

Factors causing vaccine hesitancy among parents in Bulacan

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Abstract

Purpose: This study aimed to determine the significant factors that cause vaccine hesitancy among parents in Bulacan

Research methodology: A non-experimental quantitative descriptive research study was used as a research design by using a formulated questionnaire based on the developed tool created by the World Health Organization-Strategic Advisory Group on Experts (SAGE) on Immunization and distributed among the 400 respondents in Bulacan. The respondents were purposively chosen.

Results: The result showed that the majority of the parents are hesitant to vaccinate their child, considering that the most common factor causing their decision to have vaccine hesitancy is the scientific evidence of the risk and benefits of vaccination. In addition, there is a weak negative correlation (-0.103) between the economic status of the parents and their vaccine hesitancy regarding the cost of the vaccine. Furthermore, the correlation analysis between the educational attainment of the parents and their vaccine hesitancy is interpreted as a negligible correlation (0.098).

Limitations: By COVID-19, the survey questionnaire was conducted through the online platform called Google Form which the study was only limited to parents who have access to the internet.

Contribution: The findings of the study are beneficial to the province of Bulacan for them to further assess and evaluate the vaccination programs in the province, and this also helps in developing plans on how to reduce vaccine hesitancy among parents in Bulacan.

Keywords: Parents, Vaccine, Vaccine hesitancy, Awareness, Bulacan

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1. Introduction

Since the first vaccine was created in 1796, different vaccination programs have been successful in their goal to prevent and control infectious disease outbreaks around the world ([World Health Organization, 2016](#)). In 1976, the World Health Organization (WHO) established the Expanded Program on Immunization to decrease the morbidity and mortality rate among children, as well as to prevent the prevalence and proliferation of different diseases like tuberculosis, poliomyelitis, diphtheria, tetanus, pertussis, and measles. As this program had started to be implemented in the Philippines, the Department of Health (DOH) has maintained the country's polio-free status since October 2000 ([Capuyan, 2020](#)).

However, while the different vaccination programs continue to fulfill their commitment to eradicating and eliminating the diseases, the Philippines declared a polio outbreak in September 2019 ([Department of Health, 2020](#)). Furthermore, the United Nations International Children's Emergency Fund (UNICEF) stated that approximately 2.9 million Filipino children are still unvaccinated as of 2019. They also mentioned that the measles immunization coverage in the country in 2018 has decreased at an alarming rate of 70%, compared to the 73% in 2017 and 88% in 2013, which are far below the 95% immunization rate requirement in every country ([UNICEF, 2019](#)). The decrease in the vaccination rate was largely caused by vaccine hesitancy among the parents ([McNeil et al., 2019](#)).

Vaccine hesitancy, as defined by the World Health Organization, refers to a delay in acceptance or refusal of a vaccine despite having access to the vaccination services. This hesitancy led to vaccine delays and refusals and caused an increase in the risk of disease outbreaks ([World Health Organization, 2014](#)). To prevent the occurrence of these outbreaks, “we need to establish a comprehensive global strategy and continuous communication between all societies, which will make the general public aware and capable of protecting themselves. ([Khan & Al Amin, 2021](#)).”

[Damjanović et al. \(2018\)](#) stated that it is important to take note that parents play a vital role in maintaining and improving the community and public health through their decision to vaccinate their children. As stated in the [Republic Act No. 10152](#) or the Mandatory Infants and Children Health Immunization Act of 2011, newborns and children up to 5 years old should undergo mandatory basic immunization. Furthermore, parental decision-making largely influenced the vaccination rate as the WHO mandated that children within the age group of 6 to 17 years old require consent from their parents or legal guardian ([World Health Organization, 2014](#)). However, the parents become hesitant due to several factors. In 2014, the World Health Organization- Strategic Advisory Group on Experts (SAGE) on Immunization published an article where they collected several studies regarding vaccine hesitancy. It is stated that there are three categories of influences that caused the hesitancy of parents. These categories are the contextual influences, individual and groups influences, and the vaccine/ vaccination-specific issues.

For further understanding, the World Health Organization-Strategic Advisory Group on Experts (SAGE) on Immunization explained that contextual influences are the influences that occur due to historic, socio-cultural, environmental, health system/institutional, economic or political factors. These include the communication and media environment, influential leaders, historical influences, and religion/ culture/ gender/ socio-economic. On the other hand, individual and group influences are caused by the personal perception of the vaccine or influences of the social/peer environment. The factors included are the experiences with past vaccination, knowledge/awareness, health care providers' trust, and immunization as a social norm. Lastly, vaccine/vaccination-specific issues pertain to the influences caused by the issues that are directly related to vaccine or vaccination. These are the scientific evidence of the risks/ benefits of vaccines, the introduction of a new vaccine or new formulation, mode of administration, mode of delivery, vaccination schedule, and the costs of the vaccines ([World Health Organization, 2014](#)).

As the COVID-19 started to emerge in December 2019, there are four approved COVID-19 vaccines in the Philippines as of March 26, 2021. These vaccines are manufactured by Pfizer/BioNTech, Gamaleya, Oxford/AstraZeneca, and Sinovac ([Basta and Moodie, 2021](#)). However, despite the availability of COVID-19 vaccines to the priority populations such as health care workers and the elderly, the number of people who are still hesitant to the vaccine continues to be a concern. According to the study conducted by the Johns Hopkins Center for Communication Programs, only 63% of their participants across 23 countries will accept a COVID-19 vaccine ([Desmon, 2021](#)). This study supports the idea of [Facciola et al. \(2019\)](#) that newer vaccines usually generate more vaccine hesitancy as caused by their knowledge, experiences, and media misinformation. Moreover, as the COVID-19 continues to affect the healthcare system, [Mwesigwa et al. \(2021\)](#) suggested that numerous interventions need to be taken up by the government especially in rural areas where restocking of vaccines are inadequate. [Barack & Munga \(2021\)](#) also mentioned that “the community should invest in the standardization of

public health practices and equipment to avoid future tensions in the wake of a similar kind of pandemic.”

On the other hand, the incident of Dengvaxia controversy that happened in November 2017 contributed to an increase in vaccine hesitancy in the Philippines. The controversy arose after the Sanofi Pasteur, the manufacturer of Dengvaxia, revealed that Dengvaxia produced a higher risk of infection to those individuals with no history of dengue infection than to those who had already been through the infection which became a controversy in the Philippines and led to the suspension of Dengvaxia ([Fatima & Syed, 2018](#)). This issue totally affected the perception of parents regarding vaccines. A study showed that in 2015, 93% of respondents agreed to the importance of vaccines and 82% agreed that vaccines are safe. However, in 2018, after the Dengvaxia controversy, only 32% agreed to the importance of vaccines and 21% for the idea that vaccines are safe ([Larson et al., 2019](#)). With this, the Department of Health identified this controversy as one of the reasons for an increase in vaccine hesitancy in the Philippines, which also led to the rise in measles cases in 2018 ([Migriño et al., 2020](#)).

Since vaccine hesitancy is an important topic particularly to the public health, especially during a pandemic crisis, the researchers intended to assess the nature and scale of it among the parents in Bulacan by using the World Health Organization- Strategic Advisory Group on Experts (SAGE) on Immunization’s standardized survey tool. Furthermore, as stated by [Migriño et al. \(2020\)](#), the evidence regarding factors that cause vaccine hesitancy in the Philippines is lacking so the researchers aimed to determine the factors that caused vaccine hesitancy among the parents in Bulacan. By determining these factors, it would be helpful in understanding the parents’ concerns so as to provide a better response to the issues that are relevant to them. It would be beneficial to the community in order to improve the situation, to fight the widespread vaccine hesitancy, and to reduce the risk of infectious disease outbreaks in the Philippines, particularly in the province of Bulacan.

2. Research methodology

This study was started in September 2020 and was successfully defended in April 2021. As the study aimed to determine the factors causing vaccine hesitancy among parents in Bulacan, the researchers conducted a non-experimental quantitative descriptive research study as a research design. [Business Research Methodology \(2020\)](#) stated that descriptive studies aim to describe population, situation, or phenomenon accurately. Furthermore, this methodology was used since the researchers investigated more than one variable ([McCombes, 2020](#)). Also, the researchers used purposive non-probability sampling since the respondents were the parents who have either an infant (young child under one year of age) or children within the age group of 1 to 17 years old. These children’s age group require parental consent before the vaccination process as mandated by the World Health Organization. In addition, the snowball sampling technique was used due to the short period of time and limited contact given by this pandemic. According to the [Philippines Statistics Authority](#), there were 760, 964 total number of households as of June 2018. With the use of Slovin’s formula, the researchers were able to identify the sample size of 400 participants.

Furthermore, the researchers used a modified questionnaire based on the developed tool created by the World Health Organization- Strategic Advisory Group on Experts (SAGE) in determining vaccine hesitancy ([Larson et al., 2015](#)), the questionnaire is divided into three sections which are the demographic profile, perception of parents, and last are the factors causing vaccine hesitancy under contextual influences, individual and group influences, and vaccine and vaccination specific issues.

For the demographic profile, it includes the name of respondents, municipality, sex, educational attainment (Elementary, High school, College Undergraduate, College Graduate, Post Graduate Degree, Vocational, No formal education attended), age of the youngest child under the care of the Respondent, and last is the Monthly income of the family (Less than PHP 10,957, Between PHP 10,957 and PHP 21,914, Between PHP 21,914 and PHP 43,828, Between PHP 43,828 and PHP 76,699, Between PHP 76,699 and PHP 131,484, Between PHP 131,484 and PHP 219,140, PHP 219,140 and above). In the perception of parents, questions are asked about their awareness of the free vaccines provided by the

government, and would they be hesitant to vaccinate their child/children when vaccines are to be provided by the government, including the COVID-19 vaccine.

In the last part of the questionnaire, questions regarding the factors causing vaccine hesitancy among parents in Bulacan are provided, and it is divided further into three classifications according to World Health Organization- Strategic Advisory Group on Experts (SAGE) on Immunization. First, under contextual influences which influences arise due to historic, socio-cultural, environmental, health system/institutional, economic or political factors. Second, the individual and group influences which are the influences arising from the personal perception of the vaccine or influences of the social/peer environment. Third, the vaccine and vaccination specific issues that are directly related to vaccine or vaccination ([World Health Organization, 2014](#)).

However, as the researcher made modifications from the tool created by the World Health Organization-Strategic Advisory Group on Experts (SAGE) on Immunization. In contextual influences, the factors included are the mass media, influential leaders, historical influences, and religion/culture. In individual and group influences, it includes the factors of experience with past vaccination, knowledge/awareness, healthcare providers' trust, and immunization as a social norm. Last, in vaccine and vaccination specific issues, under this are the factors of risk/benefit (scientific evidence), the introduction of a new vaccine or a new formulation, mode of administration, mode of delivery, vaccination schedule, and cost. Moreover, the instrument was structured in a modified Likert fashion, and the participants were instructed to respond to their level of agreement with the statements contained in the questionnaire and with the use of Google Form as its platform, the researchers had a computerized collection of data. In addition, the designed questionnaire for the study was subjected to a reliability and validity process.

For the statistical treatment, for the demographic profile of the respondents. The researchers used frequency distribution and percentage to determine the number of respondents per municipality of Bulacan, the sex of the respondents, the educational attainment of the parents, and the monthly income of the family. The researchers also had the age of the youngest child under the care of respondents that can verify that they are a parent having at least one (1) child who is either an infant or within the age range of one (1) to 17 years old.

In answering the most significantly different factors causing the vaccine hesitancy among parents in Bulacan, ANOVA Test was performed followed by the Tukey Pairwise Comparison. ANOVA Test, according to [Glen \(2016\)](#), will help to determine if the results are overall significant but are unable to indicate where the specific differences lie. But with the help of Tukey Pairwise Comparison, it will enable the researchers to determine which specific groups' mean is different or which factor is significantly different from the other factors. This study also utilized frequency distribution, which was defined as "statistical representation that displays the number of observations within a given interval" ([Young, 2020](#)). According to [Young \(2020\)](#), frequency distributions are used for normal distributions showing probabilities divided by standard deviations. So, frequency distribution together with standard deviations, and mean, helping out the researchers in answering the most common factor causing vaccine hesitancy among parents in Bulacan under contextual influences, individual and group influences, and vaccine and vaccination-specific issues.

Moreover, in answering the level of awareness of the parents towards free vaccines by the government and the degree of vaccine hesitancy of the parents in Bulacan, the researchers utilized percentage. The researchers also used Welch's t-Test to determine the significant difference between the mothers' and fathers' level of vaccine hesitancy which this test is intended for two samples with different variances. For the relationship between economic status and the vaccine hesitancy among parents, it was determined with the aid of Spearman Rank Correlation, defined as a test used to measure the degree of association between two variables. Lastly, the researchers were able to determine the relationship between educational attainment and vaccine hesitancy among the parents with the help of the Eta Coefficient, defined as a "method to determine the strength of association between dependent and independent variable." ([SAGE Research Methods Databases, 2014](#)).

3. Results and discussion

The researchers interpreted the results based on the data gathered wherein this study aims to determine the significant factors that cause vaccine hesitancy among parents in Bulacan. This also addresses the parents' level of awareness regarding vaccines and vaccine hesitancy. Lastly, this part of the study will further discuss the correlation between the educational attainment and economic status to the vaccine hesitancy of the parents.

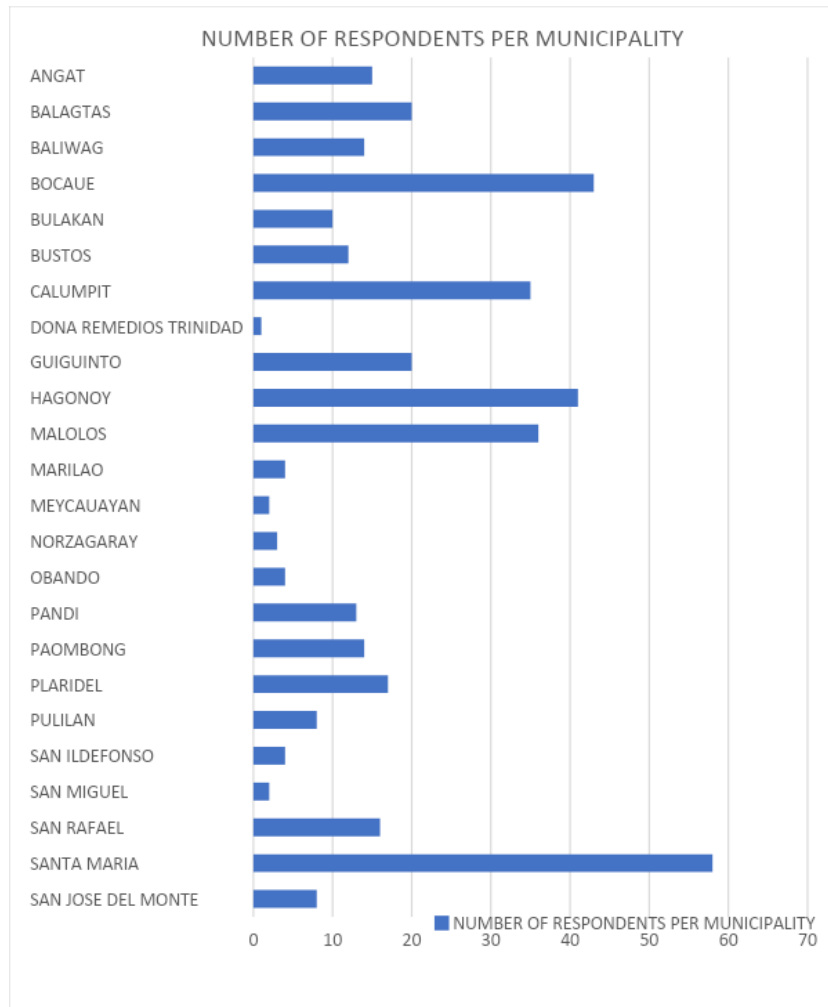


Figure 1. Number of Respondents per Municipality

The researchers guaranteed that the population of every parent in Bulacan is well-represented in this study by assuring that every municipality has at least one (1) participant. After the data collection, it turned out that the municipality of Santa Maria gathered the greatest number of respondents, having 15% of the total number of respondents. It is followed by Bocaue (10.75%), Hagonoy (10.25%), Malolos (9%), Calumpit (8.75%), Balagtas (5%), Guiguinto (5%), Plaridel (4.25%), San Rafael (4%), Angat (3.75%), Baliwag (3.5%), Paombong (3.5%), Pandi (3.25%), Bustos (3%), Bulakan (2.5%), Pulilan (2%), San Jose Del Monte (2%), Marilao (1%), Obando (1%), San Ildefonso (1%), Norzagaray (0.75%), Meycauayan (0.5%), San Miguel (0.5%), and Doña Remedios Trinidad (0.25%).

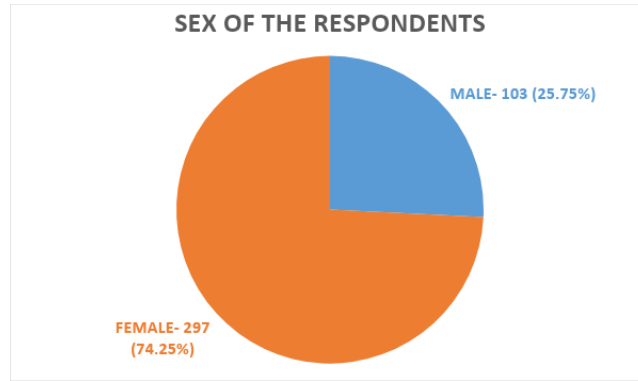


Figure 2. Sex of the Respondents

Moreover, this figure shows that most of the respondents who participated in the study were females, comprising 74.25% of the total respondents. On the other hand, 25.75% of the respondents were males.

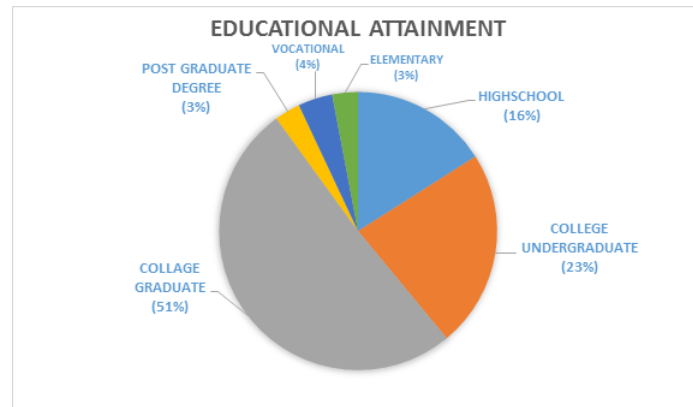


Figure 3. Educational Attainment of the Parents

Upon interpreting the data, it is revealed that most of the participants are college graduates, having 51% of the total respondents. Whereas, 23% of the respondents said that they are college undergraduates, while 16% of them mentioned that they are high school graduates and 3% are elementary graduates. Likewise, 4% of them had undergone vocational education and 3% stated that they pursued post-graduate degrees.

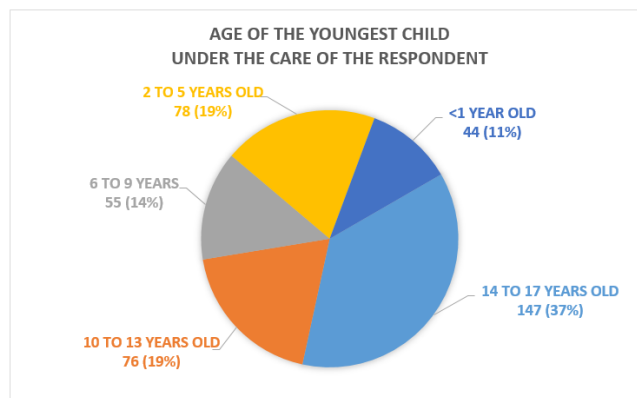


Figure 4. Age of the Youngest Child under the Care of the Respondent

This figure shows the ages of the youngest child of the respondents. The majority of the respondents have children ages 14 to 17 years old, with a total of 37% of the respondents. It is followed by 19% of

parents having children ages 10-13 years old and 2-5 years old. Moreover, 14% of the respondents have children under 6-9 years old. Lastly, only 11% of the respondents have children < 1-year-old.

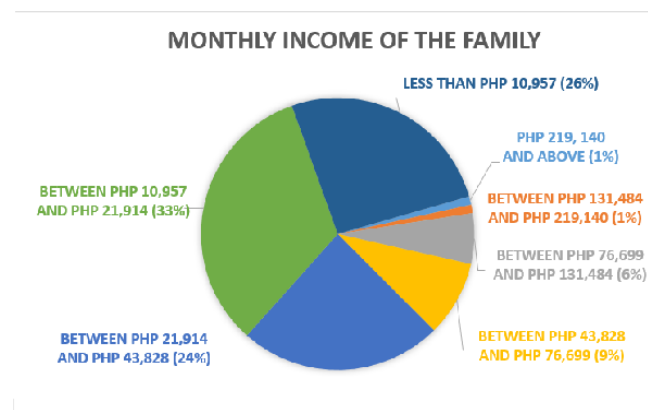


Figure 5. Monthly Income of the Family

Lastly, Figure 5 presents the monthly income of the family. As per the data collected, it turned out that most of the parents who participated in the study, or 33% of the respondents, have a monthly income of between PHP 10,957 and PHP 21,914 (low-income but not poor). Out of 400 participants, 26% of them stated that their monthly income is less than PHP 10,957 (poor). Then, parents who have a monthly income of between PHP 21,914 and PHP 43, 828 (lower middle) comprised 24% of the total respondents. 9% of them have responded that their monthly income is between PHP 43,828 to PHP 76, 699 (middle), while 6% answered they have a monthly income of between PHP 76,699 and PHP 131,484 (upper middle). On the other hand, 1% of the respondents have a monthly income between PHP 131,484 to 219, 140 (upper-middle nut not rich). Last of all, having the same percentage, only 1% answered that their monthly income is PHP 219,140 and above (rich).

Table 1. Summary and Results of ANOVA

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
<i>Mass Media</i>	400	1623	4.06	0.86
<i>Influential Leaders</i>	400	1409	3.52	1.07
<i>Historical Influences</i>	400	1536	3.84	1.22
<i>Religion/Culture</i>	400	1009	2.52	1.12
<i>Experience with Past Vaccine</i>	400	1227	3.07	1.36
<i>Knowledge/Awareness</i>	400	1578	3.95	0.75
<i>Healthcare Providers</i>	400	1469	3.67	1.05
<i>Immunization as a Social Norm</i>	400	1318	3.30	1.16
<i>Risk/Benefit</i>	400	1651	4.13	0.75
<i>Introduction of New Vaccine</i>	400	1610	4.03	0.71
<i>Mode of Administration</i>	400	1286	3.22	1.29
<i>Mode of Delivery</i>	400	1346	3.37	1.23
<i>Vaccination Schedule</i>	400	1294	3.24	1.28
<i>Cost</i>	400	1532	3.83	1.13

ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
<i>Between Groups</i>	1100.084	13	84.622	79.005	0.000	1.722
<i>Within Groups</i>	5983.105	5586	1.071			
<i>Total</i>	7083.189	5599				

From the ANOVA test, it resulted in $F= 79.005$ with $p\text{-value} = 0.00$. Since $p\text{-value}$ is less than the significance level of 0.05. The researchers conclude that there is a significant difference among the factors. This result implies that there is a varying cause of vaccine hesitancy among parents in Bulacan.

Tukey Pairwise Comparisons

Grouping Information Using the Tukey Method and 95% Confidence

Factor	N	Mean	Grouping
Risk/Benefit	400	4.1275	A
Mass Media	400	4.0575	A B
Introduction of New Vaccine	400	4.0250	A B
Knowledge/Awareness	400	3.9450	A B
Historical Influences	400	3.8400	B C
Cost	400	3.8300	B C
Healthcare Providers	400	3.6725	C D
Influential Leaders	400	3.5225	D E
Mode of Delivery	400	3.3650	E F
Immunization as a Social Norm	400	3.2950	E F G
Vaccination Schedule	400	3.2350	F G
Mode of Administration	400	3.2150	F G
Experience with Past Vaccine	400	3.0675	G
Religion/Culture	400	2.5225	H

Means that do not share a letter are significantly different.

Figure 6. Tukey’s Pairwise Comparisons among Factors

In addition, the result in Tukey’s Pairwise Comparisons, indicated that the scientific evidence of Risk/Benefit of vaccines had the highest mean score of (4.12) that was significantly different from other factors while Religion/Culture with the least mean score of (2.52) was also significantly different from other factors (Figure 6). Moreover, according to [Lane et al. \(2018\)](#) risk-benefit (scientific evidence), lack of knowledge and awareness of vaccination, and issues about religion/culture regarding vaccines are the top three reasons for having vaccine hesitancy in different countries of America, Africa, Europe, Eastern Mediterranean, South East Asia, and Western Pacific. Now, from the results of the study, it implies that the risk/benefit (scientific evidence) of vaccination is the topmost factor among parents in Bulacan causing vaccine hesitancy. However, despite the religion/culture included in the top three reasons for having vaccine hesitancy, in this study, the religion/culture is the least factor that causes vaccine hesitancy among parents in Bulacan which [Mwesigwa, D. \(2021\)](#) stated that cultural limitations could be a factor that can affect the willingness of the citizens to local participation.

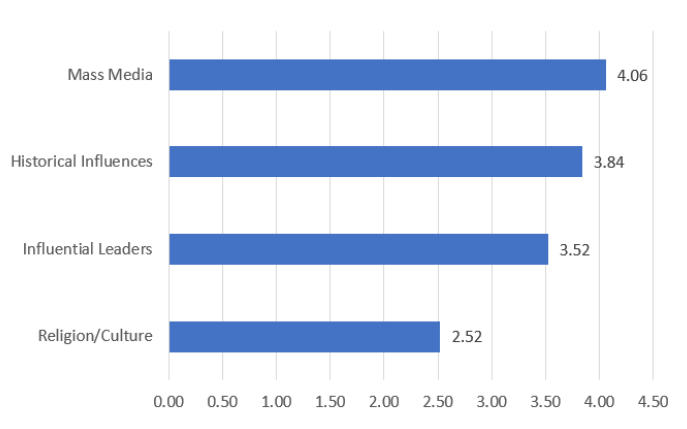


Figure 7. Contextual Influences Causing Vaccine Hesitancy among Parents

Based on the results, the most common factor is mass media with a mean score of 4.06 or interpreted as agree, followed by historical influences with a mean score of 3.84 or interpreted as agreeing, influential leaders with a mean score of 3.52 or interpreted as agreeing, and religion/culture with a mean score of 2.52 or interpreted as neutral. And with the continuous widespread of fake news and misinformation within the Philippines, many people tend to believe in the wrong information as some of them still find it difficult to identify fake news from the real ones ([Nicomedes et al., 2020](#)). This implies that the mass media has its role in information dissemination, which includes the information from legitimate sources or the spread of fake news that affect people’s perceptions towards vaccination

decisions (Larson et al., 2015). In addition, one of the causes of vaccine hesitancy is the increasing rate of misinformation and fake news to the public on social media platforms, since rumors and misinformation aggregate the people’s hesitancy with vaccines (McGee & Suh, 2019).

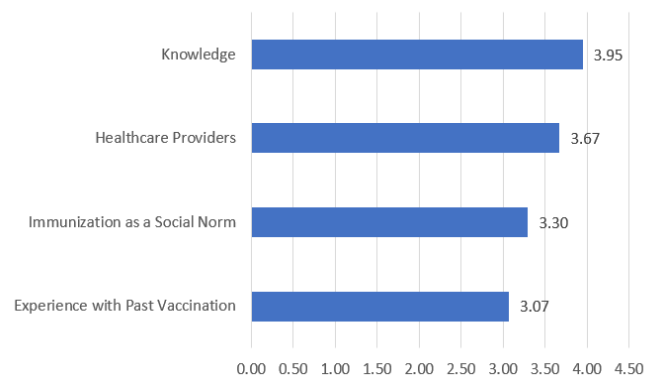


Figure 8. Individual and Group Influences Causing Vaccine Hesitancy among Parents

Moreover, the most common factor under individual and group influences that caused the vaccine hesitancy among parents in Bulacan. Based on the results, the most common factor is the knowledge/awareness with a mean score of 3.95 or interpreted as agree, followed by healthcare providers’ trust with a mean score of 3.67 or interpreted as agreeing, immunization as a social norm with a mean score of 3.30 or interpreted as neutral, and experience with past vaccination with a mean score of 3.07 or interpreted as neutral. This denotes that “vaccine hesitancy can be caused by whether an individual or group has accurate knowledge, a lack of awareness due to no information, or misperceptions due to misinformation” (World Health Organization, 2014). And according to Harmsen et al. (2012) to satisfy parents’ information needs like providing sufficient sources about vaccination for its effectiveness and benefits of vaccines, and possible imposed risk of it. Through this, it enables them to make a well-informed decision whether to vaccinate or not their children.

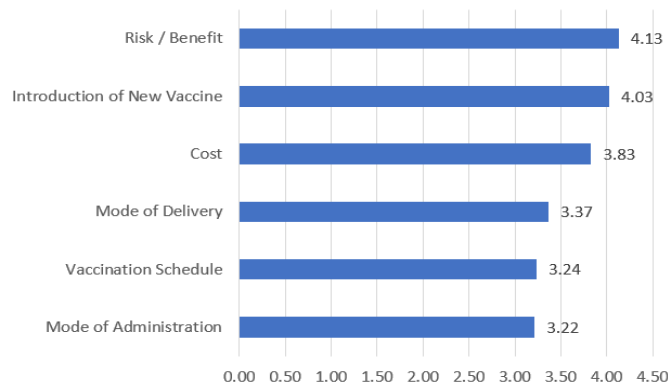


Figure 9. Vaccine and Vaccination Specific Issues Causing Vaccine Hesitancy among Parents

Lastly, the most common factor under vaccine and vaccination-specific issues that caused vaccine hesitancy among parents in Bulacan. Based on the results, the most common factor is scientific evidence of risk/benefit of vaccines with a mean score of 4.13 or interpreted as agree, followed by an introduction to new vaccines with a mean score of 4.03 or interpreted as agreeing, cost with a mean score of 3.83 or interpreted as agreeing, mode of delivery with a mean score of 3.37 or interpreted as neutral, vaccination schedule with a mean score of 3.24 or interpreted as neutral, and mode of administration with a mean score of 3.22 or interpreted as neutral. This implies that the scientific evidence of the risk/benefit of vaccines can prompt individuals to hesitate. This is due to the unexpected medical problems that occur after a vaccination, which is commonly known as the adverse effect or the side effects of vaccines

([Center for Disease Control and Prevention, 2014](#)). And regardless of how these adverse effects influence the vaccine hesitancy among parents, [Shen & Dubey \(2019\)](#) suggested that it is still the physicians' and other health care providers' job to be honest about the side effects of vaccination to gain the trust of patients towards the health care system.

Table 2. Level of Parents' Awareness

Responses	Count	Percent
Strongly Agree	119	29.8%
Agree	189	47.3%
Neutral	72	18.0%
Disagree	12	3.0%
Strongly Disagree	8	2.0%
Total	400	100.0%
Mean	4.00	
Interpretation	Agree	

Furthermore, 119 out of 400 (29.8%) respondents strongly agree with the awareness of free vaccines provided by the government. In addition, 189 out of 400 (47.3%) respondents agreed that they were aware of the free vaccines by the government, with neutral 72 is 18.0%, with disagree is 12 or 3.0%, and with strongly disagree is 8 or 2.0%. (Table 2). Thus, the level of awareness of parents in Bulacan towards free vaccines by the government has an overall mean of 4.00 interpreted as agreeing wherein the majority of the parents in Bulacan are aware of the free vaccines that are being provided by the government. However despite the awareness of the parents in Bulacan, according to the article released by the [World Health Organization \(2019\)](#), a polio outbreak was reported in 2019. This outbreak became the wake-up call to conduct an immunization program to increase the population immunity to prevent further proliferation of vaccine-preventable diseases. The said immunization program was given to children below five years of age living in Davao City, Davao del Sur, Lanao del Sur, and Metro Manila from October 14-27 of 2019.

Table 3. Level of Parents' Vaccine Hesitancy

Responses	Count	Percent
Strongly Agree	92	23.0%
Agree	159	39.8%
Neutral	101	25.3%
Disagree	31	7.8%
Strongly Disagree	17	4.3%
Total	400	100.0%
Mean	3.70	
Interpretation	Agree	

On the other hand, the level of vaccine hesitancy among parents in Bulacan regarding general vaccines including the COVID-19 vaccine showed an overall mean of 3.70, interpreted as agree (Table 3). And this result showed that despite the fact that most of the parents are aware of the free vaccines provided by the government, there is still vaccine hesitancy among parents in Bulacan for the general vaccines including the COVID 19 vaccine. Therefore, this result agrees with the statement released by [Larson et. al. \(2019\)](#) that the vaccine controversies led to public fear and concern regarding general vaccines and other health interventions. And this is why vaccine hesitancy must be addressed and keep in mind that parental decision has a major role in the immunization of their children ([Damnjanović et al., 2018](#)). Assessing the decision of vaccine-hesitant parents would help the medical community and society to reduce the risk of acquiring vaccine-preventable diseases ([Facciola et al., 2019](#)).

Table 4. T-Test Results Comparing the Mothers' and Fathers' Level of Vaccine Hesitancy

	Mother	Father
Mean	3.750842	3.533981
Variance	1.059332	1.133638
Observations	297	103
Hypothesized Mean Difference	0	
df	173	
t Stat	1.79642	
P(T<t) one tail	0.037086	
t critical one tail	1.653709	
P(T<t) two tail	0.074173	
t critical two tail	1.973771	

Table 4 showed the t-Test results comparing the mothers' and fathers' levels of vaccine hesitancy. Based on the study conducted by [Delgado et al. \(2021\)](#), they stated that mothers are more hesitant compared to fathers. However, based on the result presented in Table 4, the p-value (0.074173) is greater than the alpha, 0.05. With this, the researchers conclude that there is no significant difference between the mothers' and fathers' levels of vaccine hesitancy.

Table 5. Correlation Analysis between Economic Status and Vaccine Hesitancy

Spearman Rank Correlation	-0.103
Interpretation	Very Weak Negative

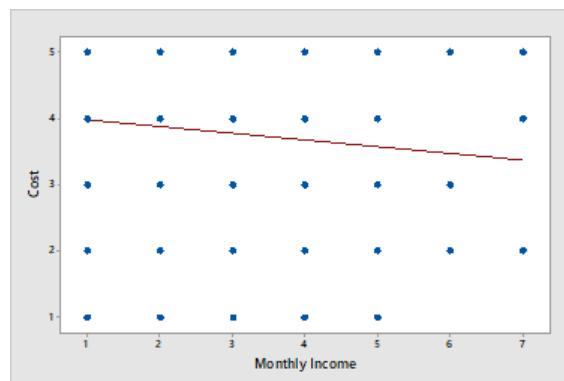


Figure 10. Scatterplot between Economic Status and Vaccine Hesitancy

In addition, the correlation analysis between the economic status of the parents and their vaccine hesitancy regarding the cost of the vaccine was interpreted as a very weak negative correlation using Spearman Rank Correlation (Table 5, Figure 10). Therefore, the correlation between the economic status of the parents and their vaccine hesitancy regarding the cost of the vaccine is inversely proportional which means that if there is an increase in the monthly income of the family then there is a decrease in vaccine hesitancy and vice versa. This agrees with the study conducted by [Paul et. al. \(2020\)](#), stating that respondents with lower annual income are likely to have negative attitudes towards vaccination. And contrary to [MacDonald et al., \(2015\)](#) argued that factors like socioeconomic status do not influence vaccine hesitancy.

Table 6. Correlation Analysis between Educational Background and Vaccine Hesitancy

Eta Coefficient	0.098
Interpretation	Negligible

However, the correlation analysis between the educational attainment of the parents and their vaccine hesitancy was interpreted as a negligible correlation measured through ETA Coefficient (Table 6). Contrary to the statement provided by [Bertoncello et al. \(2020\)](#) that parents with a higher educational background will most likely accept vaccines, this study showed there is no relationship between educational attainment and vaccine hesitancy among the parents in Bulacan.

4. Conclusion

The study is primarily focused on the determination of the significant factors that influence vaccine hesitancy among parents in Bulacan. Due to the lack of data on the total number of parents in Bulacan, the researchers were only able to gather data regarding the total number of households in Bulacan. According to the Philippine Statistics Authority, as of June 2018, there were 760,964 total households in the province of Bulacan. By using Slovin's Formula, the researchers were able to identify the number of respondents needed in the study. The 400 participants represented the population of parents in every household in Bulacan. These parents should have at least one (1) child who is either an infant or within the age range of one (1) to 17 years old since these children require parental consent before vaccinating, as mandated by the [Republic Act No. 10152](#) and the United Nations International Children Emergency Fund (UNICEF). Despite the difficulty caused by the given short period of time, the researchers guaranteed that the population of every parent in Bulacan is well-represented in this study by assuring that every municipality has at least one (1) participant.

The study was conducted through the utilization of a modified questionnaire adapted from the developed survey tool of the World Health Organization- Strategic Advisory Group on Experts (SAGE) on Immunization. The set of different questions served as the guide that enabled the researchers to answer the questions mentioned in the statement of the problem. However, with the given circumstance of a pandemic crisis brought by the COVID-19, the survey questionnaire was conducted through the online platform called Google Form. With this, the respondents for this study were only limited to parents who have access to the internet.

Moreover, based on the findings and conclusions drawn from this study, the researchers recommended for future researchers to conduct further studies since [Lazarus et al. \(2021\)](#) argued that vaccine decisions can still change over time. And with the different factors that cause vaccine hesitancy, it is better to determine the other factors causing vaccine hesitancy of parents from different provinces or regions. Also, to perform an actual interview for parents who do not have internet access and were not able to answer through Google Forms. In addition, it is recommended to have the total number of parents in every barangay instead of the total number of households, and the last is to determine the level of vaccine hesitancy of parents for different kinds of vaccine which can indicate the vaccines that give high vaccine hesitancy among parents.

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