Parent's Knowledge, Attitude, and Practices towards Polio Vaccination in Quezon City, Philippines

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Abstract: Childhood immunization almost guarantees protection from several diseases where parents are the most important health decision-makers for their child, with their knowledge, attitude, and practice towards immunization contributing a great impact to eradicating vaccine-preventable diseases. However, polio has not been completely eradicated in the Philippines due to parents' doubts about the effectiveness and safety of vaccination. This study aims to assess the knowledge, attitude, and practice on polio vaccination among parents aged 18-59 years old living in Quezon City, Philippines. A cross-sectional survey was distributed online to 385 respondents from Quezon City. The gathered data was then analyzed using descriptive statistics and association measures. Results show a significant correlation between knowledge, income ($p<0.001$), and education ($p<0.05$). The attitude section also displayed relevant associations in terms of education ($p<0.05$) and income ($p<0.05$). Moreover, the KAP indicators have shown significant association with the child vaccination status ($p<0.05$). The findings suggest the aforementioned components are pre-determining factors that influence the knowledge, attitude, and practice of the respondents on polio vaccination. Furthermore highlighting the importance of education and income level in increasing the knowledge and improving the attitude of respondents regarding polio vaccination.

Keywords: — ***Knowledge, Attitude, Practices, Poliovirus, Vaccination.***

I. INTRODUCTION

Poliomyelitis is a highly infectious and life-threatening disease caused by poliovirus, which impairs the human body's nervous system, resulting in irreversible total paralysis [1]. This disease can be transmitted person-to-person primarily through the fecal-oral route with the main source of infection identified to be areas with poor sanitation [2]. Currently, there is still no cure or remedy to this disease and can only be eradicated through vaccination to achieve herd immunity [3][4]. At present, there are two types of polio vaccine being used, the Oral Polio Vaccine (OPV) and the Inactivated Polio Vaccine (IPV).

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The OPV is composed of live attenuated poliovirus, which causes an immune response in the primary poliovirus replication site, specifically, the intestinal lining. It is administered orally by liquid drops and can be subdivided into three types which vary depending on the number of serotypes [5]. The trivalent OPV (tOPV) consisted of all serotypes and was predominantly used during routine or supplemental immunization but was eventually withdrawn in 2016 and replaced with bivalent oral poliovirus vaccine (bOPV), only consisting of the attenuated serotypes 1 and 3, as it has led to the development of a novel type 2 circulating vaccine-derived poliovirus (cVDPV2) [6]. On the other hand, IPV is produced from wild-type poliovirus strains of each serotype that have been inactivated with formalin [7]. This was introduced to the national immunization schedule as recommended by the Global Polio Eradication Initiative (GPEI) to help protect children against type 2 vaccine-derived polioviruses [8]. On 19 September 2019, a polio outbreak was declared in the Philippines, which interrupted the supposed polio-free status of

the country since 2000 after a positive case was confirmed in a 3-year-old girl from Lanao del Sur [9]. The cases have then risen to 16, with confirmed cases dispersed throughout the Philippines, such as from Sultan Kudarat and Quezon City; the poliovirus was also detected in the waterways of the National Capital Region (NCR) [10]. This has led the Department of Health (DOH) to launch the "Sabayang Patak Kontra Polio" campaign intending to ensure that all children are vaccinated and to enhance the protection of those who have already received the vaccine. The campaign provides free vaccination of three polio drop doses and one dose of injection. A minimum of 95% routine immunization coverage for children is ideal to ensure herd immunity in the community to hinder the spread of polio in the country [11]. For routine immunization in the Philippines, OPV is typically given at 6, 10, and 14 weeks while IPV is only given at 14 weeks [12]. According to Mercado, the former Philippines Undersecretary of Health, a decade of consistent routine vaccination played a significant role in the former eradication of polio. This must once again be carried out to address and mitigate the ongoing polio outbreak in the Philippines, especially due to the decreasing vaccine confidence in the country which resulted in the suboptimal vaccine coverage among the population [13]. Hence, this study assessed the knowledge, attitude, and practices (KAP) of parents aged 18-59 years old currently living Quezon City, Philippines to determine the prior knowledge of the respondents which can prompt them to support or contradict, as well as their behavioral aspects towards polio vaccination which can affect the trend of outbreaks in the country. The determinants for vaccine willingness or hesitancy can also be established, therefore, can be addressed. The study was conducted through the dissemination of online survey questionnaires to assess the correlation between KAP, respondent demographic characteristics, as well as child vaccination status. Furthermore, the findings from the study can help in giving a more in-depth understanding of the determinants of the problem and in addressing the low vaccination rates in the country, the results of which can aid the healthcare system and other public health sectors by making use of the analyzed and gathered data to tailor evidence-based strategies that will encourage polio immunization, diminishing the likelihood of a further outbreak in the Philippines.

II. METHODOLOGY

A. Study Site

The researchers used a purposive sampling technique in attaining the samples by purposely selecting 385 respondents from Quezon City, a city with the largest population in Metro Manila, Philippines. The sample size was computed using Raosoft, Inc., setting the margin of error at 5%, confidence level at 95%, and response distribution at 50%. The selected respondents must have met the following requirements: parent at the age range of 18 to 59 with at least one child, currently a resident of Quezon City, and has access to an internet connection. Failing to meet one of these requirements excluded the respondents from the actual study of the researchers, such as exceeding the age limit, having no children, and not living within the stated city. Chosen respondents came from Quezon City in Metro Manila. The researchers sent the Google forms survey to the respondents through different social networking sites, which served as the basis of the whole study. The gathering of data revolved around the voluntary participation of the respondents, and the participants had the right to withdraw from answering the questions at any point or section of the survey.

B. Data Measure and Instrumentation

Questionnaires were designed after a thorough review of different related literature to achieve the best and accurate results. Improvement and corrections were made before disseminating the surveys to the respondents. The study instrument comprised six sections. The first and second sections served as the agreement for consent to participate in the survey. The third section explored the demographic information of the child and the parent, such as name, age, gender, email address, residential address, educational status, occupation, income, religion, number of children, and age of the youngest child. The fourth section examined the general knowledge of the parent towards the disease poliomyelitis and its symptoms. The fifth section probed the knowledge and awareness of the parent towards polio vaccination. The sixth and seventh sections observed the attitude and practices of the parent towards polio vaccination, respectively. The analysis of the questionnaire was initiated using STATA Software, SPSS, and Microsoft Excel. Chi-square test was used to identify the significant correlations/relationships between socio-demographic variables, as well as indicators of KAP towards polio vaccine and the knowledge, attitude, and practices section and the vaccination status of children, respectively.

C. Data Gathering Procedure

The researchers submitted all the required documents to the Faculty of Pharmacy Research Ethics Committee for approval, and once approved, the research commenced. Due to the nature of the study, cross-sectional surveys were used as the means of data collection. The survey forms were created based on previously published studies on knowledge, attitude, and practices on vaccination. In line with this, the questionnaire used was based on the studies of Khowaja et al. (2012), Khan et al. (2015), Muhsin and Jawad (2019), and Chaudhry, Javed, and Wattoo (2020). The consent form in the questionnaire included the purpose and objective of the study, procedure, advantages, and disadvantages for the respondent, compensation, voluntariness, and confidentiality. The survey forms were then examined by the research adviser and the statistician. Once approved, pilot testing was conducted to ensure the accuracy of the survey and to check for possible errors. After pilot testing, a reliability test was conducted using the Kuder-Richardson (KR-20) to test for the internal consistency of the data collected. Since the results showed good reliability from the data collected, the survey forms were then disseminated. Every participant was asked to accomplish the consent form before they can participate in the research. Due to the pandemic, the research was only conducted online, and the questionnaires were disseminated via Google forms. Links of the survey in Google forms were propagated through various social networking sites (SNS), such as Facebook, Twitter, Instagram, Viber, and email. The survey was accessible from April 07, 2021, to May 20, 2021, in order to give ample time for the respondents to answer. Once the Google forms are closed and all the answers have been submitted, the researchers proceed with data encoding. The data was then sent to the statistician for statistical analysis. After which, the discussion of the results by the researchers then ensued. All the data gathered from the participants were subjected to the data privacy act, strictly confidential, and solely used for the purpose of the study. The data of the respondents will be stored for two months after the publication of the study.

D. Data Analysis

The researchers used a correlational analysis or a statistical hypothesis test, such as the chi-square test, to measure or determine the significant relationships or association between the variables and KAP, aside from descriptive statistics. Moreover, to attempt the rejection of the null hypothesis that the data are independent or vice versa and also to evaluate how likely it is between the null hypothesis and observations. The data analysis was conducted using SPSS, STATA Software, and Microsoft Excel. Nevertheless, p-values were also used to reject or accept the null hypothesis using a significance level of 5% or 0.05. The totals or percentages from each variable were interpreted through graphs or tables. As a quantitative study, the researchers are primarily based on correlating the variables rather than computing values through the usage of statistical computations. From here, the researchers may analyze and discern data that could further strengthen the study and lead to more precise findings. Also, these tests could help in employing the correct analysis and effectively present the result by minimizing false interpretations that may lead to wrong conclusions.

III. RESULTS

A. Demographic Profile

It must be taken into account that the sample size was computed using Raosoft, Inc. in order to set the margin of error at 5%, confidence level at 95%, and response distribution at 50%. In regard to this, a total of 393 respondents answered the questionnaire survey, however only 385 respondents were used to serve as the sample size of the study. This is due to the fact that the excess eight (8) respondents did not agree with the consent form or did not fit the criteria.

The demographic profile of the respondents comprises a majority of parents within 31-40 years age group (32.7%), who are female (66.2%), with tertiary level education (83.9%), with Catholic as a religion (71.9%), who are employed (79.7%), with incomes ranging from PHP 100,000 to PHP 250,000 (36.4%), and who have one to two children (57.4%). Correspondingly, the majority of the parents (50.6%), in terms of the age of youngest child, have children with age ranging from 11 to 20 years old (See Table 1).

Table.1. Socio-Demographic Characteristics of Parents

Characteristics	Frequency	Percentage
Age		
18-30 yrs. old	37	9.6%

31-40 yrs. old	126	32.7%
41-50 yrs. old	114	29.6%
51-59 yrs. old	108	28.1%
Gender		
Male	130	33.8%
Female	255	66.2%
Educational Attainment		
No formal education	1	0.3%
Primary level	3	0.8%
Secondary level	58	15.1%
Tertiary level	323	83.9%
Religion		
Catholic	277	71.9%
Christian	97	25.2%
Other religion	11	2.9%
Occupation		
Employed	307	79.7%
Unemployed	78	20.3%
Income		
No income	12	3.1%
Less than PHP 100,000	139	36.1%
PHP 100,000 to PHP 250,000	140	36.4%
PHP 250,000 to PHP 400,000	32	8.3%
PHP 400,000 to PHP 550,000	19	4.9%
More than PHP 550,000	43	11.2%
Number of Children		
One to two children	221	57.4%
Three to four children	144	37.4%
Five to six children	17	4.4%
More than six children	3	0.8%
Age of the Youngest Child		
Ten years old and below	159	41.3%
11 to 20 years old	195	50.6%
21 to 30 years old	28	7.3%
31 to 40 years old	3	0.8%

(continued)

B. General Knowledge

It can be observed that 367 (95.32%) of 385 respondents heard about polio. 246 (63.90%) of them knows that polio is a highly contagious disease, 247 (64.20%) know that polio is a life-threatening disease, and 232 (60.30%) of the total respondents answered "NO" in the question that polio has a cure, which is correct.

In addition, the most common symptoms that the respondents answered were muscle weakness (20.03%), loss of reflexes (18.85%), body stiffness (15.52%), and fever (13.97%) (See Table 2).

Table.2. General Knowledge of Respondents on Poliomyelitis and its Possible Symptoms

Items	Frequency	Percentage
Basic Information		
I have heard about polio.	367	95.32%
Polio is a highly contagious disease.	246	63.90%
Polio is a life-threatening disease.	247	64.20%
Polio already has a cure.	232	60.30%
Possible Symptoms		
Fever	189	13.97%
Fatigue	136	10.05%
Sore Throat	87	6.43%
Headache	119	8.80%
Vomiting	86	6.36%
Body Stiffness	210	15.52%
Loss of Reflexes	255	18.85%
Muscle Weakness	271	20.03%

C. Knowledge

Out of 385 respondents, 211 (55.60%) of the respondents' children are not vaccinated for polio, while the remaining 174 (44.40%) of the respondents' children are vaccinated for polio. In line with this, out of 174 children who are vaccinated for polio, 159 (91.38%) of them are fully vaccinated, while only 15 (8.62%) are partially vaccinated for polio.

In addition, 77 respondents (36.5%) answered that lack of information towards polio vaccination was the main reason for not being able to vaccinate their children for polio. It must be noted that the majority of the respondents (58.0%) heard about the polio vaccine through the health sectors.

When it comes to the awareness of the respondents to vaccination programs in their community, 202 respondents (52.5%) responded that they are aware, while 183 respondents (47.5%) said that they are not aware.

Lastly, out of 385 respondents, 322 (83.6%) of them believe that polio vaccines may prevent children from getting infected with the disease, and 271 (70.4%) of them believe that it induces side effects (See Table 3).

Table.3. Knowledge Assessment of Parents on Polio Vaccination

Items	Frequency	Percentage
Is your child vaccinated for polio?		
YES	174	44.40%
NO	211	55.60%
If answered YES, is your child:		
Fully Vaccinated	159	91.38%
Partially Vaccinated	15	8.62%
If not, what is the primary reason?		
The vaccine was unavailable in the hospital/clinic.	6	2.8%
Too expensive to vaccinate.	13	6.2%
Side effects/ adverse effects of vaccination.	55	26.1%
Lack of information towards vaccination.	77	36.5%

Vaccines are not needed by the child.	36	17.1%
Lack of time.	9	4.3%
Low risk of contracting the illness.	11	5.2% (continued)
Afraid of the procedure.	4	1.9%
Where did you hear about the polio vaccine?		
Billboards	7	1.4%
Advertisements	25	5.0%
Infographics or Leaflets	71	14.1%
Health Sectors	293	58.0%
Television or Radio Broadcasts	98	19.4%
School	3	0.6%
Family and Friends	4	0.8%
Internet	3	0.6%
Others	1	0.2%
I am aware of the vaccination program in my community.		
YES	202	52.5%
NO	183	47.5%
Effects of Polio Vaccine		
Does the polio vaccine prevent children from getting infected with the disease?	322	83.6%
Does polio vaccine induce side effects?	271	70.4%

D. Attitude

When it comes to how the vaccine should be administered, 221 respondents (57.40%) wanted to have it orally, while 295 respondents (76.6%) wanted to have it through injection. Moreover, in terms of their willingness to pay for the vaccine, 317 respondents (82.3%) agreed to have it if it is free while 231 respondents (60.0%) agreed to have it even if they have to pay for it or with a certain fee.

The attitude or reason as to why the respondents allow their children to get polio vaccination primarily revolves on disease prevention capacity of the vaccine (43.2%). On the contrary, 197 respondents (64.0%) believed that polio vaccines contain side effects, thus not allowing their child to get a polio vaccination (See Table 4).

Table.4. Attitude of Parents Concerning Polio Vaccination

Items	**Frequency**	**Percentage**
Mode of Administration for Polio Vaccine		
I would allow my child to be given a polio vaccine ORALLY.	221	57.4%
I would allow my chil to be given a polio vaccine through INJECTION.	295	76.6%
Willingness to Pay for Polio Vaccine		
I would allow my chil to get vaccinated for FREE.	317	82.3%
I would allow my child to get vaccinated even with a FEE.	231	60.0%

Reasons for Allowing Child to get Polio vaccination		
Polio vaccines prevent my child from getting the disease.	264	43.2%
Polio vaccines help m child to be stronger.	190	31.1%
Polio vaccines are effective.	156	25.5%
Others (Peace of Mind)	1	0.2%
		(continued)
Reasons for Not Allowing Child to get Polio Vaccination		
Polio vaccine is useless/unnecessary.	76	24.7%
Polio vaccines contain side effects.	197	64.0%
Polio vaccines go against my beliefs.	33	10.7%
Others (Cost of Polio Vaccine)	2	0.6%

E. Practices

It can be inferred that most or 330 respondents (85.7%) out of the 385 respondents are willing to participate in the vaccination campaigns in their community. 279 respondents (72.5%) are willing to educate co-parents about the benefits of having their child vaccinated, while 304 respondents (79.0%) are still willing to continue with the succeeding vaccine doses even after a missed dose. On the other hand, only 92 respondents (23.9%) are still willing to continue with the succeeding vaccine doses even after experiencing a side effect of the vaccine (See Table 5).

Table.5. Practice Evaluation of Parents towards Polio Vaccination

Items	Frequency	Percentage
I am willing to participate in the polio vaccination campaigns ir my community.	330	85.7%
I am willing to educate co-parents about the benefits of having their child vaccinated.	279	72.5%
I am willing to still continue with the succeeding vaccine dose even after experiencing a side effect of the vaccine.	92	23.9%
I am willing to still continue with the succeeding vaccine dose even after a missed dose.	304	79.0%

F. Significant Differences in the Demographic Profile and their Knowledge about Polio Vaccination

The table below shows the correlation between demographic profile and knowledge of parents about polio vaccination. The analysis generated a significant correlation between parent's knowledge about polio and their education ($X^2 = 40.239$, p: 0.000). The p-value in the variable is less than 0.05, which is why the null hypothesis in terms of educational status is rejected. Thus, a significant association between parent's knowledge about polio and their educational level can be seen. This indicates that the knowledge of parents when it comes to polio differs across the variable, education. Moreover, there were significant differences in parent's knowledge of the communicability of polio and their religion ($X^2 = 9.312$, p: 0.010) and income level ($X^2 = 23.589$, p: 0.001). Since the p-value is less than the significance level of 0.05, the null hypothesis is rejected. This indicates that the knowledge of parents on the communicability of polio disease differs across various religions and income groups. Significant differences were also seen in the respondents' age ($X^2 = 21.469$, p: 0.000),

gender (X^2 = 5.465, p: 0.019) education (X^2 = 5.611, p: 0.018), income (X^2 = 13.232, p: 0.039) and occupation (X^2 = 11.459 , p: 0.003). The null hypothesis of these three independent variables is rejected since their p values are lesser than 0.05. This indicates that the respondents' knowledge concerning polio as a life-threatening disease differs across different ages, educational statuses, and income groups. There was also significance in the respondents' education (X^2 = 4.299, p: 0.038), income (X^2 = 24.106, p: 0.000), occupation (X^2 = 6.296, p: 0.042) and age of youngest child (X^2 = 10.502, p: 0.014). Because of their p-values, this indicates that the respondents' knowledge about polio having a cure differs across education, income, occupation, and age of the youngest child. Significant differences were also seen in parent's knowledge of the vaccination programs in their community and their gender (X^2 = 5.849, p: 0.015), education (X^2 = 8.623, p: 0.035), occupation (X^2 = 9.400, p: 0.002), income (X^2 = 25.542, p: 0.0002) and Religion (X^2 = 7.282, p: 0.026). Furthermore, significant differences in parent's knowledge of the vaccine being a preventive measure for the disease in their religion (X^2 = 22.444, p: 0.000) and income (X^2 = 17.7013, p: 0.007). The null hypothesis is rejected as the p-value is less than the significance level of 0.05, thus indicating that the knowledge of parents towards the vaccine being a preventive measure for the disease differs across various religion and income groups.

Table.6.Correlation between Demographic Profile and Knowledge

	AGE	GEN	REL	EDUC	INCO	OCCU	# OF CHILD	AGE OF CHILD
I have heard about polio	X^2=1.905 (p:0.592) Accept Ho; not sig	X^2=2.225 (p:0.136) Accept Ho; not sig	X^2=2.779 (p:0.249) Reject Ho; sig	X^2=40.239 (p:0.00) Reject Ho; sig	X^2=10.670 (p:0.099) Accept Ho; not sig	X^2=0.978 (p:0.323) Accept Ho; not sig	X^2=6.097 (p:0.107) Accept Ho; not sig	X^2=4.275 (p:0.233) Accept Ho; not sig
Polio is highly contagious disease	X^2=4.893 (p:0.184) Accept Ho; not sig	X^2=1.292 (p:0.256) Accept Ho; not sig	X^2=9.312 (p:0.0010) Reject Ho; sig	X^2=1.367 (p:0.713) Accept Ho; not sig	X^2=23.58 (p:0.001) Accept Ho; not sig	X^2=0.325 (p:0.568) Accept Ho; not sig	X^2=5.965 (p:0.113) Accept Ho; not sig	X^2=5.756 (p:0.124) Accept Ho; not sig
Polio is a life-threatening disease	X^2=21.469 (p:0.000) Reject Ho; sig	X^2=5.465 (p:0.019) Reject Ho; sig	X^2=0.684 (p:0.876) Accept Ho; not sig	X^2=5.611 (p:0.018) Reject Ho; sig	X^2=13.232 (p:0.039) Reject Ho; sig	X^2=11.459 (p:0.003) Reject Ho; sig	X^2=6.496 (p:0.090) Reject Ho; sig	X^2=1.577 (p:0.665) Reject Ho; sig
Polio already has a cure	X^2=2.969 (p:0.396) Accept Ho; not sig	X^2=2.847 (p:0.009) Accept Ho; not sig	X^2=2.721 (p:0.436) Accept Ho; not sig	X^2=4.299 (p:0.038) Reject Ho; sig	X^2=24.105 (p:0.0004) Reject Ho; sig	X^2=6.296 (p:0.04) Reject Ho; sig	X^2=7.352 (p:0.06) Accept Ho; not sig	X^2=10.502 (p:0.014) Reject Ho; sig
I am aware of the vaccination programs in my communitv	X^2=0.347 (p:0.950) Accept Ho; not sig	X^2=5.849 (p:0.015) Reject Ho; sig	X^2=7.282 (p:0.026) Reject Ho; sig	X^2=8.623 (p:0.03) Reject Ho; sig	X^2=25.543 (p:0.0002) Reject Ho; sig	X^2=9.400 (p:0.002) Reject Ho; sig	X^2=1.294 (p:0.73) Accept Ho; not sig	X^2=0.716 (p:0.86) Accept Ho; not sig
Does polio vaccine prevent children from getting infected with the disease?	X^2=1.148 (p:0.765) Accept Ho; not sig	X^2=0.0448 (p:0.832) Accept Ho; not sig	X^2=22.4445 (p:0.00005) Reject Ho; sig	X^2=0.897 (p:0.343) Accept Ho; not sig	X^2=17.701 (p:0.007) Reject Ho; sig	X^2=2.227 (p:0.328) Accept Ho; not sig	X^2=2.135 (p:0.544) Accept Ho; not sig	X^2=2.576 (0.46) p:Accept Ho; not sig
Does polio vaccine induce side effects?	X^2=2.700 (p:0.44) Accept Ho; not sig	X^2=4.019 (p:0.044) Reject Ho; sig	X^2=2.493 (p:0.476) Accept Ho; not sig	X^2=9.171 (p:0.002) Reject Ho; sig	X^2=46.263 (p:0.000) Reject Ho; sig	X^2=1.471 (p:0.479) Accept Ho; not sig	X^2=4.662 (p:0.198) Accept Ho; not sig	X^2=0.119 (p:0.989) Accept Ho; not sig

The analysis shows that there was a significance in the respondents' gender (X^2 = 4.019, p: 0.044), education (X^2 = 9.171, p: 0.002) and income (X^2 = 46.263, p: 0.000). All their null hypotheses are rejected since the results of their p-values are less than the significance level of 0.05, which shows that the knowledge of parents towards the vaccine-inducing side effects differs across gender, education, and income.

G. Significant Differences in the Demographic Profile and their Attitudes towards Polio Vaccination

The data below shows that a significant relationship exists between the respondent attitude as well as the following demographics: Education and income. In allowing their child to be vaccinated orally, religion (X^2=11.860; p:0.0026), education (X^2=15.78; p:0.0012), and income (X^2=59.48; p: 0.000) are significant since their p-values are below 0.05. In allowing their child to be given the vaccine via injection, there were significant relationships between parents' willingness to allow their children to be vaccinated with polio vaccine through injection and their education (X^2 = 21.496, p: 0.000), income (X^2 = 11.860, p: 0.002), and number of children (X^2 = 3.540, p: 0.038). This result indicates that there were significant associations between willingness to allow their children to be vaccinated with polio vaccine through injection and their religion, income levels, and number of children. There were significant differences in parent's attitudes towards allowing their child to be vaccinated for free and education (X^2 = 11.958 p: 0.007) and income (X^2 = 19.171, p: 0.003).

Table.7. Correlation between Demographic Profile and Attitude

	AGE	GEN	REL	EDUC	INCO	OCCU	# OF CHILD	AGE OF CHILD
I would allow my child to be given polio vaccine orallv	X^2=5.933 (p:0.114) Accept Ho; not sig	X^2=3.531 (p:0.060) Accept Ho; not sig	X^2=11.860 (p:0.0026) Reject Ho; sig	X^2=15.78 (p:0.0012) Reject Ho; sig	X^2=59.48 (p:0.000) Reject Ho; sig	X^2=1.174 (p:0.278) Accept Ho; not sig	X^2=3.334 (p:0.342) Accept Ho; not sig	X^2=0.747 (p:0.862) Accept Ho; not sig
I would allow my child to be given a polio vaccine through iniection	X^2=4.4410 (p:0.220) Accept Ho; not sig	X^2=0.125 (p:0.723) Accept Ho; not sig	X^2=1.627 (p:0.443) Accept Ho; not sig	X^2=21.496 (p:0.0008) Reject Ho; sig	X^2=11.860 (p:0.002) Reject Ho; sig	X^2=2.458 (p:0.116) Accept Ho; not sig	X^2=8.368 (p:0.038) Accept Ho; not sig	X^2=3.540 (p:0.315) Accept Ho; not sig
I would allow my child to get vaccinated for free	X^2=0.736 (p:0.864) Accept Ho; not sig	X^2=0.700 (p:0.402) Accept Ho; not sig	X^2=3.313 (p:0.190) Accept Ho; not sig	X^2=11.958 (p:0.007) Reject Ho; sig	X^2=19.171 (p:0.003) Reject Ho; sig	X^2=0.0055 (p:0.940) Accept Ho; not sig	X^2=1.449 (p:0.694) Accept Ho; not sig	X^2=4.981 (p:0.173) Accept Ho; not sig
I would allow my child to get vaccinated with a fee	X^2=4.320 (p:0.228) Accept Ho; not sig	X^2=3.919 (p:0.047) Reject Ho; sig	X^2=2.265 (p:0.322) Accept Ho; not sig	X^2=14.639 (p:0.002) Reject Ho; sig	X^2=60.699 (p:0.000) Reject Ho; sig	X^2=4.5044 (p:0.033) Reject Ho; sig	X^2=3.364 (p:0.3388) Accept Ho; not sig	X^2=3.913 (p:0.270) Accept Ho; not sig

Therefore, this indicates that the attitude of parents regarding the vaccine with payment differs across their educational attainment and income. Lastly, there were significant differences in parent's attitude allowing their child to be vaccinated even with a fee and their gender (X^2 = 3.919, p: 0.047), education (X^2 = 14.639, p: 0.002), occupation (X^2 = 4.504, p: 0.033), and income (X^2 = 60.699, p: 0.000). Therefore, this indicates that the attitude of parents regarding the vaccine with payment differs across different gender, education, occupation, and income levels.

H. Significant Differences in the Demographic Profile and their Practices towards Polio Vaccination

The results gathered below show the correlation between demographic profile and different practices. The data from the results show no existing or significant relationships between the respondent practices and the following demographics, namely the age, gender, education, occupation, income, religion, number of children, and age of the youngest child. This shows that across different age groups, gender, education, occupation, income, religion, number of children and age of the youngest child, the parent's practices in willingness to participate in the polio vaccination campaigns in their community, willingness to educate co-parents about the benefits of having their child vaccinated, willingness to still continue with the succeeding vaccine doses even after experiencing a side effect of the vaccine, and willingness to still continue with the succeeding vaccine doses even after experiencing a side effect of the vaccine do not vary. All of their p-values are above 0.05 hence the hypothesis is accepted, and it is not significant.

Table.8. Correlation between Demographic Profile and Practices

	AGE	GEN	REL	EDUC	INCO	OCCU	# OF C	A OF CHILD
I am willing to participate in the polio vaccination campaigns in my community	X^2=0.1323 (p:0.987) Accept Ho; not sig	X^2=1.982 (p:0.159) Accept Ho; not sig	X^2=1.344 (p:0.510) Accept Ho; not sig	X^2=3.432 (p:0.329) Accept Ho; not sig	X^2=10.62(p: 0.100) Accept Ho; not sig	X^2=0.171 (p:0.678) Accept Ho; not sig	X^2=4.058 (p:0.255) Accept Ho; not sig	X^2=1.913 (p:0.590) Accept Ho; not sig
I am willing to educate co-parents about the benefits of having their child vaccinated	X^2=3.272 (p:0.351) Accept Ho; not sig	X^2=0.084 (p:0.770) Accept Ho; not sig	X^2=2.184 (p:0.341) Accept Ho; not sig	X^2=1.667 (p:0.644) Accept Ho; not sig	X^2=3.255 (p:0.776) Accept Ho; not sig	X^2=0.018 (p:0.892) Accept Ho; not sig	X^2=1.340 (p:0.719) Accept Ho; not sig	X^2=2.693 (p:0.441) Accept Ho; not sig
I am willing to still continue with the succeeding vaccine doses even after experiencing a side effect of the vaccine	X^2=0.598 (p:0.896) Accept Ho; not sig	X^2=0.272 (p:0.601) Accept Ho; not sig	X^2=4.531 (p:0.103) Accept Ho; not sig	X^2=1.371 (p:0.712) Accept Ho; not sig	X^2=6.067 (p:0.415) Accept Ho; not sig	X^2=0.998 (p:0.317) Accept Ho; not sig	X^2=5.806 (p:0.121) Accept Ho; not sig	X^2=3.624 (p:0.305) Accept Ho; not sig
I am willing to still continue with the succeeding vaccine doses even after a missed dose.	X^2=5.384 (p:0.145) Accept Ho; not sig	X^2=2.819 (p:0.093) Accept Ho; not sig	X^2=0.527 (p:0.768) Accept Ho; not sig	X^2=6.690 (p:0.082) Accept Ho; not sig	X^2=3.051 (p:0.802) Accept Ho; not sig	X^2=0.192 (p:0.660) Accept Ho; not sig	X^2=0.401 (p:0.939) Accept Ho; not sig	X^2=1.302 (p:0.728) Accept Ho; not sig

I. Significant Differences in the Vaccination Status and their Demographic Profile

The findings reveal that there is a strong link between respondent vaccination status and the following demographics: gender, religion, income, and occupation. The results of the p-value of gender (X^2 = 16.521, p: 0.000), religion(X^2 = 6.929, p: 0.031), income (X^2 = 111.709, p: 0.000, and occupation (X^2 = 15.356, p: 0.000) are all below 0.05 which means the hypothesis is rejected hence it is significant.

Table.9. Correlation between Vaccination Status and Demographic Profile

	AGE	GEN	REL	EDUC	INCO	OCCU	# OF C	A OF CHILD
Is your child vaccinated for polio	X^2=2.487 (p:0.477) Accept Ho; not sig	X^2=16.521 (p:0.000) Reject Ho; sig	X^2=6.929 (p:0.031) Reject Ho; sig	X^2=2.915 (p:0.404) Accept Ho; not sig	X^2=111.709 (p:0.000) Accept Ho; not sig	X^2=15.356 (p:0.000) Reject Ho; sig	X^2=1.226 (p:0.746) Accept Ho; not sig	X^2=3.219 (p:0.359) Accept Ho; not sig

J. Significant Differences in the Vaccination Status and their Knowledge

The table below shows that there is a correlation between vaccination status and knowledge in which there were significant relationships between the vaccination status of the respondent's child and their knowledge in polio vaccination (GK1 to GK4; K5 to K7). GK1, which points to the respondents having heard about polio (X2 = 8.483, p: 0.004), GK2 or that polio is a highly contagious disease (X2 = 23.578, p: 0.000), GK3 or polio is a life-threatening disease (X2 = 41.985, p: 0.000), GK4 or polio already has a cure (X2 = 47.971, p: 0.000), K5 or respondents being aware of the vaccination programs in their community (X2 = 82.717, p: 0.000), K6 or polio vaccines prevent the children from getting infected with the disease (X2 = 44.212, p: 0.000), and finally, K7 or polio vaccines induce side effects (X2 = 82.250, p: 0.000).

Table.10. Correlation between Vaccination Status and their Knowledge

	GK1	GK2	GK3	GK4	K5	K6	K7
Is your child vaccinated for polio	X^2=8.483 (p: 0.003) Reject Ho; sig	X^2=23.578 (p: 0.000) Reject Ho; sig	X^2=41.985 (p: 0.000) Reject Ho; sig	X^2=47.971 (p: 0.000) Reject Ho; sig	X^2=82.717 (p: 0.000) Reject Ho; sig	X^2=44.211 (p: 0.000) Reject Ho; sig	X^2=82.249 (p: 0.000) Reject Ho; sig

K. Significant Differences in the Vaccination Status and their Attitude

The table below shows that there is a correlation between vaccination status and attitude wherein respondents allow their child to be given a polio vaccine orally ($X^2 = 64.912$, p: 0.000), allow their child to be given a polio vaccine through injection ($X^2 = 16.923$, p: 0.000), allow their child to be vaccinated for free ($X^2 = 18.992$, p: 0.000), and in which the respondents allow their child to be vaccinated even with a fee ($X^2 = 111.352$, p: 0.000). All of their p-values are less than the significance level of 0.05; thus, the null hypothesis is rejected.

Table.11. Correlation between Vaccination Status and their Attitude

	A1	A2	A3	A4
Is your child vaccinated for polio	X^2=64.912 (p: 0.000) Reject Ho: sig	X^2=16.923 (p: 0.000) Reject Ho: sig	X^2=18.992 (p: 0.000) Reject Ho: sig	X^2=111.352 (p: 0.000) Reject Ho: sig

L. Significant Differences in the Vaccination Status and their Practices

With the data gathered, a direct link can be shown between vaccination status and respondents' desire to engage in polio vaccination campaigns offered in their neighborhood. However, there is no significant link between vaccination status and the readiness to educate co-parents about the vaccine's benefits (($X^2 = 1.949$, p: 0.162), to continue receiving subsequent doses even after experiencing a side effect ($X^2 = 1.527$, p:1.527), or to continue even if a dose is missed $X^2 = 2.297$, p: 0.129. This is because their p-value is above 0.05 which indicates that the hypothesis is accepted hence it is not significant. On the other hand, there was a significant relationship between the vaccination status of the respondent's child and their practices towards the polio vaccine, which points to the respondents being willing to participate in the polio vaccination campaigns in their community ($X^2 = 6.103$, p: 0.013).

Table.12. Correlation between Vaccination Status and their Practices

	P1	P2	P3	44
Is your child vaccinated for polio	X^2= 6.103 (p: 0.013) Reject Ho; sig	X^2= 1.949 (p: 0.1626) Accept Ho; not sig	X^2= 1.527 (p: 1.527) Accept Ho; not sig	X^2= 2.297 (p: 0.129) Accept Ho; not sig

IV. DISCUSSION

Back on September 19, 2019, an outbreak of polio reemerged due to declining number of vaccinated children alongside being unable to detect early symptoms, and the substandard sanitation practices in the communities contributed to the rise of polio cases. Vaccination-derived polioviruses were uncommon variants of the poliovirus that had mutated genetically from the attenuated or weakened virus seen in the oral polio vaccine. They only develop from person to person over a long period of time, which can only happen in areas where vaccination coverage is low, and sanitation and hygiene are poor. It can cause spread to a number of unvaccinated people thus, the only solution is for people to be completely vaccinated. The study represented a small percentage of insights in our country towards the polio vaccination by knowing the knowledge, attitude, and practices of parents aged 18-59 residing in Quezon City towards polio vaccination. Quezon City, as the largest population in Metro Manila, may possibly give an overview of parent's insights towards the vaccination, but the outcomes should not be generalized to the whole country or other areas.

The respondent's demographics were dominated with mostly female (66%) wherein predominant age groups were aged between 31-40 years old (33%). Majority (84%) completed their education at tertiary level and 72% were Catholic, 80% were employed and 36% had an income of between Php 100,000 and Php 250,000. Out of all the socio-demographic profiles, the researchers discovered that financial status is the most important factor that influenced vaccination decisions, as evidenced by the children's vaccination status. It is critical to improve low-income parents' awareness of vaccines through health-sector efforts that will help them reduce their vaccination gap of knowledge and persuade them to let their children be vaccinated.

General knowledge of respondent's towards polio vaccination is relatively good. Large majority (95.32%) had already heard of the disease thus, were aware of it. When it comes to severity, 63.90% of the respondents knew that it is highly contagious, and 64.20% knew that it is life threatening. 232 respondents (60.30%) knew that polio does not have a cure that had a relatively higher score in relation to a study conducted by Muhammad et al. (2015) which scored 23.1% only [14]. The remaining percentage may still have an idea that the disease is curable thus, ignoring the importance of letting their child be vaccinated. Health sectors were the primary source of information for most of the respondents.

Intention of preventing the severe outbreak of disease, door-to-door or posting different materials on social media were done to enlighten the people regarding immunization's importance. In fact, WHO made a document entitled, "Philippine's polio outbreak response (guide for action)" that stated one of the ways to raise awareness would be sharing DOH social media cards or creating posts that would echo the campaign's key message [10]. Furthermore, according to De Leon (2019), the Quezon City government, in line with DOH, launched the "Sabayang Patak Kontra Polio" program that is a massive door to door campaign of vaccinating children below five years old to eradicate the polio disease [16]. In effect, 202 respondents (52.5%) were aware of the vaccination program in the community.

Knowledge and attitude in polio vaccination was seen to be significant towards demographics. Depth of knowledge greatly depends on education and income of parents wherein high income comes along with good education that leads to being more knowledgeable towards the disease compared to low income, no formal education that is less likely to be knowledgeable about polio [14]. Likewise, occupation also garnered the same significance in which being employed leads to being knowledgeable as they have different means and access to information may it be from boss, co-parents or talks. When it comes to gender, the study reveals it to be significant in questions leading to the safety of the children. Parents still portray traditional roles in their homes in which fathers are providers and protectors but having little purview in the daily lives of the children while mothers take on the task of childbearing, discipline, and managing the home [17]. Female as the dominant gender in the study reveals how mothers were usually responsible for nurturing the children and giving them everything they need; thus, the relationship behind the significance of the following knowledge questions to them. As for religion, 71.9% of the respondents identified themselves as Catholic but in reality it does not influence the knowledge behind opposition to the vaccine. No major religion opposes vaccines, they are only made up for vaccine refusal, and as a result, some groups are targeted with misinformation [18]. In fact, in times of needing vaccines, other religious people take the initiative to take the first step to inoculation. In relation to age, a study conducted by Saeed et al. (2018) had shown that respondents aged 45 years and below reveal to have relatively good knowledge about polio and vaccination compared to respondents older than 45 years old [19]. However, the study had reflected otherwise where in the age had no significance with the knowledge. Majority of the respondents were aged 31-40 years old however, their children ranged from 11-20 that were deemed to be insignificant with Polio as it only caters for 5 years old and below. Similarly with the respondent's attitude, education and income is significant in which majority who reacted positively to the vaccine finished tertiary level and have an income of between Php 100,000 to Php 250,000. Related studies from Paul et al. (2021) have found that individuals from ethnic minority origins with lower education and annual income levels had more negative attitudes against vaccination [20].

Practices in polio vaccination were insignificant towards demographics in which what they are willing to do in lieu of vaccines does not depend on who they are. The respondents may be equipped with good knowledge of polio vaccination but, what matters the most would be their personal experience and what they believe in terms of what practice they chose.

In relation to vaccination status, it shows significant relationships in demographic profiles such as gender, religion, income and occupation. The correlation of gender and vaccination status may be associated with gender inequality and expected societal gender roles wherein mothers are responsible for the overall health and well-being and fathers are responsible for household spending. This kind of responsibility had a negative effect on immunization status as mothers would prioritize child health in terms of where the household income is spent. In support, several studies from Merten et al. (2015) and Forshaw, J., Gerver, S.M., Gill, M. et al. (2017) have shown that maternal factors, such as income, directly influence the vaccination status of the child [21][22]. With religion, the differences in vaccination status among respondents with different religious beliefs can be associated with how the religion one belongs to perceives vaccines and immunization, to which they find the need to conform. One example is the opposition of the Catholic Church regarding certain types of vaccines that contain aborted fetuses [23]. In addition, possible reasons would be following the views of their church leader on vaccination or the general rejection of scientific advances in favor of religious practices. Income status was significant in which families that generate high income status have better access to health care that can be associated with a better vaccination status or a complete vaccination record. Meanwhile, respondents with low income status can be related with a hindrance to the knowledge on immunization which can result in an incomplete vaccination status or factors like indirect costs bound to free immunization services such as transportation and missed income generation opportunities. The

effect of vaccination status and income can also be seen with the study conducted by Wani et al. (2017), wherein 88.33% of their respondents showed a preference for the polio vaccination of their child to be conducted in a government hospital, owing to the free vaccine supply [24]. Having high incomes correlates to being employed or that is 79.7 % of the respondents however, the majority of their children were not fully vaccinated and can be explained by employed participants having less time to track and follow through with their child's immunization schedule, leading to no or incomplete doses of polio vaccine.

Other demographic profiles such as age, education and number of children and age of youngest child were found to have insignificant relationship with vaccination status. Age does not deem to be significant in the researcher's study that contradicts a study conducted by Borràs et al. (2009) wherein an older maternal age was associated with higher vaccination status [25]. Education status was seen to be insignificant that contradicts a study conducted by Mora and Trapero-Bertran (2018) wherein a direct association between maternal educational attainment and probability of being vaccinated were concluded [26]. Number of children and age of the youngest child is seen to be insignificant to vaccination status. The absence of these factors may be explained by the fact that vaccination status may be significant with other demographic factors and have shown a stronger correlation.

As for the relationship between vaccination status with knowledge, attitude and perception, all had significant relationships. The data from the results show a significance between the overall knowledge of the participant and the vaccination status of their child. Questions from general knowledge and knowledge section shows significance when compared with vaccination status that can indicate that parents with greater knowledge on polio being a contagious and life-threatening disease, awareness in the community vaccination program, as well as side effects of the vaccine show a good vaccination status, full or incomplete doses. Meanwhile, parents who show less knowledge regarding poliomyelitis and the vaccine have a negative vaccination status wherein their children are not immunized.

When it comes to attitudes towards polio vaccination, respondents were asked if they would allow their child to be given polio vaccine orally or through injection and their willingness to get vaccinated for free or with a fee. Based on the result, the majority preferred to be injected rather than taken orally and willing to be vaccinated for free to avoid the incurred expense of private health facilities. Similar to a study that was conducted by Wani et al. (2017) that exhibited similar results wherein 88.33% of their respondents preferred the polio vaccination of their child to be conducted in a government hospital, owing to the free vaccine supply [24].

A direct association between vaccination status and respondents' willingness to participate in the polio vaccination campaigns offered in their community can be seen which reveals the importance of the national and local immunization programs. They often educate the public on vaccination and give out free vaccine doses that contribute to vaccine confidence. In relation to this, advertisements on vaccination campaigns and proper dissemination of information regarding the vaccine should be prioritized and thoroughly addressed as these factors directly affect a child's vaccination status. However, the results also show no significant association between vaccination status and the following: willingness to educate co-parents about the beneficial aspects of the vaccine, continue receiving the succeeding doses even after experiencing an adverse effect, as well as to still continue even after a dose is missed. Practices such as educating co-parents and still continuing even after experiencing a side effect or a missed dose, show how further efforts on educating the public through the health sector must be done.

Getting any type of vaccine has its pros and cons. In order to prevent infection by the same virus or bacterium, vaccines contain a small quantity of weakened or destroyed virus or bacterium or fragments of lab-made protein that resemble the virus. This activates the body's immune system, causing it to manufacture antibodies to that specific infection or initiate other immune boosting activities. The main purpose of public health is to keep people healthy by preventing sickness as prevention is better than cure. This is precisely what vaccines do that will protect people from deadly infections while also preventing them from spreading to others. Vaccines have averted epidemics of once-common infectious illnesses like measles, mumps, and whooping cough through the years. They can have minor effects such as soreness or redness around the injection site, as well as low-grade fever nevertheless, it is widely regarded as safe. Medical professionals believe that the immunizations' established preventative advantages far exceed the risks of minor adverse effects.

V. CONCLUSION

The researchers conclude that the parents have good general knowledge about polio vaccination, exhibited a positive attitude in terms of the way the vaccine should be procured and

administered, and shown their willingness (practice) in participating in the polio vaccination campaigns of the community they live in. KAP has established significant correlations with some socio-demographic variables, such as K5 with income level, A3 with education and income, and P1 with the vaccination status of the child. Moreover, the socio-demographic variables involved in the study also have correlations to the respondents' knowledge and attitude. Overall, the findings showed that general knowledge about polio, correlations of KAP with socio-demographic variables concerning polio vaccination, as well as relationships of KAP indicators and vaccination status of the parents' children are indeed significant factors that influence the knowledge, attitude, and practices of the respondents on polio vaccination.

RECOMMENDATIONS:

Due to the current COVID-19 pandemic wherein the situation has directly limited the scope and data of the study, the researchers recommend to further conduct a wider scope of the study, use random sampling as means for acquiring respondents, ask specific questions regarding the polio vaccine itself, utilize other statistical analysis methods for a more thorough analysis, and use other means of data collection such as interviews, usage of records, and face-to-face deployment of surveys.

Ethical Considerations

This study has been granted ethical approval by the University of Santo Tomas Faculty of Pharmacy Research Ethics Committee. (FOP-REC-2021-02-204)

Conflict of Interest Statement

The authors of this study declare to have no conflict of interest. The research was conducted in the absence of any commercial or financial association.

REFERENCES

[1]. Centers for Disease Control and Prevention. (2013). What is Polio?. Retrieved November 07, 2020.

[2]. World Health Organization. (2021). Poliomyelitis (polio). Retrieved October 15, 2020.

[3]. Global Polio Eradication Initiative.(n.d.). Polio + Prevention. Retrieved October 15, 2020.

[4]. Mehndiratta, M., Mehndiratta, P. & Pande, R. (2014). Poliomyelitis: Historical facts, epidemiology, and current challenges in eradication. The Neurohospitalist, 4(4), 223–229.

[5]. World Health Organization. (n.d.). Oral polio vaccine (OPV). Retrieved October 16, 2020.

[6]. Immunization Action Coalition. (2020). Polio. Retrieved October 16, 2020.

[7]. World Health Organization. (2021). Poliomyelitis. Retrieved October 16, 2020.

[8]. Lopez, A., Harris, J., Raguindin, P., Aldaba, J. Morales, M., Sylim, P., Hampton, L. (2018). Introduction of inactivated poliovirus vaccine in the Philippines: Effect on health care provider and infant caregiver attitudes and practices.

[9]. World Health Organization. (2019). WHO, UNICEF and partners support Philippine Department of Health's polio outbreak response. Retrieved October 16, 2020.

[10]. World Health Organization. (2020). DOH, WHO, UNICEF resume polio campaign. Retrieved June 10, 2020.

[11]. Omer, M. (2020). Sabayang patak kontra polio. The Communication Initiative Network. Retrieved June 10, 2021.

[12]. UNICEF. (2021). Routine immunization for children in the Philippines.

[13]. Larson, H., Hartigan-Go, K. & Figueiredo, A. (2019). Vaccine confidence plummets in the Philippines following dengue vaccine scare: Why it matters to pandemic preparedness. Human Vaccines and Immunotherapeutics, 15(3),625-627.

[14]. Khan, M., Ahmad, A., Aqeel, T., Salman, S., Ibrahim, Q., Idrees, J. & Khan, M. U. (2015). Knowledge, attitudes and perceptions towards polio immunization among residents of two highly affected regions of Pakistan. BMC public health, 15,1100.

[15]. De Leon, S. (2019). QC intensifies door-to-door campaigns to eradicate polio. Reliefweb. Retrieved June 9, 2021.

[16]. Alampay, L. P. & Jocson, R. M. (2011). Attributions and Attitudes of Mothers and Fathers in the Philippines. Parenting, Science and Practice, 11(2-3), 163–176.

[17]. Belluz, J. (2019). Religion and vaccine refusal are linked. We have to talk about it. Vox. Retrieved 22 August 2021.

[18]. Saeed, H., Azhar, S., Syed, A., Khalid, S., Bukhari, A. & Saeed, N. (2018). Polio and its vaccination: A cross-sectional study of knowledge, attitude and perception of general public in district Abbottabad and Mansehra, Khyber Pakhtunkhwa, Pakistan. Anti-Infective Agents, 16(1), 22-31.

[19]. Paul, E., Steptoe, A., & Fancourt, D. (2021). Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. The Lancet Regional Health - Europe, 1, 100012.

[20]. Biaggi, C., Bosch-Capblanch, X., Hombach, J., Hilber, A., Merten, S. & Secula, F. (2015). Gender determinants of vaccination status in children: Evidence from a meta-ethnographic systematic review. PLoS ONE, 10(8).

[21]. Forshaw, J., Gerver, S., Gill, M., Cooper, E., Manikam, L. & Ward, H. (2017). The global effect of maternal education on complete childhood vaccination: A systematic review and meta-analysis. BMC Infectious Diseases, 17(801).

[22]. Pelčić, G., Karačić, S., Mikirtichan, G., Kubar, O., Leavitt, F., Cheng-Tek Tai, M., Tomašević, L. (2016). Religious exception for vaccination or religious excuses for avoiding vaccination. Croatian Medical Journal, 57(5), 516–521.

[23]. Wani, R., Dar, H. & Raina, Z. (2017). Knowledge, attitude, and practices of mothers with children under five years of age about vaccination. Journal of Medical Science and Clinical Research, 5(7).

[24]. Borràs, E., Domínguez, À. Fuentes, M., Batalla, J., Cardeñosa, N., & Plasencia, A. (2009). Parental knowledge of pediatric vaccination. BMC Public Health, 9(1).

[25]. Mora, T., & Trapero-Bertran, M. (2018). The influence of education on the access to childhood immunization: The case of Spain. BMC Public Health, 18(1).