

# The Effect of Dengvaxia Issues on the Perception of Mothers towards Vaccination and Vaccine Hesitancy

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**Abstract:** - Vaccines are considered as the most important medical instruments to manage diseases. However, the Dengvaxia controversy created a significant difference between the perspective of mothers before and after the incident. Thus, this thesis aimed to identify the effect of Dengvaxia issues on the mothers' perception towards vaccination and vaccine hesitancy because of its relevance in the COVID-19 vaccine acceptance. To assess the respondents' perception, the researchers used a descriptive and quantitative approach by surveying 385 mothers in Region IV-A. Two versions of the survey questionnaire with informed consent were given, answering their perception towards vaccination before and after the issue. Various statistical treatments were used for data analysis. The Kruskal-Wallis one-way analysis of variance identified the respondents' perception towards the statements based on their mean values. The Post Hoc test determined which group had significantly different responses using  $p$ -values. The paired sample t-test showed the significant differences of the mean scores of the respondents throughout the issue. Results indicated that mothers had a more positive perception towards vaccines before the issue. Consequently, their occupation was the only demographic profile that showed a significant difference in the attitude of mothers towards vaccination compliance. In conclusion, the Dengvaxia controversy significantly affected their perception towards vaccination and vaccine hesitancy. Hence, this study can be a framework for researchers to correlate behaviors of people towards vaccine hesitancy. The researchers recommend conducting a wider scope of participants, considering other factors as part of the criteria and using different methods to obtain more diverse results.

**Keywords:** — *Dengvaxia, Vaccination, Vaccine Hesitancy, Vaccine Confidence, Mother's perception.*

## I. INTRODUCTION

Vaccination is one of the most effective health interventions considered fundamental to immunization as it has led to the management of diseases [1]. In fact, according to the Centers for Disease Control and Prevention (CDC), vaccines aid in the development of the body's immunity to certain infections by exposing the human body to a specific weakened virus to trigger the immune system to activate the production of antibodies [2]. This principle implied that vaccination would protect the health of the vaccinated individual and prevent the transmission of infections from one person to another.

Therefore, the World Health Organization (WHO) emphasized that to attain successful immunization and vitality of the vaccines; vaccination uptake shall be increased and maintained [3].

A significant public health concern in the Philippines is Dengue, which is prevailing in all regions of the country [4]. However, the reputation of vaccines and the health community were affected due to the Dengvaxia controversy. Dengvaxia is a dengue vaccine innovated by Sanofi Pasteur and was launched in 2016 to help protect children against all four dengue serotypes. Moreover, since the vaccine was licensed to be used in dengue-endemic countries, its use was suitable in the Philippine setting. As a result, the Department of Health spent billions of money, Php 3.2B, to be exact, on the vaccine. At the same time, they began an immunization program for the masses, intending to immunize millions of students by the end of the year [5]. Dengvaxia was then found to reduce the risk of

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severe Dengue and hospitalizations, as a whole, due to the disease.

According to the World Health Organization Strategic Advisory Group of Experts (WHO SAGE), vaccine hesitancy is described as the "prolonged acceptance or refusal to be vaccinated despite vaccine availability." This led vaccine-preventable disease outbreaks such as polio and measles to rise around the world [6]. Concerning this, the Department of Health (DOH) identified that the public's views on vaccines were negatively affected by the Dengvaxia controversy, leading to the increased cases of vaccine hesitancy [7,8].

### A. Objectives of the Study

The main objective of this study was to identify the impact of the issues regarding Dengvaxia in the Philippines on the perception of mothers residing in Region IV-A or CALABARZON towards vaccination and vaccine hesitancy. Specifically, the researchers aimed to determine mothers' perceptions regarding vaccination and the external factors that influenced their perceptions.

### B. Statement of the Problem

This study determined the views of mothers regarding vaccines and vaccination, their attitude towards vaccination compliance, and how the Dengvaxia issues affected their perceptions. Furthermore, this study aimed to answer the following questions:

- What is the demographic profile of the respondents in terms of:
  - a. Age
  - b. Educational attainment
  - c. Occupation
- What is the attitude of respondents towards vaccination compliance before the reported complications caused by the Dengvaxia vaccination program?
- What is the attitude of respondents towards vaccination compliance after the reported complications caused by the Dengvaxia vaccination program?
- Is there a significant difference in the attitudes of the respondents towards vaccination compliance before and after the reported complications caused by the Dengvaxia vaccination program?
- Is there a significant difference in the attitude towards vaccination compliance when grouped to the demographic profile of the respondents?

### C. Hypothesis

The following were the hypotheses used in the study:

- Null hypothesis: There was no significant difference in mothers' attitudes towards vaccination compliance before and after the reported complications caused by the Dengvaxia vaccine in the provinces of Region IV-A.
- Alternative Hypothesis: There was a significant difference in the attitudes of mothers towards vaccination compliance before and after the reported complications caused by the Dengvaxia vaccine in the provinces of Region IV-A.

With this, the study focused on the effects of Dengvaxia-related issues on mothers' perception towards vaccination, rather than the vaccine itself, and how vaccine hesitancy develops in their behavior. Therefore, with the acquisition of pertinent information from the point of view of the research participants, the researchers will be able to recommend and suggest strategies on how to address vaccine hesitancy in the country.

## II. HEALTH BELIEF MODEL THEORY

A theoretical framework describing the ground basis of the study can be explained by the Health Belief Model Theory developed by social psychologists, namely Irwin Rosenstock, Godfrey Hochbaum, Stephen Kegeles, and Howard Leventhal. This theory was derived from both psychological and behavioral theory with two components as its foundation: the desire of an individual to prevent disease and their belief that a specific health action will help cure or prevent it [9].

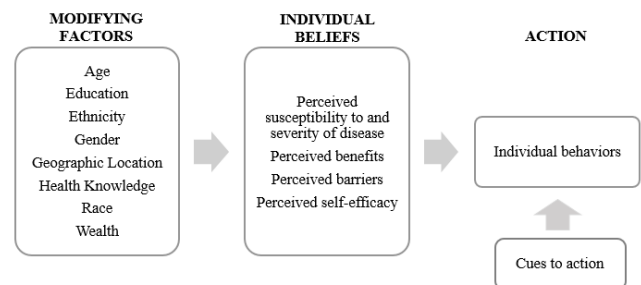


Fig. 1. Health Belief Model Theory

Its elements are classified into three: modifying factors, individual beliefs, and action. The modifying factors in the framework were suggested to affect an individual's behaviors relating to health by affecting the particular views that were

also shown in the exact figure. These personal beliefs were approaches that were involved to health, such as the individual's perceived risk of acquiring illness or disease, feelings on the seriousness of contracting illness or disease, perceived benefits to reduce or avoid the risks of illness or disease, feelings on the impediments in the said course of action to eliminate the risk of infection or illness, and level of confidence of the individual to perform such behavior. The cue to act in the framework was the stimulus that prompts the individual to make a health change. These individual beliefs led to the individual's health-related behavior.

Since the study focused on mothers' perception towards the dengue immunization program, the Health Belief Model Theory was used. Using this model as the theoretical study, the researchers developed a conceptual framework that allowed them to gather information with the said key elements that influence the mothers' health behaviors. It was a helpful tool in understanding the different behaviors of mothers towards vaccination and vaccine hesitancy as it explained the different perceptions that may affect such behavior.

#### A. Conceptual Framework

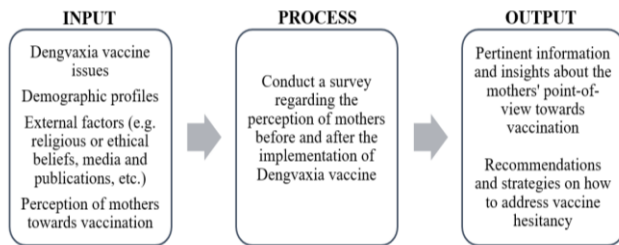


Fig.2. Conceptual Framework of the Study

The conceptual framework described the procedures on how the researchers obtained the necessary data to come up with and answer their stated objectives. The input consisted of the following: the issues regarding Dengvaxia vaccine, the demographic profiles of the mothers of Region IV-A provinces, the perception and knowledge of mothers towards vaccination, and other external factors such as religious or ethical beliefs, media, and publications about vaccination, which could influence their perception and decision-making with regards to their children's vaccination. With the aforementioned inputs, the researchers processed them by conducting surveys about the mothers' perception before and after the Dengvaxia implementation and acquiring the information obtained from the previous studies to strengthen the recent research. By correctly and subsequently following these procedures, the researchers

were able to produce valuable and accurate information regarding mothers' perception towards Dengvaxia and their willingness to vaccinate their children in the present time. Furthermore, after obtaining the needed information, the researchers came up with strategies and recommendations concerning the mothers' perception of vaccinations.

### III. METHODOLOGY

#### A. Research Design

The study used a descriptive design as it described the respondents' perspectives towards vaccination before and after the issue of Dengvaxia arose in the Philippines. It used a quantitative approach by utilizing survey questionnaires that were answered depending on the behavior and perception of the mothers. Moreover, it focused on the differences in knowledge and attitudes regarding immunization based on demographic profiles, along with the effects of the Dengvaxia issue. The researchers gathered the respondents' insights and determined the extent of the influence of the Dengvaxia scare on the respondents.

#### B. Research Locale

The locales included in the study were the provinces of Region IV-A, including Cavite, Laguna, Batangas, Rizal, and Quezon, Philippines. The primary reason these were chosen was due to the researchers' accessibility to obtain information from the respondents within the vicinity of the region. The duration of this study lasted approximately 10 months.

#### C. Research Respondents

The study respondents were Filipino mothers within 18 to 59 years of age who were situated in the provinces of Region IV-A. The age was specified in a manner that the data gathering did not require the use of parental consent. The vulnerable group—specifically mothers below 18 and above 59 years of age and those with medical conditions—were excluded from the study. Furthermore, the respondents were purposely chosen based on the information of their motherhood—if they had one or more children—and their authority to decide whether or not their children can be vaccinated. Participants who decided to withdraw during the study were immediately excluded and were freely allowed to participate no further. Untoward incidents related to the study, which involved any of the participants were evaluated by the researchers and were addressed immediately.

#### D. Data Gathering Techniques

The Parent Attributes about Childhood Vaccine (PACV) was the standardized questionnaire used and modified in the study. The standardized questionnaire was able to identify moderate vaccine hesitancy among caregivers from primary care centers [10]. Each respondent was given a copy of the modified survey questionnaire to assess the impact of the Dengvaxia issue on their perception towards vaccination through the use of an online platform, Google Forms. Two versions of the survey questionnaire were given, particularly: (a) their perception towards vaccination before the Dengvaxia issue and (b) their perception towards vaccination after the Dengvaxia issue. Recruitment of the respondents was done by contacting the parents, students, relatives, and acquaintances of the researchers who were residing in Region IV-A. This assisted the researchers in disseminating the survey questionnaires appropriately. Moreover, the Google Form links were given to respondents and passed online through social media applications, allowing them to access and answer the survey questionnaire at the preferable time that was most convenient for them.

#### E. Sampling Method

The snowball sampling technique was adopted primarily because it allowed identifying and selecting appropriate individuals for the research. Since the study focused on the mothers within the Region IV-A area, the researchers contacted the Philippines Statistics Authority (PSA) to obtain the total population of the sample respondents. In doing so, the online forms were disseminated to the mothers. The sample size was composed of 383 mothers living in Region IV-A, Philippines. The value was computed using a sample size calculator made by the Australian Bureau of Statistics. However, the final respondent count included in the data treatment was 385 mothers, which the statistician approved. Assistance from parents, students, relatives, and acquaintances from Region IV-A was of help in gathering the responses through Google Forms.

#### F. Sampling Size

The sample size was composed of 383 mothers living in Region IV-A, Philippines. The value was computed using a sample size calculator made by the Australian Bureau of Statistics [11]. However, the final respondent count included in the data treatment was 385 mothers, which the statistician approved. Assistance from parents, students, relatives, and acquaintances from Region IV-A was of help in gathering the responses through Google Forms.

According to the Philippine Statistics Authority's Various Census Reports in 2015, the total population of mothers in Region IV-A was 94,027 [12]. Using this and the numerical values substituted on the proportion and confidence interval provided by a licensed statistician, the sample size was calculated through the Cochran Q formula:

$$x = Z(c/100)^2 r(100-r)$$

$$n = N^x / ((N-1)E^2 + x)$$

$$E = \text{Sqrt}[(N-n)^x / n(N-1)]$$

Where  $n$  = Sample size

$E$  = Margin of error

$N$  = Population size

$r$  = Fraction of the responses of interest

$Z(c/100)$  = Critical value for  $c$

$c$  = Confidence level

The sample size obtained from the formula depicted the total number of mothers required to validate the responses gathered by the researchers.

#### G. Data Analysis

The study used quantitative data analysis methods as its data gathering process involved distributing questionnaires to several respondents. Moreover, the study, being quantitative, focused more on deductive reasoning and scientific methods. The specific data analysis tools utilized in the research were: (1) frequency and percentage, which showed the count and ratio comparison of the demographic profile of the respondents, (2) mean and standard deviation, which measured the average level of agreement of the respondents to the questions given to them and the centrality and variability of their corresponding answers, (3) paired sample t-test and its non-parametric equivalent, the Wilcoxon signed-rank test, which showed the significant difference of the mean score of the respondents before and after the Dengvaxia issue, and lastly, (4) the analysis of variance (ANOVA) and its non-parametric equivalent, the Kruskal-Wallis one-way analysis of variance, which identified the significant difference in the mean scores of the respondents to the different variables when grouped according to their demographic profiles with more than two groups. The  $p$ -values included were based on the Kruskal-Wallis test.

In addition to this, the values for mean and standard deviation were expressed as M and SD, respectively. Concerning the verbal interpretation of the data, the scale used was 1.000 to 1.800 (strongly disagree), 1.810 to 2.610 (disagree), 2.610 to

3.400 (undecided), 3.410 to 4.200 (agree), and 4.210 to 5.000 (strongly agree).

On the other hand, for reverse questions, the scale used was 4.210 to 5.000 (strongly disagree), 3.410 to 4.200 (disagree), 2.610 to 3.400 (undecided), 1.810 to 2.610 (agree), and 1.000 to 1.800 (strongly agree).

**IV. RESULTS AND DISCUSSION**

Table 1. Demographic Profile of the Respondents

Demographic Profile		Frequency (%)
<b>Age</b>	18 – 29	42 (10.9 %)
	30 – 39	125 (32.5%)
	40 – 49	139 (36.1%)
	50 – 59	79 (20.5%)
<b>Educational Attainment</b>	Grade School and High School	38 (9.9%)
	College Undergraduates	112 (29.1%)
	Bachelor’s Degree	167 (43.4%)
	Master’s/Post-graduate	68 (17.7%)
<b>Occupation</b>	Support Staff and Manual Laborers	20 (5.2%)
	Business and Finance	111 (28.8%)
	Education	163 (42.3%)
	Engineering, Health, Science and Technology	28 (7.3%)
	Housewife/Unemployed	63 (16.4%)

Table.1. presented the demographic profile of the respondents which was composed of three components: age, educational attainment, and the respondents' occupation. Most respondents belonged to the age group of 40 to 49 years of age for the age demographic.

Almost half of the respondents finished with a bachelor’s degree in terms of their educational attainment. Lastly, for their occupation, most belonged to the educational sector.

According to the study by [13], mothers aged above 40 years old exhibit higher hesitancy rates. However, in a study conducted by [14] younger parents were most likely to be vaccine hesitant. Therefore, the age demographic profile of mothers is relevant in determining the vaccine hesitancy and confidence of mothers.

Furthermore, according to [15], the level of parental education contributes to the level of vaccine hesitancy of the parents. Likewise, based on the study by [16], individuals working in the healthcare sector were more likely to have vaccination compliance. Thus, occupation is considered vital in identifying vaccine hesitancy.

Table.2. Modified PACV Survey Questions (Before & After Dengvaxia)

QUESTIONS		BEFORE		AFTER	
		M	V.I.	M	V.I.
<b>IMMUNIZATION BEHAVIOR</b>					
1	Children get more shots than are good for them.	2.216	*A	2.621	*UD
2	I believe that many of the illnesses that shots prevent are severe.	3.971	A	3.569	A
3	It is better for my child to develop immunity by getting sick than to get shot.	3.018	*UD	3.008	*UD
7	I am concerned that my child might have a serious side effect from a shot.	2.260	*A	2.294	*A
8	I am concerned that any one of the childhood shots might not be safe.	2.595	*A	2.423	*A
9	I am concerned that a shot might not prevent the disease.	2.579	*A	2.457	*A
<b>TRUST</b>					
5	I trust the information I receive about shots.	3.906	A	3.660	A
6	I am able to openly discuss my concerns with my child’s doctor.	4.291	SA	4.127	A
10	I trust my doctor.	4.306	SA	4.122	A
<b>BELIEFS ABOUT VACCINE SAFETY AND EFFICACY</b>					
4	It is better for children to get fewer vaccines at the same time.	2.844	*UD	2.797	*UD
11	I am sure that following the recommended shot schedule is a good idea for my child.	4.153	A	3.935	A
12	I have delayed my child’s shot for reasons other than illness or allergy.	2.652	*UD	2.681	*UD
13	I have decided to not get a shot for my child for reasons other than illness or allergy.	2.940	*UD	2.683	*UD
14	If I had another infant today, I want him/her to get all the recommended immunization shots.	4.182	A	3.852	Agree
15	Overall, how hesitant about childhood shots would you consider yourself to be?	2.774	*UD	2.675	*UD
<b>AVERAGE</b>		<b>3.246</b>	<b>UD</b>	<b>3.127</b>	<b>UD</b>

Interpretation: Asterisk (\*) - Interpreted answers from negative questions; M - Mean; V.I. - Verbal Interpretation; SA - Strongly Agree; A - Agree; UD - Undecided; D - Disagree; SD - Disagree

In Table.2., the attitude of the respondents towards vaccination compliance before the reported complications caused by the Dengvaxia vaccination program was measured through the mean and standard deviation to identify the variability of the responses gathered. In the immunization behavior domain, the mean value was interpreted as agree. However, in the reverse questions, the mean values were interpreted as undecided or agree. The domain, trust, had mean values interpreted as agree or strongly agree. Lastly, the beliefs about vaccine safety and efficacy had a mean which was interpreted as agreeing. However, the reverse questions were interpreted as undecided. Overall, the attitude of the respondents was undecided.

Table.2. also discussed the attitude of the respondents towards vaccination compliance after the Dengvaxia issue was measured through mean and standard deviation to assess the variability of the responses. The overall attitude of the respondents had an overall mean value interpreted as undecided. In the immunization behavior domain, the mean values were interpreted as undecided or agree. However, in the reverse questions, the mean values were interpreted as agree. Moreover, the trust domain had mean values which were interpreted as agree. Lastly, beliefs about vaccine safety and efficacy domain obtained mean values, which were interpreted as undecided.

In a study conducted by [17], in 2015, the confidence level of the Filipinos with vaccines was 93%, which they strongly agreed that vaccines were effective before the issue of Dengvaxia occurred. However, following the Dengvaxia issue, vaccine confidence declined steeply to 32% by 2018, resulting in a decrease in vaccine compliance.

The mean between the responses before the Dengvaxia issue and after the Dengvaxia issue was measured and observed in Table.3. The paired sample t-test and Wilcoxon signed-rank test were used to assess the significant difference between the two variables. The following questions with a significant difference

in their responses were: 1, 2, 5, 6, 8, 9, 10, 11, 13, 14. Moreover, the average score indicated a significant difference between the two variables.

The results obtained from the data gathered can be supported with the study conducted by [18] wherein parents were encouraged to vaccinate their children with Dengvaxia due to the prevalence of Dengue. After the news about Dengvaxia, some became fearful and miserable for their children, and others were mad at the government for being careless. Because of this aftermath, parents became more vigilant and cautious concerning their children's health.

In a similar study by [19], there was a significant decline in terms of vaccine confidence in importance, safety, and effectiveness, between the years 2015 and 2018 in the Philippines due to the fear brought about by the controversies regarding the Dengvaxia vaccine in 2017, which in turn, had also affected that of the uptake of routine vaccines suggested by the national immunization program.

Lastly, in Table.4., through the application of Kruskal-Wallis one-way ANOVA and Post Hoc tests, it was determined that the only demographic profile that showed a significant difference in the attitude of the mothers towards vaccination compliance was occupation. In particular, occupations 2 or business and finance employees and 4&5 or engineering, health, science, and technology professionals established significant differences with the other occupations before the Dengvaxia issue. Occupation 2 showed significant differences with occupations 3 or educators and 4&5. Occupations 4&5 also established differences with occupations 1 or support staff and manual laborers, 2, 3, and 6 or housewives or unemployed individuals. After the Dengvaxia issue, occupations 4&5 had significant differences with all occupations. Occupation 1 also had significantly different responses compared to occupation 2. In contrast to this, both the respondents' age and educational

Table.3. The Comparison of the Mean Values of the Perceptions of Mothers Before and After the Dengvaxia Issue

VARIABLES/QUESTIONS	BD		AD		p-value	Significance
	M	SD	M	SD		
1. Children get more shots than are good for them.	2.216	0.970	2.621	1.042	0.000	Reject Ho
2. I believe that many of the illnesses that shots prevent are severe.	3.971	0.864	3.569	0.955	0.000	Reject Ho
3. It is better for my child to develop immunity by getting sick than to get shot.	3.018	1.259	3.008	1.156	0.839	Do Not Reject Ho
4. It is better for children to get fewer vaccines at the same time.	2.844	1.091	2.797	1.028	0.346	Do Not Reject Ho
5. I trust the information I receive about shots.	3.906	0.873	3.660	0.955	0.000	Reject Ho
6. I am able to openly discuss my concerns with my child's doctor.	4.291	0.752	4.127	0.861	0.000	Reject Ho

7. I am concerned that my child might have a serious side effect from a shot.	2.260	1.102	2.294	1.068	0.578	Do Not Reject Ho
8. I am concerned that any one of the childhood shots might not be safe.	2.595	1.185	2.423	1.083	0.003	Reject Ho
9. I am concerned that a shot might not prevent the disease.	2.579	1.129	2.457	1.067	0.024	Reject Ho
10. I trust my doctor.	4.306	0.692	4.122	0.834	0.000	Reject Ho
11. I am sure that following the recommended shot schedule is a good idea for my child.	4.153	0.832	3.935	0.923	0.000	Reject Ho
12. I have delayed my child's shot for reasons other than illness or allergy.	2.652	1.172	2.681	1.115	0.620	Do Not Reject Ho
13. I have decided to not get a shot for my child for reasons other than illness or allergy.	2.940	1.170	2.683	1.129	0.000	Reject Ho
14. If I had another infant today, I want him/her to get all the recommended immunization shots.	4.182	0.892	3.852	1.019	0.000	Reject Ho
15. Overall, how hesitant about childhood shots would you consider yourself to be?	2.774	1.145	2.675	1.112	0.074	Do Not Reject Ho
<b>OVERALL</b>	<b>3.246</b>	<b>0.490</b>	<b>3.127</b>	<b>0.547</b>	<b>0.000</b>	<b>Reject Ho</b>

Interpretation: *BD* - Before Dengvaxia; *AD* - After Dengvaxia; *M*- Mean; *SD* - Standard Deviation;

attainment indicated no significant difference before and after the Dengvaxia issue. Hence, the null hypotheses for both factors were accepted.

Based on the results, the mothers from engineering, health, science, and technology backgrounds had significantly different responses in the survey. The average scores in both before and after the Dengvaxia issue showed the mothers' varied answers from these fields compared to the other occupations. This result is aligned to the data obtained in the study of [20], wherein community pharmacists situated in Ontario, Canada, had positive attitudes and behaviors towards getting vaccinated—including other health professions. Therefore, due to the background knowledge of the respondents on vaccines, they perceived vaccination positively.

## V. CONCLUSIONS

Based on the given data of this study, the reported Dengvaxia issues had an effect on the perceptions of the mothers towards vaccination and vaccine hesitancy. Specifically, the researchers identified the following conclusions:

- Demographics had shown that most respondents belonged to the age range of 30 to 49 years old, while respondents who were 18 to 29 years old comprised the least. Moreover, the majority of them were college undergraduates, while a few had bachelor's degrees. Respondents who worked in the fields of education and business finance made up the more significant number of the respondents, contrary to the support staff and manual labor workers and engineering, science, health, and technology professionals, which comprised the least of the population.
- Before the reported complications caused by the Dengvaxia vaccination program, the mothers were undecided about vaccination compliance and had a lack of knowledge and confidence on vaccines and immunization.
- The mothers remained undecided overall with their behaviors, trust which concerned information coming from other people or sources, and their trust in their own belief regarding the safety and efficacy of vaccines, even after the Dengvaxia complications were reported.

Table 4. The Comparison of Mean Values of the Perceptions of Mothers based on their Occupation (Before & After Dengvaxia)

VARIABLES / QUESTIONS	BEFORE DENGVAXIA		AFTER DENGVAXIA	
	<i>p</i> -value	Significance	<i>p</i> -value	Significance
1. Children get more shots than are good for them.	0.840	Do Not Reject Ho	0.232	Do Not Reject Ho
2. I believe that many of the illnesses that shots prevent are severe.	0.661	Do Not Reject Ho	0.403	Do Not Reject Ho
3. It is better for my child to develop immunity by getting sick than to get shot.	0.000	Reject Ho	0.005	Reject Ho

4. It is better for children to get fewer vaccines at the same time.	0.000	Reject Ho	0.041	Reject Ho
5. I trust the information I receive about shots.	0.323	Do Not Reject Ho	0.025	Reject Ho
6. I am able to openly discuss my concerns with my child's doctor.	0.579	Do Not Reject Ho	0.025	Reject Ho
7. I am concerned that my child might have a serious side effect from a shot.	0.046	Reject Ho	0.222	Do Not Reject Ho
8. I am concerned that any one of the childhood shots might not be safe.	0.000	Reject Ho	0.124	Do Not Reject Ho
9. I am concerned that a shot might not prevent the disease.	0.003	Reject Ho	0.210	Do Not Reject Ho
10. I trust my doctor.	0.202	Do Not Reject Ho	0.207	Do Not Reject Ho
11. I am sure that following the recommended shot schedule is a good idea for my child.	0.682	Do Not Reject Ho	0.222	Do Not Reject Ho
12. I have delayed my child's shot for reasons other than illness or allergy.	0.090	Do Not Reject Ho	0.077	Do Not Reject Ho
13. I have decided to not get a shot for my child for reasons other than illness or allergy.	0.063	Do Not Reject Ho	0.118	Do Not Reject Ho
14. If I had another infant today, I want him/her to get all the recommended immunization shots.	0.611	Do Not Reject Ho	0.186	Do Not Reject Ho
15. Overall, how hesitant about childhood shots would you consider yourself to be?	0.031	Reject Ho	0.222	Do Not Reject Ho
<b>OVERALL</b>	<b>0.000</b>	<b>Reject Ho</b>	<b>0.002</b>	<b>Reject Ho</b>

- Mothers had more confidence and positivity regarding their children's vaccines and immunization before the issues regarding the Dengvaxia vaccine was known compared to after the Dengvaxia issues had arisen. This was because there was a significant difference in the respondents' attitudes, in which the average scores before the issue based on the data comparatively were higher than that of the scores after the Dengvaxia issues were reported.
- Occupation was the only external factor that could influence the mothers' perceptions towards vaccination. It was the only demographic profile that showed a significant difference in the mothers' attitudes towards vaccination compliance before and after the reported issues caused by Dengvaxia vaccination programs.
- This study could serve as a framework for future studies to correlate various behaviors concerning vaccine hesitancy. This can be done by tailoring the content to uncover behaviors and domains more appropriate in the Filipino context.
- In terms of the demographic profile of the respondents, this study did not include mothers who were senior citizens, uneducated, and those with occupations other than the factors the researchers included. Considering these as inclusion criteria for future researchers would help in getting more mixed results for the study. Also, the study was only limited to age, educational attainment, and occupation as its factors. Including more factors other than those mentioned above could provide more critical information to help the study's findings.
- Due to the event of a pandemic, the researchers were not able to gather data from respondents personally and instead used an online platform in disseminating the survey questionnaires. It was recommended for future researchers to use a different method in collecting data, such as face-to-face interviews, for better insights into the respondents' opinions and perceptions towards vaccination and vaccine hesitancy.

## VI. RECOMMENDATIONS

This study has contributed to understanding the mothers' perception towards vaccination and vaccine hesitancy provided the effects of the Dengvaxia vaccination program. As the study progressed, there were few areas that surfaced that were suggested for future research. The recommendations are as follows:

- The area of focus in the study was mothers residing in region IV-A or CALABARZON. It was recommended for future researchers to conduct similar research in the broader scope of participants for better findings in the study.

## REFERENCES

- [1]. Dubey, V., & Shen, S. C. (2019). Addressing vaccine hesitancy: Clinical guidance for primary care physicians working with parents. *Canadian family physician Medecin de famille canadien*, 65(3), 175–181.



- [2]. Centers for Disease Control and Prevention. (2012). Vaccines: The Basics. Retrieved on October 29, 2020.
- [3]. World Health Organization. (2017). Immunization, Vaccines, and Biologicals: Dengue Vaccine Research. Retrieved on October 29, 2020.
- [4]. Undurraga, E. A., Edillo, F. E., Erasmo, J., Alera, M., Yoon, I. K., Largo, F. M., & Shepard, D. S. (2017). Disease Burden of Dengue in the Philippines: Adjusting for Underreporting by Comparing Active and Passive Dengue Surveillance in Punta Princesa, Cebu City. *The American Journal of Tropical Medicine and Hygiene*, 96(4), 887–898.
- [5]. Lo, C. (2019, December 16). The dengue vaccine dilemma. *Pharmaceutical-Technology.Com*; *Pharmaceutical Technology*. Retrieved on October 29, 2020.
- [6]. World Health Organization. (2014). Report of the Sage Working Group on Vaccine Hesitancy. Retrieved on October 29, 2020.
- [7]. Department of Health. (2018). DOH Identifies Vaccine Hesitancy As One of the Reasons for Measles Outbreak. Retrieved on February 28, 2021.
- [8]. DOH puts DENGUE Immunization on hold after new findings FROM SANOFI-PASTEUR: Department of health website. (2017, December 1). Retrieved on February 28, 2021.
- [9]. LaMorte, W. W. (2019, September 9). The Health Belief Model. Retrieved from Behavioral Change Models:
- [10]. Nekrasova, E., Stockwell, M., Localio, R., Shults, J., Wynn, C., Shone, L., Berrigan, L., Kolff, C., Griffith, M., Johnson, A., Torres, A., Opel, D., & Fiks, A. G. (2020). Vaccine hesitancy and influenza beliefs among parents of children requiring a second dose of influenza vaccine in a season: An American Academy of Pediatrics (AAP) Pediatric Research in Office Settings (PROS) study, *Human Vaccines & Immunotherapeutics*, 16(5), 1070-1077.
- [11]. Australian Bureau of Statistics. Sample Size Calculator. Retrieved on February 4, 2021.
- [12]. Philippine Statistics Authority. (2017, June 30). Statistical Tables: Philippine Population Surpassed the 100 Million Mark (Results from the 2015 Census of Population). Retrieved on March 5, 2021.
- [13]. Charron, J., Gautier, A., & Jestin, C. (2020). Influence of information sources on vaccine hesitancy and practices. *Medecine et maladies infectieuses*, 50(8), 727–733.
- [14]. Mohd Azizi, F. S., Kew, Y., & Moy, F. M. (2017). Vaccine hesitancy among parents in a multi-ethnic COUNTRY, MALAYSIA. *Vaccine*, 35(22), 2955-2961.
- [15]. Facciola, A., Visalli, G., Orlando, A., Bertuccio, M. P., Spataro, P., Squeri, R., Picerno, I., & Di Pietro, A. (2019). Vaccine hesitancy: An overview of parents' opinions about vaccination and possible reasons for vaccine refusal. *Journal of Public Health Research*, 8(1).
- [16]. Dror, A. A., Eisenbach, N., Taiber, S., Morozov, N. G., Mizrahi, M., Zigran, A., Srouji, S., & Sela, E. (2020). Vaccine hesitancy: the next challenge in the fight against COVID19. *European Journal of Epidemiology*, 35(8), 775–779.
- [17]. Larson, H. J., Hartigan-Go, K., & De Figueiredo, A. (2018). Vaccine confidence plummets in the Philippines Following dengue vaccine scare: Why it matters to pandemic preparedness. *Human Vaccines & Immunotherapeutics*, 15(3), 625-627.
- [18]. Manlapaz, J., San Pedro, M. S., Silva, J. A., Soriano, P. R., Sta. Maria, A. L., Sy, M. C., Tan, I. A., & Umali, G. E. (2019). Dengvaxia Phenomenon: Lived Experiences of Parents with Dengvaxia-vaccinated children. *Annals of Tropical Medicine & Public Health* 22(11), 374-380.
- [19]. De Figueiredo, A. D., Karafillakis, E., Larson, H. J., Paterson, P., & Simas, C. (2020). Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: A large-scale retrospective temporal modeling study. *The Lancet*, 396(10255), 898-908.
- [20]. Pullagura, G. R., Violette, R., Houle, S. K., & Waite, N. M. (2020). Exploring influenza Vaccine hesitancy in community pharmacies: KNOWLEDGE, attitudes, and practices of Community pharmacists in Ontario, Canada. *Canadian Pharmacists Journal / Revue Des Pharmaciens Du Canada*, 153(6), 361-370.