

# Factors Associated with Basic Immunization Status in Children with Congenital Heart Disease

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**Abstract Background:** Children with congenital heart disease are susceptible to infection that could be prevented by immunization. Information about factors associated with immunization in children with congenital heart disease is lacking. **Objective:** To determine factors associated with the basic immunization in children with congenital heart disease. **Methods:** This is a sequence explanatory mixed method study which combined quantitative analytic study on 90 subjects and qualitative study using focus group discussion. Parents of children with congenital heart disease aged 12-60 months who possess immunization card were included. Independent variables were mother's age, education, occupation, child's age at diagnosis, congenital heart disease type, information and source of information, knowledge and attitude, while basic immunization status served as dependent variable. Outcome of quantitative study was used as initial topics discussed at the focus group discussion. **Results:** The percentage of fully immunized children in this study was 83.3%. Knowledge and information have significant association with basic immunization status. Counseling by health workers and the information about vaccines' safety gave confidence to participants of focus group discussion to provide immunizations. The biggest concern came from midwives who worried about the children's condition so they refused to give the immunization. **Conclusion:** Knowledge and information are factors associated with basic immunization status in children with congenital heart disease. Midwives concern about children condition made them refuse to give the immunization. It is necessary to provide counselling for midwives about immunization in children with congenital heart disease.

**Keywords:** children, congenital heart disease, immunization

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## 1. Introduction

Congenital heart disease (CHD) is one of the most common forms of malformation found in infants and children. The numbers of children with congenital heart disease increased as the increase of global population. The incidence of CHD in America is estimated to be 1 million people each year, while the incidence of CHD in Indonesia is 8 for every 1000 live births. [1] Children with chronic disorders, such as CHD is susceptible to infections. Basic immunization is one of many means to prevent infection in these children.

In previous studies, several factors were known to be associated immunization. Some factors were found in quantitative studies such as parents' education and occupation, mother's age, economic status, race, knowledge, attitude, information and source of information about immunization, severity of the disease, fears of vaccines side effects and vaccines safety [2,3,4,5,6]. While other factors found in qualitative study beside those factors, including parent's trust in health workers. [7,8,9]

None of the previous studies, whether quantitative or qualitative study, gave information about factors related to basic immunization status in children with congenital heart disease.

The aim of this study is to determine the factors associated with basic immunization status in children with congenital heart disease. These factors include mother's age, education and occupation; type of congenital heart disease; information and the source of information about immunization; knowledge and attitude. In addition, this study also aimed to obtain more detailed information regarding the association of these factors with the basic immunization status in children with CHD. Therefore, in addition to quantitative study, we also conducted the qualitative study.

## 2. Methods

This is a sequence explanatory mixed method study which combined analytic quantitative study using cross sectional method and quantitative study using focus group discussion. Parents of children with CHD aged 12-60 months who still possess the immunization cards were

included in this study. Diagnosis of CHD was confirmed through history taking, physical examination, chest X-ray, electrocardiogram and echocardiography. The exclusion criteria was the parents of children with CHD who had contraindications of immunization when their children age was 0–11 months, with these contraindications such as human immunodeficiency virus infection, long-term immunosuppressant therapy, malignancy, history of anaphylaxis to the vaccine, history of encephalopathy 7 days after vaccination, history of fever above 40.5°C after 48 hours of vaccine administration, history of shock at 48 hours after administration of the vaccine that is not attributable to other causes and cardiac isomerism diseases. This study was conducted at the Pediatric Cardiology Outpatient Clinic in Hasan Sadikin General Hospital from November 2016 to January 2017.

Independent variables in this study were the mother's education level and occupation; child's age at diagnosis; type of congenital heart disease; information and source of information about immunization; knowledge and attitude; with the basic immunization status as the dependent variable. Bivariate analysis was done first by using the Mann Whitney and Chi-Square tests. Variables with  $p < 0.25$  were analyzed further with multiple logistic regression analysis. Statistical significant were represented with  $p$  value  $\leq 0.05$ . The data obtained were processed using the Statistical Package for Social Sciences (SPSS) program version 21.0 for Windows. Qualitative study was conducted with focus group discussion. First, topics were determined, and then questions were developed by topics and arranged sequentially so that it was easily understood by the participants.

Topics that were in the FGD was based on quantitative study outcomes. The duration of FGD was 60 minutes. Discussion was guided by one facilitator accompanied by one notetaker. Analysis of qualitative study was conducted with familiarization, identifying a thematic framework, indexing, mapping and interpretation.

Sample size in quantitative study was conducted using a rule of thumb to determine the outcomes of 8 independent variables. Minimum subject required was 80 people, but the number of samples taken were 90 people. Sampling was done in consecutively. Focus group discussion participants were selected from the 90 subject on the quantitative study.

The study were conducted after obtaining the approval from the Health Research Ethics Committee of Hasan Sadikin General Hospital. Informed consent for participating in the study were signed by subjects.

### 3. Results

There were 90 subjects who met the inclusion criteria. The characteristics of subjects can be seen in Table 1. The average of mother's age was 32.2667 (SD:  $\pm$  6.7587) years. Both father and mother are high school graduates (46.7% and 55.6%, respectively). Most mothers (95.6%) were unemployed. Acyanotic type of congenital heart disease was found in 87.8%. Primary health care was the most common place in giving immunization (48.9%) (Figure 1). Ninety-five point six percent of respondents had been informed about immunization with private

midwives as the main source of information (45.6%) (Figure 2).

Table 1. The Characteristics of Subjects

Variables	n = 90
<b>Mother's age</b>	
Mean $\pm$ SD	32.2667 $\pm$ 6.7587
Median	33.000
Range (min-max)	19.00-47.00
<b>Father's age</b>	
Mean $\pm$ SD	36.1111 $\pm$ 7.5004
Median	36.000
Range (min-max)	21.00-55.00
<b>Mother's education</b>	
Elementary School	11 (12.2%)
Junior High School	29 (32.2%)
Senior High School	42 (46.7%)
Diploma	3 (3.3%)
Undergraduate	5 (5.6%)
<b>Father's education</b>	
Elementary school	8 (8.9%)
Junior High School	25 (27.8%)
Senior High School	50 (55.6%)
Diploma	3 (3.3%)
Undergraduate	4 (4.4%)
<b>Mother's occupation</b>	
Employed	4 (4.4%)
Unemployed	86 (95.6%)
<b>Father's occupation</b>	
Laborer	32 (35.6%)
Entrepreneur	36 (40.0%)
Private employee	14 (15.5%)
Government employees/army	8 (8.9%)
<b>Child's age</b>	
Mean $\pm$ SD	36.700 $\pm$ 15.1579
Median	36.000
Range (min-max)	12.00-59.00
<b>Sex</b>	
Male	43 (47.8%)
Female	47 (52.2%)
<b>Type of CHD</b>	
Acyanotic	79 (87.8%)
Cyanotic	11 (12.2%)
<b>Immunization Provider</b>	
Pediatrician	6 (6.7%)
General practitioner	0 (0.0%)
Private midwife	40 (44.4%)
Primary health care	44 (48.9%)
<b>Information on Immunization</b>	
Yes	86 (95.6%)
No	4 (4.4%)
<b>Source of information</b>	
Pediatricians	4 (4.4%)
Private midwives	41 (45.6%)
Primary health care	40 (44.4%)
Healthcare helper	1 (1.1%)
Media	4 (4.4%)

Notes: Categorical data presented in frequency and percentage, while the numerical data presented in the mean, standard deviation, median and range (min-max).

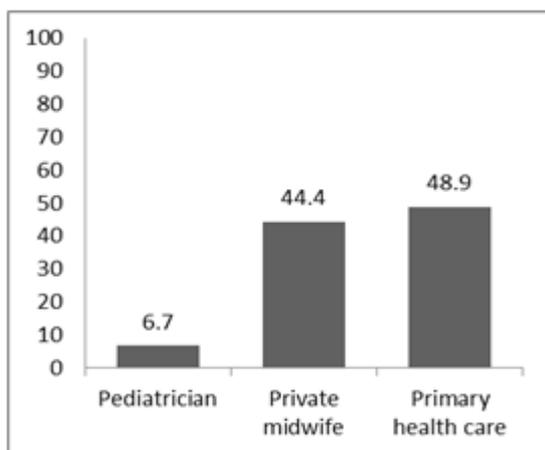


Figure 1. Immunization provider (percentage)

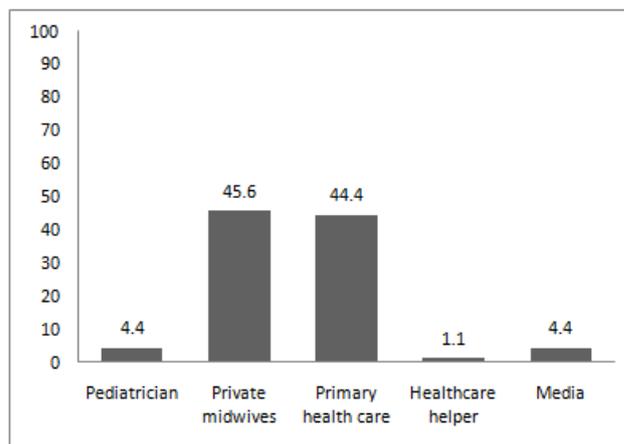


Figure 2. Source of information (percentage)

Table 2. Association between Subject Characteristics and Basic Immunization Status

Variables	Basic Immunization		p value
	Complete n = 75	Incomplete n = 15	
<b>Mother's age (years)</b>			<b>0.447*</b>
Mean ± SD	32.5067±6.8228	31.0667±6.5188	
Median	33.000	32.000	
Range (min-max)	19.00-47.00	23.00-41.00	
<b>Mother's education</b>			<b>0.999**</b>
Elementary school	9 (12.0%)	2 (13.3%)	
Junior high school	25 (33.3%)	4 (26.7%)	
Senior high school	33 (44.0%)	9 (60.0%)	
Diploma	3 (4.0%)	0 (0.0%)	
Undergraduate	5 (6.7%)	0 (0.0%)	
<b>Mother's occupation</b>			<b>0.647**</b>
Employed	3 (4.0%)	1 (6.7%)	
Unemployed	72 (96.0%)	14 (93.3%)	
<b>Type of CHD</b>			<b>0.886**</b>
Acyanotic	66 (88.0%)	13 (86.7%)	
Cyanotic	9 (12.0%)	2 (13.3%)	
<b>Information about Immunization</b>			<b>0.067**</b>
Yes	73 (97.3%)	13 (86.7%)	
No	2 (2.7%)	2 (13.3%)	
<b>Source of Information</b>			<b>1.000**</b>
Pediatricians	4 (5.3%)	0 (0.0%)	
Private midwives	35 (46.7%)	6 (40.0%)	
Primary health care	34 (45.3%)	6 (40.0%)	
Health care helper	0 (0.0%)	1 (6.7%)	
<b>Knowledge</b>			<b>0.006**</b>
Good	69 (92.0%)	10 (66.7%)	
Poor	6 (8.0%)	5 (33.3%)	
<b>Attitude</b>			<b>0.571**</b>
Good	39 (52.0%)	9 (60.0%)	
Very good	36 (48.0%)	6 (40.0%)	

Notes: \*Mann-Whitney, \*\*Chi-Square.

**Table 3. Multivariate Analysis Outcomes for Knowledge and Information on Immunization with Basic Immunization Status**

Variables	p value	OR (CI 95%)
Knowledge	0.007	7.034 (1.690-29.281)
Information	0.048	0.118 (0.014-0.984)

Notes: p value <0.05 was statistically significant.

Based on bivariate analysis, we found significant differences between knowledge and basic immunization status in both groups (Table 2). Independent variables in the bivariate analysis with p value <0.25 were included to multivariate analysis. Those variables were knowledge and information about immunization (Table 3).

Multivariate analysis in Table 3 showed that variables of knowledge and information on immunization have significant associations with basic immunization status.

## 4. Focus Group Discussion

Focus group discussion participants were taken from 90 quantitative subjects based on these criterias: education level, cooperativeness and the place of residence. There were 10 subjects who met this criteria, but 3 subjects were dropped out, so there were 7 subjects who participated in focus group discussion. The outcomes in quantitative study will be explore deeper in the discussion.

All participants described basic immunization well and noted that immunization was very important to protect their children from diseases. One of the participants who has children with cyanotic heart disease said that the disease didn't stop her to continue the child's immunization. Concerns about the side effects of immunization was recognized by all participants, but this didn't stop them to continue the immunization. One participant said that the discontinued of her son's immunization was because her son often experienced cough and cold.

Counseling about the importance of immunization in health centers gave participants confidence to give their children the immunization. This was supported by the information given by physicians during their visit at the Pediatric Cardiology Outpatient Clinic in Hasan Sadikin General Hospital regarding basic immunization which could be safely performed in CHD children.

We found some interesting statements expressed by the participants. All participants agreed that there was no specific place for giving the immunization for CHD children, but if they go to private practices, they could choose the vaccine with minimum side effect such as fever. Another interesting point was the concerns of private midwives against giving immunization for children with CHD. All participants included in FGD had experienced of being refused by midwives when they asked to give immunization for their children.

## 5. Discussion

The percentage of fully immunized children in this study was 83.3%. This number is greater than the basic immunization coverage in West Java province in 2014 which is 54%. [10] This study showed that knowledge and

information about immunization were factors associated with basic immunization status in children with CHD. Previous studies conducted on children without congenital heart disease with varying methods also found association between the knowledge of parents and information on immunization with parents' decision to immunization. A descriptive analytic study in India which conducted an analysis of seven factors, showed that two factors were associated with immunization, namely knowledge and information on immunization. [5] A study in Malaysia on 88 parents which analyzed 10 factors, found knowledge as one of the three factors that associated with immunization. [11] However, in a study in Nigeria on 685 children, analyzing 12 factors by regression analysis, found that there was no association between knowledge and the completion of immunization. [12] Except a study in Nigeria, other previous study reported similar results with our study showing association between knowledge and information on immunization with basic immunization status, either in CHD children or other children.

In our study, we found no significant association between education level, employment, the type of congenital heart disease, source of information, attitudes and basic immunization in children with CHD. A study in Karnataka, India conducted to mothers or caregivers of 155 children, found that education was one of the three factors analyzed that have no association with immunization. [13] The results of the retrospective study in Spain analyzing of three factors obtained significant association between education and occupation of parents. [14] A study using bivariate analysis were conducted in India and found that mother's education, occupation and source of information have a significant association with immunization status [5]. The same results also obtained in a multivariate analysis study in the United States that found mother's age had significant association with immunization status [15].

In the FGD conducted in this study showed that parents have good understanding on both immunization and the importance of immunization to prevent infection. Information on vaccination safety in children with CHD and trust in health workers as well as the will to protect their child from diseases, made parents continue the vaccination, although they were concerned about their children condition.

A qualitative study using in-depth interviews to find out parents misperception found that the most concerns of the parents was side effects of vaccines, especially mumps, measles and rubella (MMR) vaccines. [7] Benin conducted a qualitative study by using open-ended interviews showed information on immunizations and trust in health workers had an association with mother's decision to immunize. [8] A qualitative study in The Netherlands using online focus group discussion involving 8 groups (n=60), emphasized that healthcare workers were the key to immunization programs and can influence parents' decisions when they have doubts about vaccine. Healthcare workers should communicate effectively and positively to influence satisfaction and compliance of patients. [9] Kennedy described that 84% of mothers that completed immunization for their children had strong belief on recommendations given by healthcare providers. [16]

An interesting finding in FGD was that the most concerns didn't come from parents but from the healthcare workers, in this case, midwives. Six of seven FGD participants

mentioned that they have experienced rejection from midwives. No information obtained from prior qualitative studies stating the refusal of health workers to immunize.

Limitations of this study is the selection of subjects who participated in focus group discussions using certain criteria, so it might not representative for the rest subjects in this study. We recommend a qualitative study to be conducted using a randomization of the whole subjects.

## 6. Conclusion

Parents' knowledge and information about immunization were factors associated with the basic immunization status in children with CHD. This study showed that although parents of children suffered from CHD have concerns about immunization, their will to protect their children from diseases and their trust in health workers encourage them to continue immunization. An interesting finding in FGD was that the most concerns against immunization in children with CHD came from health workers, in this case, midwives.

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## Conflict of Interest

There is no conflict of interest in conducting and publishing this research.

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