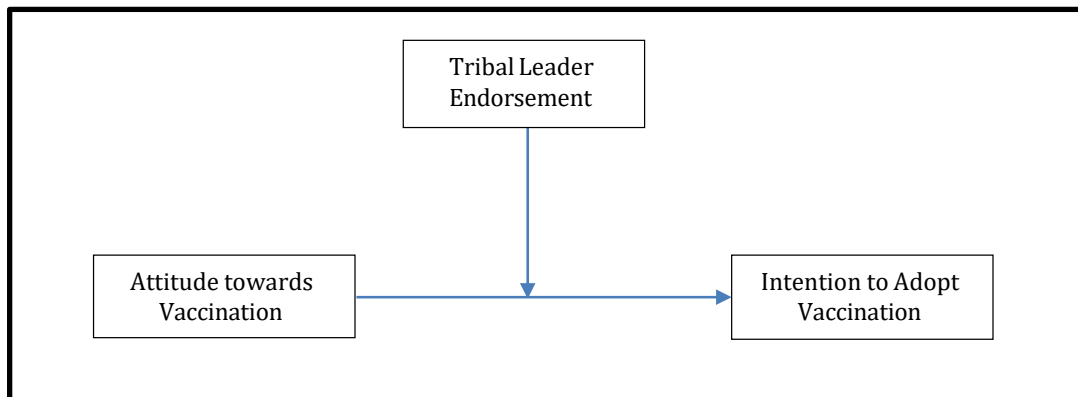
Hypotheses: This study made attempts to examine the moderating factor of tribal leader endorsement in the relationship between attitude and intention to adopt vaccination. Therefore, the following hypotheses were postulated;

H1: Attitude towards Vaccination significantly affects intentions to adopt vaccination
H2: Endorsement of vaccination by tribal leaders has a significant impact on intention to adopt vaccination
H3: Endorsement of vaccination by tribal leaders moderates the relationship between attitude and intention to adopt vaccination.

3. Methodology

The purpose of this study is to understand the phenomenon of vaccination acceptance among members of tribes within the context of indigenous communities. A quantitative study was conducted to assess vaccination acceptance among the indigenous community and the moderating role of tribal leader endorsement. A survey was distributed to 350 an individual among the indigenous community in Perak and the survey return rate was 89 percent (n=312) used for the data analysis. Out of 350 questionnaires, 312 questionnaires were returned. 38 of the questionnaires were incomplete as the respondents failed to answer certain sections of the survey. As a result, a total of 312 responses were usable in this study.

The Structural Equation Model (SEM) using Smart PLS was applied to analyze the objectives of this study. In SEM, there are two levels analysis of measurement model and the structural model. In the measurement model, the first step is examining the factor loadings. According to Hair et al. (2019), threshold values for factor loadings above 0.708 are recommended, as they indicate that the construct explains more than 50 percent of the indicator's variance, thus providing acceptable item reliability. Next is assessing the reliability of the item. According to Diamantopoulos et al. (2012), reliability values between 0.60 and 0.70 are considered "acceptable in exploratory research," and values between 0.70 and 0.90 range from "satisfactory to good." The third is assessing the average variance extracted (AVE) for all items on each construct. An acceptable value of AVE is 0.50 or higher indicating that the construct explains at least 50 percent of the variance of its items. The fourth analysis is the discriminant validity. In this study, was applied the heterotrait-monotrait (HTMT) ratio of the correlations (Voorhees et al., 2016). The HTMT value above 0.90 would suggest that discriminant validity is not present. But when constructs are conceptually more distinct, a lower, more conservative, threshold value is suggested, such as 0.85 (Henseler et al., 2015a) is explains that there are no issues with discriminant validity.

After completing the measurement model, this study further assesses the structural model. As suggested by Shmueli et al. (2016) standard assessment criteria, which should be considered, include the coefficient of determination (R^2), the blindfolding-based cross-validated redundancy measure Q^2 and the statistical significance and relevance of the path coefficients. In addition, researchers should assess their model's out-of-sample predictive power by using the PLS prediction procedure. The R^2 measures the variance, which is explained in each of the endogenous constructs and the values of R^2 range from 0 to 1, with higher values indicating a greater explanatory power. As a guideline by Hair et al. (2011), the R^2 values of 0.75, 0.50 and 0.25 can be considered substantial, moderate and weak. Another means to assess the PLS path model's predictive accuracy is by calculating the Q^2 value (Geisser, 1974). Q^2 values should be larger than zero for a specific endogenous construct to indicate the predictive accuracy of the structural model for that construct. As a rule of thumb, Q^2 values higher than 0, 0.25 and 0.50 depict small, medium and large predictive relevance of the PLS-path model.

4. Demographic Analysis and Model Validation

Demographic Analysis: As shown in Table 1 below, approximately 312 samples were collected from the indigenous population residing in the peninsular region of Malaysia. These samples were obtained from nine various tribes of indigenous populations residing in Malaysia. The study found that the majority of the samples, namely 69.9%, were derived from individuals belonging to the Semai tribe. Additionally, 11.54% of the samples were attributed to the Jakun tribe, while 5.45% were associated with the Temuan tribe. A smaller proportion, specifically 3.85%, represented individuals from the Jah Hut tribe. The remaining samples were sourced from several other tribes, including Mah Beri, Semaq Beri, Semelai, and Orang Kuala. The composition of our samples consists of 60% female and 40% male individuals. Approximately 73% of

the participants were below the age of 45, with the remaining respondents falling into the category of being above 45 years old. Approximately 33% of the participants obtained diplomas, bachelor's degrees, and master's degrees from institutions of higher education, as shown by their educational attainment. Approximately 14% of the participants reported a lack of formal schooling. Slightly more than 34% of the samples remained unmarried at the time the data was compiled.

Table 1: Demographic characteristics of respondents

Characteristic	F	%
Gender Male	125	40.1
Female	187	59.9
Age		
18 – 25	142	45.5
26 – 35	36	11.5
36 – 45	50	16
46 – 55	49	15.7
56 and above	35	11.2
Education level		
Not attending school	45	14.4
Primary school	29	9.3
Secondary school	49	15.7
SPM	70	22.4
STPM	17	5.4
Diploma	55	17.6
Bachelor Degree	46	14.7
Master Degree	1	0.32
PhD	0	
Marital Status Married	107	34.3
Single	205	65.7
Types of Tribe Semai	218	69.9
Temiar	2	0.64
Jah Hut	12	3.85
Mah Beri	4	1.28
Semaq Beri	2	0.64
Temuan	17	5.45
Jakun	36	11.54
Semelai	11	3.53
Orang Kuala	2	0.64
Others	8	2.56

Note: Total N=312

Model Validation: The study framework was evaluated using the Partial Least Squares (PLS) modelling technique, specifically with SmartPLS v3.0. This choice was made due to the ability of PLS to analyze data without being constrained by sample size or assumptions of normality. In addition, it has been found that SmartPLS demonstrates a higher level of predictive accuracy and facilitates the examination of cause-effect linkages (Ringle et al., 2005). Before analyzing the hypotheses of the study model, the researchers assessed the discriminant and convergent validity. Subsequently, the pertinent information was organized based on metrics that indicate the primary variables and their respective dimensions for the variable under study (Hair et al., 2014). To assess appropriateness more thoroughly, some criteria must be considered. These criteria include factor loading, which should exceed a value of 0.7. Additionally, the Average Extracted Variance (AVE) should be greater than 0.4. Furthermore, both Cronbach's Alpha (CA) and Combined Reliability (CR), which measure internal consistency reliability, should be above a threshold of 0.7 (Hair et al., 2014).

Validity Assessment of Instrument
(a) Reliability test: The Cronbach's alpha coefficients presented in Table 2 indicate the level of internal consistency or the extent to which a group of test items are correlated. The study utilized three variables with values ranging from 0.80 to 0.87, indicating the items have been proven to be reliable and understandable such that the scores based on the Cronbach's alpha test have successfully achieved above 0.80.

(b) Convergent and discriminant validity: For each study scale, convergent and discriminant validity approaches were used to confirm construct validity. Convergent validity measures the association between agreeing construct indicators. Convergent validity was assessed using AVE, loading factor, and CR. Each item's loading factor must exceed 0.5 (Fornell & Larcker, 1981). For convergent validity, the AVE and CR must be greater than 0.5 and 0.7, respectively (Hair et al., 2014). Table 2 shows all results that were accepted, proving the study item's convergent validity.

Table 2: Convergent Validation Analysis

	Cronbach's Alpha	Composite Reliability (Rho_A)	Composite Reliability (Rho_C)	Average Variance Extracted (AVE)
Attitude Towards Vaccination	0.832	0.845	0.889	0.667
Intention To Adopt Vaccination	0.804	0.808	0.885	0.719
Tribal Leader Endorsement	0.865	0.878	0.902	0.649

The HTMT method was used to further test the discriminant validity resulted in all values being less than 0.9

Table 3: Discriminant Validation using the HTMT Method

	Attitude Towards Vaccination	Intention To Adopt Vaccination	Tribal Leader Endorsement	Tribal Leader Endorsement X Attitude Towards Vaccination
Attitude Towards Vaccination				
Intention To Adopt Vaccination	0.724			
Tribal Leader Endorsement	0.547	0.606		
Tribal Leader Endorsement X Attitude Towards Vaccination	0.188	0.164	0.061	

(Henseler et al., 2015b), as seen in Table 3.

Measurement Model 1: The purpose of this part is to provide a description of the responses from the individuals in the study sample and analyze them using the arithmetic mean and standard deviation in relation to the independent and moderating variables and intention to adopt, as seen in Figure 2.

Figure 2: Significance Assessment of the Structural Model
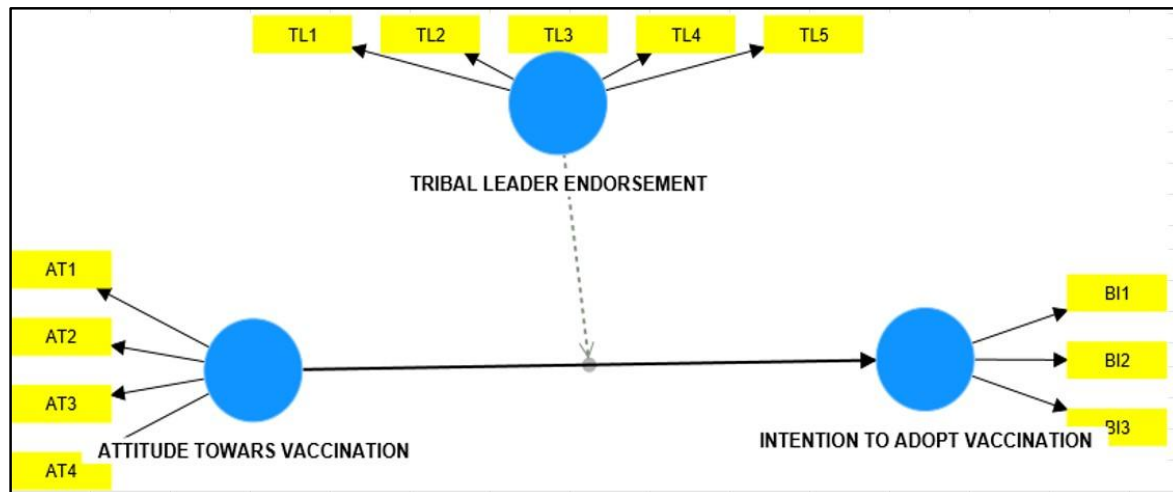
(a) Assessment of the SEM Significance: This study employed three hypotheses to address the research questions specified. In the process of hypothesis testing, the statistical significance of parameter estimations and coefficient values was assessed using a bootstrapping technique within the framework of Partial Least Squares Structural Equation Modeling (PLS-SEM) as outlined by Hair et al. (2014). The study employed the bootstrapping approach with 1000 bootstrap re-samplings and bias-corrected confidence intervals to assess the significance of the path coefficients (Chan et al., 2007). According to Hair et al. (2014) and Tabachnick et al. (2013), in a two-tailed test, the t-value must meet or above the threshold of 1.96 at a significance level of 5%.

Table 4: Hypotheses Tests of Study

	T statistics	P values	Results
Attitude Towards Vaccination -> Intention to Adopt Vaccination	8.296	0.000	Supported
Tribal Leader Endorsement -> Intention to Adopt Vaccination	5.139	0.000	Supported
Tribal Leader Endorsement X Attitude Towards Vaccination -> Intention to Adopt Vaccination	1.198	0.231	Unsupported

In the beginning, Hypothesis 1 anticipates that attitude will impact the intention to adopt the vaccine. The findings shown in Table 4 illustrate a statistically significant and positive correlation between individuals' attitudes and their intentions to accept vaccination. Therefore, the evidence supports H1. Hypothesis 2 posits that the endorsement of vaccination by tribal leaders has a significant impact on individuals' inclination to adopt immunization. The findings demonstrate that there is a statistically significant relationship at a 5% significance level, supporting hypothesis H2. Table 3 provides evidence that the endorsement of tribal leaders does not act as a moderating factor in the association between attitude and intention to accept vaccination. Consequently, the hypothesis H3, which posited such a moderation effect, is not supported.

(b) Coefficient of Determination R^2: Analysis of the PLS-SEM structural model requires a coefficient of determination (R^2). R^2 measures the variance in a dependent variable due to regressors or independent variables (J. Hair et al., 2014). R^2 is 0.000–1.000. A 0 value shows no perfect link between constructs. An R^2 value of 1.000 shows a perfect relationship, positive or negative. This research investigation solely focuses on a single endogenous variable, namely the intention to adopt. The adjusted R^2 considers the number of independent factors employed in predicting the target variable and assesses the impact of attitude on the intention to adopt. Consequently, it serves as an indicator to ascertain whether the inclusion of a new variable in the model will enhance the model's overall fit. The coefficient of determination (R^2) for the intention to adopt, as seen in this study, was found to be 0.428. The findings suggest that the model incorporating the two exogenous factors successfully accounted for around 0.428 percent of the observed fluctuations in the dependent variable, namely the desire to adopt.

(c) Assessment of Effect Size (F^2): The present study employed the f^2 statistic as a means to evaluate the comparative influence of the independent factors on the endogenous construct, specifically the intention to adopt. According to Hair et al. (2014), effect sizes of a model are evaluated using values of 0.02, 0.15, and 0.35. According to the findings presented in Table 5, it can be observed that the exogenous constructs have rather modest effect sizes on the corresponding endogenous construct.

Table 5: *f² statistic*

F-Square	Attitude towards Vaccination	Intention to Adopt Vaccination	Tribal Leader Endorsement
Attitude towards Vaccination		0.254	
Intention to Adopt Vaccination			
Tribal Leader Endorsement		0.128	
Tribal Leader Endorsement X Attitude towards Vaccination		0.007	

Predictive Relevance (Q^2): For this investigation, the measured value of Q^2 was 0.406, which is greater than zero. This reflects how well a model predicts the data of missing cases, which is evident in the improved predictive significance of the study variables regarding the effect of attitude, and tribal leaders' endorsement on adoption intention. Predictive Relevance (Q^2) is a metric used to assess the predictive relevance of the inner model. This metric is based on a sampling technique known as blindfolding. This method involves omitting a portion of the data matrix, estimating model parameters, and predicting the omitted portion (Hair et al., 2014). When the result value of Q^2 for a specific endogenous construct is larger than zero, this indicates the predictive relevance route model for this construct.

Discussion: Understanding of COVID-19 vaccination is limited among the indigenous communities, given where they commonly live, thus requiring strategies for vaccination uptake put into practice specific for their communities. According to existing scholarly works, one of the ways to increase the number of people inoculated among the indigenous community is by means of the tribal leader's endorsement. Many countries around the globe are utilizing tribal leaders to encourage community participation within their primary healthcare system. In northern Nigeria, tribally led initiatives have been proven successful in scaling up polio campaigns (Nwaze & Mohammed, 2013), meanwhile in North Carolina tribal leaders helped increase access to healthy, affordable foods for tribal communities (Fleischhacker et al., 2011) and in South Africa, tribe leader brings positive inspiration on HIV and AIDS prevention (Webb-Myllynen et al., 2011). In the Malaysia context, Cameron Highlands MP Ramli Mohd Nor, the country's first Orang Asli elected representative proposed that "the government empower Orang Asli community leaders or Tok Batin for support in administering vaccination" (Hisamudin, 2021). As such, this study believes that tribal leaders as potential public health change agents help bear vaccination challenges among indigenous communities.

However, despite vaccination proven useful in fighting COVID-19 disease continues to claim many lives, yet with ongoing negative publicities surrounding vaccination uptake, has created apprehensions towards the vaccination among the public. Perceived advantages of the vaccine, perceived benefits of the vaccine severity, signals to action, self-reported health outcomes, and trust were all factors in the decision to adopt the COVID-19 vaccination (Wong et al., 2021) as well as concerns about safety, efficacy, costs, and side effects (Reiter et al., 2020). Indigenous people in Peninsular Malaysia are reluctant to get the COVID-19 vaccine due to concerns about the vaccine's safety and its potential for long-term adverse effects (Khalid, 2021).

According to Moorthy et al. (2022), "building public trust is critical to the success of the immunization program". As such, tribal leaders may help in narrowing vaccine trust gaps by educating members of the tribe about vaccine benefits, vaccine accessibility, vaccine availability, efficacy and vaccine side effects and others. Indigenous communities often subscribe to their customary leaders for advice on spirituality, family life-related and religiosity matters. According to Arthur & Nsiah (2011), members of the tribe hold tribal leaders in high esteem and largely rely on their guidance to make decisions. Thus, a tribal leader has the capability to convince and promote the members of the tribe to accept vaccination.

The finding of this study was drawn upon three generations of Generation X, Generation Y and Generation Z. Generation X represents a cohort with a starting birth year of 1965 and 1980 as ending birth years (Amyx et al., 2011). Gen-Xers are highly focused on the desired results (Dayan, 2005). Generation Y or Millennials were born between 1981 and 2000 (Amyx et al., 2011). They are a demographic cohort following Generation X. People from this generation acknowledge contributing to society is important (Eisner, 2005). Generation Z is the demographic cohort succeeding Gen Y and is widely known as Digital Natives (Feiertag & Berge, 2008) and is a heavy user of the internet (Merriman, 2015).

The finding of this study that the endorsement of tribal leaders does not act as a moderating factor in the association between attitude and intention to accept vaccination could be explained by the fact that different generation cohorts may represent a different set of behavioral characteristics. On one hand, younger people's preference for vaccination uptake was to follow the examples of local vaccination "heroes," (Chan et al., 2022). Meanwhile, on the other hand, older people think differently is their group age is most likely associated with medical conditions, leading to being unsure about being vaccinated. According to Hisamudin (2021), people are scared to be vaccinated because they have medical conditions and due to a lack of credible

information about the vaccines.

In summary, although universally, the tribal leader is considered the most trusted information source within the indigenous community, yet, the finding of this study shows inversely, that although indigenous communities are closely tied and show devotion to their tribal leader, there is still a visible wall when it comes to their decision whether to get vaccinated. However, Johns Hopkins University reported that traditional leaders were "an untapped resource and a key link needed to bring various stakeholders on the same path to better health" (JHUCCP, 2014), the Malaysia government should utilize tribal leader to drive vaccination efforts in indigenous villages in the country. Tribal leaders in the indigenous community should be invited to formally spearhead their village's vaccination efforts by sharing any information hassle-free, convincing villagers to register for the program and ensuring vaccine compliance to younger generational groups within the indigenous community.

5. Conclusion

The world is still being shadowed by COVID-19 disease. COVID-19 virus is indivisibly affecting all humankind, including indigenous communities. As current cross-country evidence many indigenous people in Malaysia have been affected by COVID-19, The Government should be responsive in tackling COVID-19 vaccination acceptance by extending solution that is more likely to meet the context and culture of the indigenous. With the potential of traditional leaders as agents of change towards vaccination being less likely studied, further research is needed to ascertain tribe leader endorsement towards vaccination among the Indigenous population across generational periods.

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