# Pendekatan Ekologi Cakupan Imunisasi Dasar Lengkap pada Bayi di Indonesia (2017-2019)

## *Ecological Analysis of Complete Basic Immunization Coverage for Infants in Indonesia (2017-2019)*

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## ABSTRACT

*Background: Complete basic immunization for infants in Indonesia is an obligation in an effort to protect infant health. It is one of the important indicators in determining the quality of health services in a certain area. However, the coverage of complete basic immunization in Indonesia in 2017 and 2018 has not been achieved nationally with National Strategic Planning and it has not been achieved the targets of 80% of districts/cities in 2019. Objective: This study aims to analyze the factors correlated to the complete basic immunization coverage of infants in Indonesia in 2017-2019. Methods: Ecological analysis was carried out using secondary data from the report of the Ministry of Health of the Republic of Indonesia in 2017-2019. Univariate analysis was conducted using descriptive statistics and one sample Kolmogorov Smirnov. Bivariate analysis was conducted by correlation test (Pearson and Spearman) and scatter plot. Results: Complete basic immunization for infants had a significant correlation with the adequacy of midwives at the primary health care in 2017 (r = -0.337). There was significant correlation between poverty and complete basic immunization in 2017 and 2018 (r = -0.362 and r = -0.535). In 2019, active Integrated Service Post (Posyandu) was correlated to the complete basic immunization (r = 0.444). The first neonatal visit was correlated to the complete basic immunization of infants for three consecutive years (2017-2019). Conclusion: Efforts that can be made to increase the coverage of complete basic immunization in Indonesia are increasing the distribution of midwives in Indonesia, increasing the coverage of the first neonatal visit by paying attention to Posyandu cadres, especially in provinces with high poverty rates.*

*Keywords: Active Integrated Service Post, Complete basic immunization, First neonatal visit, Good-health, Poverty, Well-being*

## ABSTRAK

*Latar Belakang: Imunisasi dasar lengkap pada bayi di Indonesia bersifat wajib sebagai upaya melindungi kesehatan bayi. Cakupan imunisasi dasar lengkap pada bayi merupakan salah satu indikator penting dalam menentukan kualitas pelayanan kesehatan di suatu daerah. Namun imunisasi dasar lengkap di Indonesia tahun 2017 dan 2018 belum tercapai secara nasional dengan Renstra dan belum tercapainya target 80% kabupaten/kota pada tahun 2019. Tujuan: Penelitian ini bertujuan untuk menganalisis faktor yang berhubungan dengan cakupan imunisasi dasar lengkap bayi di Indonesia tahun 2017-2019. Metode: Analisis ekologi dilakukan dengan menggunakan data sekunder dari laporan Kementerian Kesehatan Republik Indonesia tahun 2017-2019. Analisis univariat dilakukan dengan statistik deskriptif dan satu sampel Kolmogorov Smirnov. Analisis bivariat dilakukan dengan uji korelasi (pearson dan spearman) dan scatter plot. Hasil: Imunisasi dasar lengkap pada bayi memiliki korelasi yang signifikan dengan kecukupan bidan di Puskesmas tahun 2017 (r = -0,337). Ada hubungan yang signifikan antara kemiskinan dengan imunisasi dasar lengkap tahun 2017 dan 2018 (r = -0,362 dan r = -0,535). Pada tahun 2019, posyandu*

*aktif berkorelasi dengan imunisasi dasar lengkap (r = 0,444). Sedangkan kunjungan neonatus pertama berkorelasi dengan imunisasi dasar lengkap bayi selama tiga tahun berturut-turut (2017-2019).* **Kesimpulan: Upaya yang dapat dilakukan untuk meningkatkan cakupan imunisasi dasar lengkap di Indonesia adalah** *meningkatkan distribusi bidan di Indonesia, meningkatkan cakupan kunjungan neonatal pertama dengan memberi perhatian pada kader posyandu khususnya pada daerah dengan tingkat kemiskinan yang tinggi.*

**Kata kunci**: *Posyandu aktif, Imunisasi dasar lengkap, Kunjungan neonatal pertama, Kesehatan, Kemiskinan, Kesejahteraan*

## INTRODUCTION

Every infant (aged 0-11 months) in Indonesia is required to receive complete basic immunizations consisting of 1 dose of Hepatitis B, 1 dose of BCG, 3 doses of DPT-HB-HiB, 4 doses of polio drops, and 1 dose of measles/MR. DPT immunization coverage was moderately correlated to the number of diphtheria cases in 2018 (Setiawan *et al.*, 2021). A previous study stated that incomplete immunization was correlated to pneumonia in toddlers (Fitriyah, 2019).

The percentage of districts/cities that achieve 80% of complete basic immunization for infants was one indicator of equity and quality of health services in the health development targets in the 2015-2019 Strategic National Planning, with a target of 95% in 2019. Percentage of districts/cities that achieved 80% of basic immunizations completeness in infants tends to increase, and in 2017 it reached 85.41% districts/cities. However, in 2018 it decreased to 72.76%. In 2019, 73.74% of districts/cities had achieved 80% complete basic immunization, but this still did not meet the set target of 95% (Ministry of Health in Indonesia, 2018, 2019, 2020). The percentage of districts/cities with universal child immunization status was significantly related to malnutrition in toddlers (Wahyuni and Mahmudah, 2018).

Complete basic immunization in Indonesia reached 91.12% in 2007. This number was slightly below the 2017 Strategic Plan target of 92%. Meanwhile, fifteen provinces had achieved the 2017 Strategic Plan target (Ministry of Health in Indonesia, 2018). Based on the 2018 Indonesian Health Profile, complete basic immunization coverage in Indonesia in the last five years had always been above 85% but had not yet reached the target of the Strategic Plan of the Ministry of Health. In 2018, complete basic immunization in Indonesia was 90.61%, which was slightly below the 2018 Strategic Plan target of 92.5% (Ministry of Health in Indonesia, 2019). However, In 2019, complete basic immunization in Indonesia was 93.7%, this had met the 2019 Strategic Plan target of 93% (Ministry of Health in Indonesia, 2020).

A previous study stated that one of the causes of the unsuccessful implementation of complete basic immunization coverage was the lack of health workers at the primary health care (Amir, Darwin and Lestari, 2018). The data of the national level reported that 83.53% of primary health care had more than the standard number of midwives. Nevertheless, there were still 12.91% of primary health care which was included in the less category.

Integrated Service Post or *Pos Pelayanan Terpadu* (*Posyandu*) is a form of Community-Based Health Efforts carried out by, from, and with the community, to empower and provide convenience to the community to obtain health services for mothers, infants, and children under five years. *Posyandu* had an important role in the first neonatal visit and immunization program (Cintyamena *et al.*, 2021). In 2019, Indonesia had 296,777 *Posyandu*. There were 188,855 or around 63.6% of active *Posyandu* in Indonesia (Ministry of Health in Indonesia, 2020).

The number of poor people in Indonesia in March 2019 was 25.14 million people (9.41%), which decreased from March 2018 which was 25.95 million people (9.82%). During the period of March 2018 to March 2019, the poor

population in urban areas decreased by 0.15 million people, while in rural areas decreased by 0.65 million people. The percentage of poor people in September 2018 was 9.66%, has decreased to 9.41% in March 2019 (Ministry of Health in Indonesia, 2020). The higher the income level of a person, the higher the chance to complete basic immunization (Debie *et al.*, 2020).

Indonesia's coverage of first neonatal visit achievement in 2019 was 94.9%, smaller than in 2018 which was 97.4%. However, this achievement had met the 2019 Strategic Plan target of 90%. A total of 16 provinces (47.1%) had met the target. A new strategy is needed between health workers and caregivers in monitoring complete basic immunizations (Mutua *et al.*, 2016). Therefore, this study aimed to determine the factors correlated to the complete basic immunization coverage of infants in Indonesia from 2017 to 2019.

## METHOD

The design of this study used an ecological analysis. Ecological studies focus on comparisons between groups, not individuals. The data analysis was aggregated data in certain groups or levels, which in this study was the provincial level. Variables in ecological analysis can be aggregate measures, environmental measures, or global measures (Mooney and Pejaver, 2018; Laksono and Kusrini, 2020; Laksono and Sandra, 2020).

This study used secondary data from the 2018 Data and Information of Indonesia Health Profile report. The report was officially issued by the Ministry of Health of the Republic of Indonesia annually. The unit of analysis in this study was the province as many as 34 provinces. All variables were obtained from the 2017-2019 Health Profile as follows.

The dependent variable in this study was complete basic immunization for infants. This was obtained from the number of infants who received complete basic immunization compared to the total number of infants in the province.

The independent variables in this study were the percentage of primary health care with less midwives, percentage of active *Posyandu*,

percentage of poor population, and percentage of first neonatal visits. Percentage of primary health care with less midwives was defined as the minimum standard for the number of midwives in the non-inpatient health centers which as many as four midwives and in the inpatient health centers with a minimum of seven midwives. If the primary health care had midwives less than the minimum standard, then it is included in the category of primary health care with less midwives (Ministry of Health in Indonesia, 2020).

Percentage of Active *Posyandu* was defined as the percentage of *Posyandu* that are able to carry out their main activities regularly every month (MCH: pregnant women, postpartum mothers, infants, toddlers, family planning, immunization, nutrition, prevention, and control of diarrhea) with a minimum coverage of 50% each and carry out additional activities (Ministry of Health in Indonesia, 2020).

Percentage of Poor Population was defined as the percentage of people who had an average consumption expenditure per capita per month below the poverty line. The poverty line shows the minimum amounts of rupiah needed to meet the minimum basic needs of food which is equivalent to 2100 kilocalories per capita per day and non-food basic needs. The percentage of poor people is the percentage of poor people in urban and rural areas in each province (Ministry of Health in Indonesia, 2020).

Percentage of First Neonatal Visit was defined as the percentage of the services during first neonatal visits including counseling for newborn care, exclusive breastfeeding, administration of vitamin K1 injection, and Hepatitis B0 injection (if have not been given). The coverage of the first neonatal visit is the indicator that describes the health efforts made to reduce the risk of death in the neonatal period, which is 6-48 hours after birth (Ministry of Health in Indonesia, 2020).

Data were analyzed using univariate and bivariate analysis. Univariate analysis was conducted to describe the statistical description of the variables using descriptive statistics and normality tests. Normality test was analyzed by One-Sample Kolmogorov Smirnov because of the small amounts of data. Bivariate

analysis was carried out using a scatter plot and correlation test to show the correlation between two variables. Pearson correlation was used for normal data distribution. While Spearman correlation was used for non-normal data distribution. The r score indicates the strength of the linear relationship between two variables. If the r score is positive, this means that the correlation is unidirectional and if the r score is negative, this means that there is an inverse correlation. The analysis process utilized SPSS 21 software.

## RESULTS AND DISCUSSION

Results show that the average coverage of complete basic immunization for infants by the province in Indonesia in 2017 was 87.1882%. Meanwhile, the average of complete basic immunization coverage for infants by the province in Indonesia in 2018 decreased by 85.2121%

(29.6% – 102.99%). In 2019, the average coverage of complete basic immunization for infants by the province in Indonesia rose to 89.0882% (50.9% – 104.2%) (Table 1).

The highest complete basic immunization coverage in 2017, 2018, and 2019 respectively were South Sumatra Province, Central Java Province, and Bali Province. Meanwhile, the provinces with the lowest achievements in 2017-2019 were North Kalimantan (66.2%), Papua (29.60%), and Aceh (50.9%) (Table 1).

The results of the normality test show that poor population, active *Posyandu*, first neonatal visit, and complete basic immunization were normally distributed, thus, the correlation test used the Pearson test. While the less of midwives in primary health care was not normally distributed (P-value <0.05), thus, the correlation test used the Spearman test.

**Table 2.** Descriptive Statistics and Normality Tests of Complete Basic Immunization Coverage in Infants and other Related Variables in Indonesia (N = 34)

| Variable | Year | Range (Min – Max) | Mean | Asymp. Sig of normality test |
|---|---|---|---|---|
| Percentage of Primary health care with less midwives | 2017 | 0.00 - 71.06 | 14.6921 | 0.016 |
| | 2018 | 0.00 - 65.31 | 14.9803 | 0.010 |
| | 2019 | 0.00 - 68.45 | 10.5788 | 0.003 |
| Percentage of Poor Population | 2017 | 3.78 - 27.76 | 10.9512 | 0.270 |
| | 2018 | 3.55 - 27.43 | 10.6076 | 0.378 |
| | 2019 | 3.47 - 27.53 | 10.4550 | 0.355 |
| Percentage of Active *Posyandu* | 2017 | 17.70 - 95.58 | 51.7826 | 0.997 |
| | 2018 | 7.92 - 99.14 | 55.3529 | 0.840 |
| | 2019 | 0.00 - 95.60 | 54.5765 | 0.735 |
| Percentage of First Neonatal Visit | 2017 | 48.89 - 118.38 | 84.9250 | 0.532 |
| | 2018 | 53.37 - 128.93 | 89.1715 | 0.932 |
| | 2019 | 53.10 -106.10 | 88.6353 | 0.689 |
| Complete Basic Immunization Coverage of Infants | 2017 | 66.20 - 102.30 | 87.1882 | 0.557 |
| | 2018 | 29.60 - 102.99 | 85.2121 | 0.557 |
| | 2019 | 50.90 - 104.20 | 89.0882 | 0.790 |

**Table 3.** Correlation Test on Basic Infant Immunization Coverage in Indonesia by Province in 2017-2019

| No | Variable | 2017 | | 2018 | | 2019 | |
|---|---|---|---|---|---|---|---|
| | | r | P value | r | P value | r | P value |
| 1 | Percentage of Primary health care with less midwives | -0.337 | 0.047 | -0.209 | 0.229 | -0.307 | 0.073 |
| 2 | Percentage of Poor Population | -0.362 | 0.033 | -0.535 | 0.001 | -0.327 | 0.055 |
| 3 | Percentage of Active *Posyandu* | 0.184 | 0.289 | 0.134 | 0.443 | 0.444 | 0.007 |
| 4 | Percentage of First Neonatal Visit | 0.617 | 0.000 | 0.743 | 0.000 | 0.516 | 0.002 |

**Factors Correlated to the Complete Basic Immunization Coverage of Infants**

In 2017, three variables were significantly related to complete basic immunization coverage for infants, namely the percentage of primary health care that had less midwives, the percentage of poor population, and the percentage of first neonatal visits. In 2018, two variables were significantly related to complete basic immunization coverage for infants, namely the percentage of poor population and percentage of first neonatal visits. In 2019, three variables were significantly related to complete basic immunization coverage for infants, namely the percentage of active *Posyandu* and the percentage of first neonatal visits (Table 2).

**Correlation between the Less of Midwives in Primary Health Care and Complete Basic Immunization**

The percentage of primary health care that had less midwives was significantly related to complete basic immunization coverage in 2017 with the value of r = -0.337. However, in 2018 and 2019, there was no significant correlation between the less of midwives in primary health care and complete basic immunization (Table 2).
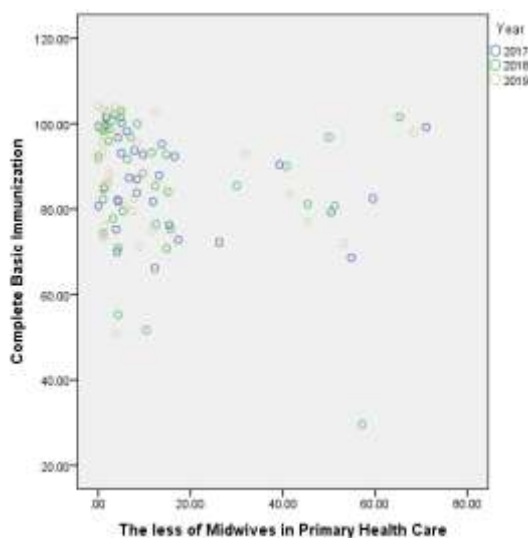


**Figure 1.** Scatter Plot of the Less of Midwives in Primary Health Care and Complete Basic Immunization in Province of Indonesia 2017-2019.

According to the scatter plot, figure 1 shows that that the plots spread on the left and top, this means that there was an inverse relationship between the less of midwives in primary health care and complete basic immunization coverage.

A previous study showed that the management of the immunization program by the village midwives was one of the variables that had a direct influence on the efficacy of the immunization program (Aliansy and Hafizurrachman, 2016). Immunization services were the most widely provided health services by health workers compared to other health services (Martiana *et al.*, 2019).

The existence of primary health care that did not have a sufficient number of midwives was caused by the uneven distribution of midwives. Therefore, there was an excess of midwives in most of the primary health care. Most of the primary health care in one province in Indonesia were sub-health centers so they did not pay much attention to the adequacy of midwives (Ministry of Health in Indonesia, 2020). However, there was a decrease in the r score of the adequacy of midwives in 2018 and 2019 compared to 2017 (Table 2), which means that there had been an effort to distribute midwives in health centers in Indonesia after 2017.

**Correlation between Poor Population and Complete Basic Immunization**

Results show that the percentage of the poor population was correlated to complete basic immunization in 2017 and 2018 with r = -0.362 and r = -0.535. However, there was no significant correlation between the percentage of the poor population and complete basic immunization coverage in 2019 (Table 2).

The scatter plot results show that the plots spread on the left and top side, this means that the higher the percentage of the less of midwives in primary health care, the lower complete basic immunization coverage in the province of Indonesia (Figure 2). This is in line with previous research which stated that the higher a person's income level, the higher the chance for complete basic immunization (Debie *et al.*, 2020; Fenta *et al.*, 2021).
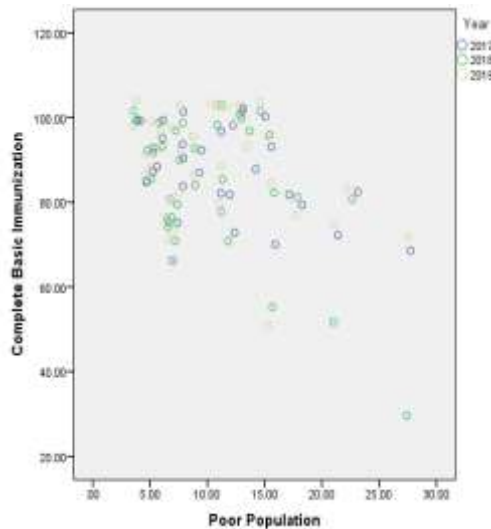
**Figure 2.** Scatter Plot of the Poor Population and Complete Basic Immunization in Province of Indonesia 2017-2019.

Immunization coverage gaps due to income-based inequality were widened by maternal education and place of residence (Sharma *et al.*, 2021). Incomplete basic immunizations were lower in children from wealthier households, compared to those from poorer households (Noh *et al.*, 2018; Ndwandwe *et al.*, 2021). In addition, low-income households were more likely to participate in *Posyandu* than high-income households (Nazri *et al.*, 2016).

**Correlation between Active *Posyandu* and Complete Basic Immunization**
In 2017 and 2018, there was no significant relationship between active *Posyandu* and basic immunization coverage for infants in Indonesia. However, in 2019, there was a significant relationship between active *Posyandu* and basic immunization coverage for infants in Indonesia with the score of r = 0.444.

The scatter plot results show that the plots spread on the right side more, this means that the higher the percentage of the active *Posyandu* in the province, the higher the complete basic immunization coverage for infants in Indonesia (Figure 3). A previous study stated that the achievement of complete neonatal visits in *Posyandu* with an active role for health cadres was greater than the achievement of neonatal visits in *Posyandu* with a less active role for health cadres (Setyatama, 2019). This happened because health services at *Posyandu* were

highly dependent on *Posyandu* cadres, the presence of *Posyandu* cadres was needed as a system to provide basic health services.
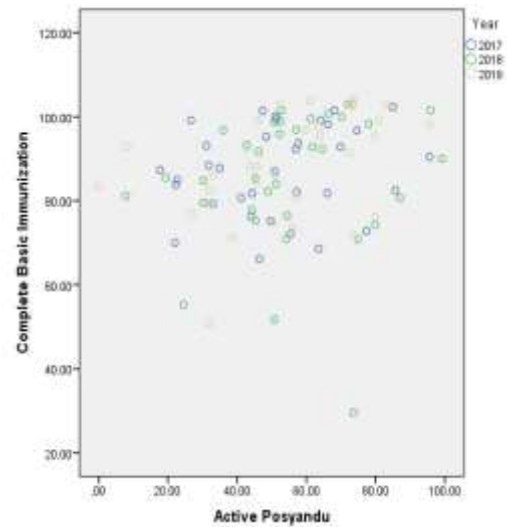


**Figure 3.** Scatter Plot of the Active *Posyandu* and Complete Basic Immunization in Province of Indonesia 2017-2019.

*Posyandu* is one of the places to monitor complete basic immunization. Meanwhile, active *Posyandu* is important to achieve complete basic immunization and neonatal visit. The main reason for mothers to attend *Posyandu* is to know the progress and to monitor the nutritional status of children under five years old (Nazri *et al.*, 2016) because the second step in the five-table or five-step system in *Posyandu* is the monitoring step of the child's nutritional status. Complete basic immunization at *Posyandu* also depends on maternal's education and knowledge (Suhaid and Faranita, 2018; Zida-Compaore *et al.*, 2019). Maternal participation to come to the *Posyandu* also depends on the services of health workers (Astuti and Fitri, 2017). Therefore, the existence of a training intervention for the health workers in primary health care will improve the performance of health workers in the immunization program (Nicol, Turawa and Bonsu, 2019).

**Correlation between First Neonatal Visit and Complete Basic Immunization**
The proportion of first neonatal visits was correlated to complete basic immunization coverage in 2017-2019. In

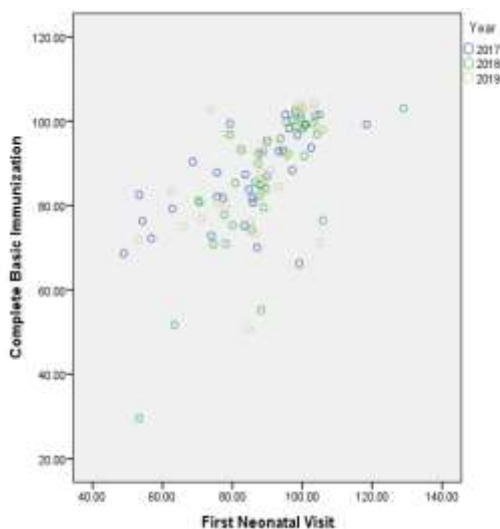addition, the r value shows a strong and positive value (Table 2).



**Figure 4.** Scatter Plot of the First Neonatal Visit and Complete Basic Immunization in Province of Indonesia 2017-2019.

According to figure 4, the scatter plot shows that the plot spread on the right and to the top side, this means that the higher the percentage of first neonatal visits, the higher the complete basic immunization coverage in the province. This is supported by a previous study that stated there was a causal relationship between neonatal visits and complete basic immunizations (Astuti and Fitri, 2017). This happened because neonatal visits on 0-7 days provide health services to infants, especially the provision of HB0 immunization which is one of the indicators of complete basic immunization in Indonesia. A previous study showed that 55% of respondents were not given the Hb0 immunization (Sidabutar, Friani and Pasaribu, 2021). In addition, neonatal visits can increase neonatal access to basic health services, one of which is the provision of HB0 immunization (Ginting, Melva and Ningsih, 2017).

Adequacy of midwives in primary health care can help to improve the quality of health services by continuously monitoring maternal and child health. A previous study has mentioned that mothers who did not get re-monitoring after childbirth from health workers caused to be not indifferent to carrying out neonatal visits, moreover

immunization (Rahmawati, Husodo and Shaluhiyah, 2019).

## CONCLUSION

The adequacy of midwives was a factor correlated to the complete basic immunization in 2017. The poverty factor was correlated to the complete basic immunization in 2017 and 2018. While active *posyandu* was a factor correlated to the complete basic immunization in 2019. Posyandu is an important factor in the implementation of the first neonatal visit and complete basic immunization. The percentage of first neonatal visit coverage has been the most important factor correlated to the complete basic immunization coverage for three consecutive years (2017-2019) in Indonesia. The coverage of the first neonatal visit is important for infant immunization coverage as one of the first neonatal visit services is HB0 immunization. Therefore, it is necessary to increase the distribution of midwives in primary health care in Indonesia hence neonatal visits can be carried out intensively by health officers/cadres to encourage mothers to participate in implementation of complete basic immunization for infants in Indonesia. In addition, provinces with high poverty rates should be given more attention to receive intervention programs for increasing infant immunization coverage in Indonesia.

## ACKNOWLEDGEMENT

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