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Adherence of inactivated polio vaccine immunization for children in Central Java Province

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ABSTRACT

Indonesia is a country with high-risk polio transmission. Administering inactivated polio vaccination (IPV) after drops-polio or oral polio vaccination (OPV) was a strategy stopping polio transmission because its ability to ward off poliovirus which was very dangerous. The IPV coverage was very low and have never reached the target since it was launched in 2016. The study purpose was analyzing determinants factors of IPV adherence. A cross-sectional survey conducted in 31 districts in Central Java Province. Sample was 685 children aged 11-23 months and selected using purposive and accidental sampling method. Collecting data by interview using structured questionnaire and observation with maternal and child health (MCH) Handbook to identify immunization status. The collected data was analyzed univariate, bivariate, and multivariate. As many as 74.3% of children received IPV. Partially, variables of delivery history, immunization status, knowledge, attitudes, sources of information, and service satisfaction were related to IPV adherence. Simultaneously, immunization status, attitudes, and sources of information influenced IPV adherence with an overall effect 35.2%. Immunization status as the dominant influencing factor. Efforts were needed reducing resistance to IPV through psychological approach that was motivating and personal, also using of social media as a medium for positive information and communication, in addition to improve immunization service system.

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1. INTRODUCTION

Poliomyelitis is an emerging infectious disease which is very dangerous for children. Poliovirus belongs to the human enterovirus group that attacks the nerves of children, especially children under five years old by damaging motoric neurons in the cornu anterior of the spinal cord [1]. Polio viruses that enter the body can reach the central nervous system (CNS), especially the spinal cord, then destroy motor neurons and cause acute paralytic poliomyelitis or acute flaccid paralysis (AFP) [2]–[4]. The poliovirus replicates in the intestine and was excreted by the feces into the environment. Poliomyelitis is highly contagious and associated with poor sanitation conditions and a lack of clean drinking water, especially among the poor [5].

The spread of poliovirus is very fast because it has an average incubation period of 10 days (with a range of 5-25 days) for appearing specific symptoms [3]. Some of the early symptoms that occur in polio infection are fever, fatigue, stiff neck, headache, vomiting, and pain in the limbs [1]. It has been proved that the most effective and efficient efforts preventing poliovirus through immunization [1], [4]. The purpose of polio immunization was preventing disease and transmission of poliomyelitis virus which attacks the nerves and poses a risk of permanent disability or paralysis [6]. There are two types of polio vaccination were known, namely OPV and IPV. The OPV comes from an attenuated polio virus and was generally given as drops in the mouth, while the IPV was from an inactivated polio virus and was given in injection form [7], [8]. The IPV aims protecting the body from paralytic poliomyelitis which is caused by type-2 polio virus and is the most severe symptom of polio disease because it has very large impact on causing permanent disability or death. Administration of IPV can reduce the risk of reintroduction of type 2 poliovirus by providing some level of seroprotection, facilitating termination of transmission in an outbreak event, and accelerating eradication through increased immunity to types 1 and 3 poliovirus [4], [8].

Several studies have shown that administration of IPV after OPV could increasing the immunity of the intestinal mucosa [2], [4], [9], played a key role in stopping the transmission of polio virus [8], strengthening the immune system of children's bodies fight viruses when an infection occurs and offer lifelong protection [5], [10], as well as its high sensitivity child immunity from type-2 poliovirus attack was only obtained through IPV [1]. Many studies have proven that IPV can reduce the duration and rate of viral shedding in immunized individuals compared to unimmunized individuals, and has proven successful in eliminating the transmission of poliomyelitis in Northern European countries (the Netherlands, Sweden, Iceland, and Finland) [3]. In addition, administration of a single dose of IPV along with administration of OPV at the 4th visit was immunogenic and well tolerated [11]. In 2022, there were 16 countries that reported the incidence of polio with type-2 poliovirus including Indonesia, although in 2014 Indonesia managed to receive a polio-free certificate from WHO among the 11 countries in SEARO (South East Asia Regional Office) [12], [13].

Even though this case was the first polio case to be found since 2014, the cases related to paralysis were quite common in various areas of Indonesia. Through a national and provincial level polio transmission risk assessment conducted by WHO in 2018, Indonesia was a country with high risk criteria, where out of 34 provinces, as many as 23 provinces (76.5%) were at high risk level, nine provinces (23.5%) in moderate risk level, and only two provinces (5.9%) were at low risk level, namely Yogyakarta and Bali province [12]. Just like other the low and middle income countries (LMIC), Indonesia also has limited systems, resources, access and infrastructure needed to prevent the spread of infectious diseases and potential outbreaks [13].

By Minister of Health Regulation Number 12 of 2017 concerning Implementation of Immunizations, it was stated that in routine immunization program in Indonesia, the efforts preventing polio were carried out through giving four times of OPV to every baby of 1, 2, 3 and 4 months old, and giving once of IPV injection on four months old. The IPV was given with immunization of DPT/HB/Hib-3 together. The data of Health Ministry showed the coverage of IPV was much lower than the coverage of OPV. For IPV coverage, although it has shown an increase since it was first introduced in 2016, but nationally the coverage trend was still <80% [12]. The IPV coverage in 2017 was 47%, increasing to 66.1% (2018) and 68.4% (2019). The IPV coverage in 2020 were still lack <60% in 30 provinces, 60%-79% in 3 provinces and only 1 province (Yogyakarta Province) with a coverage rate of ≥95%. Even though data of IPV coverage for 2022 has increased, it was not optimal. There were five provinces with coverage <60%, 13 provinces with coverage 60%-79%, 12 provinces with 80%-94% coverage and only four provinces with ≥95% coverage. The data from Ministry of Health also showed that the average national coverage of IPV was 37.7%. A low coverage rate indicates a high risk of the disease that could be prevented by immunization) and/or an outbreak of an infectious disease that endangers health status, especially in children, including polio outbreaks.

The Central Java Province was one of the provinces in Indonesia which was also facing problems with polio immunization coverage, both for OPV and IPV. The data of Central Java Health Profile showed a tendency decreasing for complete basic immunization coverage (CBI), from 98.5% in 2019 to 94.3% (2020) and 86.7% (2021). This figure has not reached the target of strategic plan of Central Java Health Office of 94.6%. The coverage of Polio-4 (OPV) also tends to continue to decline from 99.1% (2019) to 95.4% (2020) and decreases further to 73.9% (2021) with the lowest achievement being Pati District (23.6%), followed by Kendal District (29%) and Pekalongan District (50.2%). For IPV coverage, it was still much lower because it was only 62.8% (in 2021). Even though the coverage of Polio-4 (OPV) and IPV has increased in 2022, the increase was due to the National Childhood Immunization Month (BIAN) program which incidentally was a scaling up program to "catch up" low immunization coverage. This result is also in line with the results of demographic and health survey in 2017 which showed only 35.83% of Indonesian children aged 0–18 months received the complete polio vaccination [14].

The cases of sudden paralysis or AFP were caused by the poliovirus and were one of the symptoms of polio that could occur due to not getting a complete vaccination. The findings of cases of paralysis in Central Java province were relatively distributed in all districts/areas with a total of 113 cases (in 2020), the most being 10 cases in Brebes district, followed by Banyumas and Pati districts (8 cases). The number of cases increased significantly in 2021 with 196 cases more spreadly with the highest number of cases in Banyumas district (20 cases), followed by Demak district (19 cases), Cilacap district (18 cases), Rembang district (13 cases) and Brebes district (12 cases). Although AFP surveillance, which was a sensitivity indicator to detecting wild polio virus has been carried out routinely by the primary health center (PHC) and the district health office (DHO), the large number of AFP cases indicate a lack of community compliance with polio vaccination as an effective preventive measure.

2. METHOD

This study is analytic research with a quantitative method and cross-sectional approach. The study aim was to analyze IPV adherence of children under two years old (12-23 months) and its determinants, which is one of the mandatory immunizations for children to achieve CBI. This study was conducted in 31 districts in Central Java Province. The district locus was selected based on locus of implementing Thematic *KKN* (field work) of Immunization Universitas Diponegoro in 2022.

The dependent variable was IPV adherence, while the independent variables included: number of children, birth weight, history of childbirth, previous immunization status includes: Polio-OPV, DPT/HB/HiB, HB-0, BCG; knowledge, mother's attitude towards immunization, perceptions of adverse events, perceptions of multiple injections, perceptions of immunization barriers, sources of information about immunization, and satisfaction with immunization services was being receive.

The research population was all children aged 12-23 months in Central Java Province with a selected sample of 685 children. Respondents were mothers or caregivers who live permanently with their children, and were willing to be respondents by signing an informed consent document. Primary data collected by interview using a questionnaire that had been tested for validity and reliability, and by observation to identify the children's immunization status using a MCH Handbook. The enumerators were students participating in Thematic *KKN* of Immunization who had received adequate explanations regarding the questionnaire and observation instruments, as well as the purposive and accidental sampling methods that had to be carried out when collecting field data. The purposive criteria used to determine the research area were based on the PHC with the lowest coverage of CBI from each district, and from each PHC was took one village with lowest immunization coverage. From each village, an average of 23 children were collected.

All collected data were analyzed univariate, bivariate and multivariate after going through of editing, cleaning, and tabulating stages. Analysis of univariate analysis with frequency distribution, analysis of bivariate with Chi-square test because the data was dichotomous. Multivariate analysis with multiple logistic regression test. This study has also met the ethical requirements through Ethical Review Certificate Number: 361/EA/KEPK-FKM/2022 by Commision of Health Research Ethics, Public Health Faculty, Universitas Diponegoro.

3. RESULTS AND DISCUSSION

Based on the characteristics, it was known that the mean age of respondents was 30.8 years old (SD 5.9 years old) with the youngest age being 18 and the oldest being 56 years old. The largest proportion had high school level education (46%), followed by junior high school (23.9%), although around 13% of respondents had low education (≤Elementary School). As many as 69.6% were housewives. The average monthly of family income was US$ 155.97 (SD US$ 87.75). While the children's characteristics as follows: 52% were female and 48% were male, with mean age of 17.02 months (SD 3.4). The youngest was 11 months and the oldest was 23 months. Based on child birth weight criteria, minimum birth weight of 1,800 grams and maximum of 4,000 grams with an average of 3,000 grams (SD 391.2). This figure showed that most children have birth weight according to minimum standard (≥2,500 grams).

The proportion of mothers who comply with giving IPV to their children was 74.3%. Based on mother’s characteristics, most of them had 1-2 children (77.2%). As many as 91.7% of their last-born children had birth weights standards (≥2,500 grams) and were born normally (73.6%). Based on immunization status, it was found that 85.1% had complete polio OPV for four times, complete DPT/HB/HiB status for three times of 87.9%, HB-0 of 89.8% and BCG of 94.4%. The results also showed that 68.5% mothers had good knowledge and good attitudes towards immunization (51.1%). Regarding the adverse events following immunization (AEFI) perceptions, 57.5% of mothers were still not good, even though their perception of multiple injection was good (52.3%). As many as 79.8% mothers have many sources of

information about immunization and the level of service satisfaction was high (60%). The study results also showed that proportion of mothers who perceived barriers to immunization was greater (63.5%) than those who did not have barriers.

Among the group of respondents who did not comply with IPV, the largest proportion were those who had >3 children (29.5%), with baby birth weight <2,500 grams (33.3%), and cesarean delivery (28.2%) as shown in Table 1. In those group, the proportion of children with incomplete immunization status for all antigen types was also higher than those with complete immunization, including polio (OPV) at 75.5%, DPT/HB/HiB (81.9%), HB0 (62.9%) and BCG (92.1%). The proportion of those with less knowledge was also greater (34.7%) than those with good knowledge (21.5%). The same condition was also seen in the variables of less attitude (31.6%), perception of AEFI (26.6%), perception of multiple injections (29.1%), few sources of information (36.2%), perception of many barriers (26.9%) and low level of satisfaction (30.3%). Table 1 also showed that there were 9 independent variables (from 14 variables) that statistically proved a relationship with IPV adherence partially (p-value<0.05) such as: labor history, polio (OPV), DPT/HB/HiB, HB-0, BCG, knowledge, attitudes toward immunization, sources of information, and satisfaction of immunization services.

Table 1. The analysis on IPV adherence for children in Central Java Province

Variables		Adherence of IPV immunization			Sig.
		Not adherence n (%)	Adherence n (%)	Total n (%)	
Number of children	1. Have 1-2 children	130 (24.6%)	399 (75.4%)	529 (77.2%)	0.259
	2. Have ≥3 children	46 (29.5%)	110 (70.5%)	156 (22.8%)	
Birth weights of baby	1. Birth weight <2,500 gr	19 (33.3%)	38 (66.7%)	57 (8.3%)	0.222
	2. Birth weight ≥2,500 gr	157 (25.0%)	471 (75.0%)	628 (91.7%)	
Childbirth history	1. Normal delivery	125 (24.8%)	379 (75.2%)	504 (73.6%)	0.000*
	2. Surgical delivery	51 (28.2%)	130 (71.8%)	181 (26.4%)	
Polio (OPV) immunization status	1. Incomplete	77 (75.5%)	25 (24.5%)	102 (14.9%)	0.000*
	2. Complete	99 (17.0%)	484 (83.0%)	583 (85.1%)	
DPT/HB/HiB immunization status	1. Incomplete	68 (810.9%)	15 (18.1%)	83 (12.1%)	0.000*
	2. Complete	108 (17.9%)	494 (82.1%)	602 (87.9%)	
Immunization of HB-0	1. No	44 (62.9%)	26 (37.1%)	70 (10.2%)	0.000*
	2. Yes	132 (21.5%)	483 (78.5%)	615 (89.8%)	
Immunization of BCG	1. No	35 (92.1%)	3 (7.9%)	38 (5.5%)	0.000*
	2. Yes	141 (21.8%)	506 (78.2%)	647 (94.5%)	
Knowledge	1. Less	75 (34.7%)	141 (65.3%)	216 (31.5%)	0.000*
	2. Good	101 (21.5%)	368 (78.5%)	469 (68.5%)	
Attitude toward immunization	1. Less	106 (31.6%)	229 (68.4%)	335 (48.9%)	0.001*
	2. Good	70 (20.0%)	280 (80.0%)	350 (51.1%)	
Perception of AEFI	1. Less	105 (26.6%)	289 (73.4%)	394 (57.5%)	0.563
	2. Good	71 (24.4%)	220 (75.6%)	291 (42.5%)	
Perception of multiple injection	1. Less	95 (29.1%)	232 (70.9%)	327 (47.7%)	0.066
	2. Good	81 (22.6%)	277 (77.4%)	358 (52.3%)	
Sources of information	1. Few	50 (36.2%)	88 (63.8%)	138 (20.1%)	0.002*
	2. Lot	126 (23.0%)	421 (77.0%)	547 (79.9%)	
Perception of barriers	1. Many barriers	117 (26.9%)	318 (73.1%)	435 (63.5%)	0.390
	2. No barriers	59 (23.6%)	191 (76.4%)	250 (36.5%)	
Satisfaction of immunization services	1. Low	83 (30.3%)	191 (69.7%)	274 (40.0%)	0.031*
	2. High	93 (22.6%)	318 (77.4%)	411 (60.0%)	

*Significant with p value<0.05

Table 2 showed the results of multivariate analysis, where final modeling has proven that the previous immunization status, both Polio-OPV, DPT/HB/HB and HB-0, attitudes towards immunization and sources of information affect the adherence of IPV simultaneously with p-value<0.05. The variable of DPT/HB/HIB status has the largest effect with value of Expβ 6.736, followed by Polio-OPV status with an Expβ value of 4.831 and HB-0 (Expβ 2.246). The effect of all variables on IPV adherence was 35.2%. The study results proved that adherence on IPV for children was mainly influenced by previous immunization status, followed by the attitude of parents and the availability of adequate information. The results of this study proved that 25.7% children did not receive IPV. The low coverage of immunization, include IPV was caused by many factors, both internal and external factors. Low support from family and environmental indicate barriers related to mothers' perceptions and attitudes towards immunization. Many studies have proven that there was a relationship between maternal knowledge and perception and the completeness of childhood immunization [15]–[17].

Table 2. The result of multivariate analysis

Variables	β	SE	df	Sig.	Exp.β	95% CI for Exp.β	
						Lower	Upper
Polio (OPV) immunization status	1.575	0.317	1	0.000*	4.831	2.594	8.996
DPT/HB/HiB immunization status	1.908	0.376	1	0.000*	6.736	3.225	14.070
Immunization of HB-0	0.809	0.338	1	0.017*	2.246	1.158	4.357
Attitude toward immunization	0.602	0.215	1	0.005*	1.826	1.197	2.785
Sources of information	0.556	0.244	1	0.022*	1.744	1.082	2.811
Constant	-3.274	0.459	1	0.000	0.038	-	-

*Significant with p-value<0.05; Value of Nagelkerke R Square (R2)=0.352

Completeness immunization was a protective factor for stunting in children under five (<5 years old), apart from low birth weight (LBW), number of children more than (<3) and parenting style. The prevalence of stunting in children with complete immunization is lower (32.5%) compared to children with incomplete immunization, 41.1%, with the risk being seven times greater [18]. Study in Timor Leste also showed that the risk of stunting was related to the immunization completeness and a history of infectious diseases in children [19]. It must be admitted the support from the environment and local stakeholders (including village level stakeholders) in immunization has not been optimal [20], including substantial multisector involvement, such as social institutions and community empowerment [13]. Despite having a positive perception of immunization, most consider the success of immunization to be entirely the PHC responsibility, health providers, health workers and cadres [21]–[24].

The study also proved that variables of delivery history, previous immunization status, knowledge, attitudes, sources of information and service satisfaction were positively associated with IPV adherence. Associated with history of delivery, the babies were born by normal parturition tend to be more obedient than those born by caesarean section. Children born through normal labor (vaginal parturition) were clinically considered to meet the health requirements for normally birth, including the mothers' health status. Although normal birth was physically tiring, the baby had smaller risk of experiencing health problems, such as the problems of respiratory, allergies, asthma, and lactose intolerance. The babies who were healthy and rarely get sick were more likely to get complete routine immunization because they were not hindered by their physical condition which was vulnerable and easily sick. The babies who were sick should not be immunized and must wait until they were healthy again. Premature babies and low birth weight were significantly associated with incomplete immunization [25].

Adherence in previous immunizations also has greater chance of remaining compliant in providing IPV for their children. Similarly, positive maternal knowledge and attitudes showed a higher level of compliance. If mothers have more information sources about immunization, the greater chance to comply. Generally, the information sources of immunization were obtained by mothers from the PHC, health workers (doctors, midwives, nurses) and health cadres [21], [26]. Many studies proved that children with parents who did not have access to adequate information media experience more missed opportunity of immunization compared to parents who have access [21], [22], including access to social media [22], [27].

Clear and correct information about vaccines, immunizations, their benefits, and side effects should be provided from the beginning, especially when women being pregnant (prenatal period) so that they were better prepared to provide immunizations when their children were born. Handling post-immunization side effects provided by health workers could reduce parents' concerns. Although post immunization reactions that appear were temporary, the mechanism for recording and reporting all reactions that arise must be carried out by health workers so that they must be monitored through the surveillance system. AEFI surveillance was very helpful for immunization programs, especially to strengthen public confidence in the importance of immunization as the most effective disease prevention effort. A comprehensive explanation of AEFIs can help parents understand the benefits of vaccines and reduce hesitancy and refusal. The causes of vaccine hesitancy are multifactorial, complex, and require multiple approaches at the individual, provider, health system, and national levels [28]–[30].

The first experience of seeing a child immunized and the risk of side effects that occur could lead to different attitudes and perceptions in each mother or parent. They were reluctant (though not averse) to immunization because they see their child crying in pain, fussing and fever after immunization which causes anxiety and hassle for the family. Decision-making related to immunization was a complex process because it was related to many factors [24]. According to Bullo *et al.* fear of needles is often associated with anxiety and fear of vaccination [31]. It should be recognized that vaccination is one of the most feared health services because it causes pain in babies and children and this condition also results in reduced compliance with the vaccination schedule [32], [33]. Fear of pain and anxiety about vaccination were important reasons why parents tend to be reluctant to vaccinate their children completely and on time [33]–[35]. Common parental concerns were mainly about the pain experienced by the children, potential side effects and uncertainty about

vaccine effectiveness [32], [35], [36]. It is the responsibility of healthcare providers to take steps reducing the pain caused by vaccination, thereby increasing adherence to the vaccination schedule [31], [32]. Resistance to vaccines was also caused by low levels of trust, which leads to hesitation, delay and even refusal [37].

Parents' knowledge, attitude and practices about immunization were major contributors to vaccination decisions for their children. The existence of many barriers to immunization, including misinformation about vaccines, vaccine side effects, vaccine-preventable diseases, and disease progression after vaccine administration will affect every decision made. A study in Uganda showed that health workers, health cadres, distance to immunization post and parent/caregiver's education were positively related to IPV vaccination compliance. The role of health workers and cadres is very important in fostering positive perceptions regarding vaccination [38]. Local studies conducted have shown that knowledge factors and health workers' role were related to utilization of IPV immunization in Jambi [39]. Knowledge, family support, availability of facilities and health workers was influencing utilization of IPV immunization in Palembang city [40]. It has been proven that parental knowledge about immunization and vaccines is strongly related to the willingness to vaccinate their children in Pakistan, especially about important vaccines such as pentavalent, pneumococcal (PCV) and inactivated polio or IPV [41]. Parental knowledge, attitude, and behavior (KAB) influence to immunization decisions for their children.

Health workers are also a trusted source of information about immunization [24]. Improving parents' health literacy through effective communication is a strategy to strengthen knowledge, attitudes, and positive perceptions about immunization. However, proper, and sophisticated communication methods must be considered so as not to get caught on the other side. Aharon's study showed that parents with high literacy levels, communicative, and critical thinkings were more at risk of not vaccinating their children because they did not always easily trust the information they receive. Conditions like this must be avoided [27]. Lack of maternal knowledge was the characteristic that have the greatest risk for non-adherence to complete basic immunization in children. Parental education and socioeconomic background of family have a significant influence on immunization decision making and immunization adherence [24].

The results of this study indicate a relationship between information sources and IPV adherence. Elran *et al.* [42] in their study showed that a high level of immunization adherence was greatly influenced by the source of information, especially from parties who were pro-vaccination, and nurses or health workers were the most influential sources of information about immunization [42]. The more sources of information that mothers have about immunization, the greater chance of adherence, especially information from pro-vaccination groups. Information could be obtained from many parties, both verbally and nonverbally, with very diverse media, including social media. It must be acknowledged that advances in communication technology have implications for the ease of obtaining information, both positive and negative information about immunization which generally comes from anti-vaccine groups.

Currently, people were increasingly using the internet and social media to communicate, learn, and make decisions about vaccination. Many studies showed that vaccine refusal or delay was more common in parents who report the internet as their main source of information about vaccines [29]. The ability to filter the correct information was a key factor. Humans were information processors who often become biased due to the influence of their cognitive psychological factors. Therefore, negative attitudes towards immunization could not be explained by relying on empirical evidence alone. Vaccination adherence could be improved both by building common beliefs and understandings about treatment that were not only evidence-based, but could using communication features and narratives that were usually related to expected natural conditions, such as the statement that vaccination will "strengthen a child's natural resistance to disease" [43].

The results of multivariate analysis showed that previous immunization status (HB-0, Polio/OPV, DPT/HB/HiB), attitude and information sources jointly influenced IPV compliance in children. This was being assumed that if the mother had a good experience during previous immunization, got the right information related to immunization and have a positive attitude about immunization, so the chances of giving IPV to her child would be even greater. When the child did not experience serious obstacles/constraints after immunization, parents would to immunize their children voluntarily because they fully understood that the completeness and timeliness of immunization was a necessity so that children were completely free from the risk of contracting dangerous diseases [15], [36], [44].

Using a psychological approach as a strategy to solve problems and barriers in immunization was a logical solution, because the results of this study showed that the barriers felt by parents so far were related to psychological dimensions, such as anxiety about fussy and sick children, perceptions of self-hassle, inconsistent communication, chaotic schedule, and laziness with queues and long waiting times. This situation results in low utilization and adherence of immunizations [45], including IPV. Delays, untimeliness and missed opportunities result in low immunization coverage, failure of herd immunity and risk of preventable-disease outbreaks. Brewer *et al.* stated that psychological approaches could provide three general propositions for intervention [46]. First, that thoughts and feelings could motivate immunization, focusing on increasing confidence and anticipating regret from contracting harmful diseases. Low belief in vaccine

effectiveness was strongly correlated with non-immunization behavior. Second, that social processes could motivate immunization, which was generally related to social norms and social interactions, especially through supported from family, community, and environment, including service providers and health workers. Third, that interventions could facilitate the utilize and adherence of immunization directly even if they did not change what parents think and feel, such as regulations, instructions, reminders and warnings, and efforts to reducing barriers through the provision of adequate logistics and infrastructure. These interventions also could shape behavior through specific incentives, sanctions, and requirements [46].

4. CONCLUSION

A total of 74.3% of children had received IPV. Partially, the variables of delivery history, immunization status (Polio/OPV, DPT/HB/HiB, HB-0, BCG), knowledge, attitude, information sources, and satisfaction with immunization services were associated with IPV immunization adherence. Simultaneously, it was proven that immunization status (Polio/OPV, DPT/HB/HiB, HB-0), attitude and information sources influenced IPV adherence with an overall effect of 35.2%. Efforts were needed to reduce IPV resistance through increasing confidence in vaccine effectiveness, eliminating misinformation and miscommunication that occurs. Improving health literacy through appropriate methods and communication media was one of the strategies that can be implemented.

Motivating and personalized psychological approaches to reduce anxiety and improve positive attitudes/perceptions need to be carried out routinely at health facilities and during home visits. The use of social media as a tool and source of positive information about immunization could be developed by paying attention to the clarity of the content narrative content and its ease of using various attractive features and applications. Health workers should also improve their communication and interaction skills to minimize misunderstanding of information and mistrust, and attend technical skills training in creating media and applications using the internet and social media networks. In addition, improvement to the immunization service system could be made by setting a clear and consistent schedule, setting up a queuing system and providing other supporting infrastructure.

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