

THE CORRELATION BETWEEN LOW BIRTHWEIGHT (LBW) WITH INFANT MORTALITY RATES (IMR) AND ANTENATAL CARE (ANC) IN EAST JAVA 2018

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ABSTRACT

Nearly 15 % of babies worldwide are born with LBW. The proportion of LBW in East Java was 6.61% higher compared to nationwide 6.2% in 2018. The East Java ranked third for the highest IMR in Indonesia, LBW as the most significant cause (42%). One of determinants for birthweight is ANC. The proportion of the first ANC was 88.25%, and the complete ANC was 80.2% in East Java in 2018. The proportion of the province's complete ANC was lower than the national by 95.2%. This research is a secondary quantitative data analytic, sourced from the Health Profiles of East Java Province in 2018. This study aims to describe the strong correlation between LBW and IMR and ANC in the province of East Java using Pearson correlation analytic. The results showed that there was a correlation with influential and unidirectional forces between LBW and IMR. There was a correlation of moderate strength between the complete ANC visit and LBW. There wasn't significant correlation between the first ANC and LBW. The government in East Java must make solution to increase complete ANC visit by searching the causes factors of low proportion of it.

Keywords: infant mortality rate, low birthweight, antenatal care, East Java, 2018

ABSTRAK

Hampir 15% bayi di seluruh dunia lahir dengan berat badan lahir rendah (BBLR). Proporsi BBLR di Provinsi Jawa Timur sebesar 6,61% lebih tinggi dari nasional yaitu 6,2% pada tahun 2018. Pada tahun 2018, Provinsi Jawa Timur menempati posisi ketiga dengan angka kematian bayi (AKB) tertinggi di Indonesia, penyebab terbesar akibat BBLR (42%). Salah satu determinan berat badan lahir adalah antenatal care (ANC). Proporsi ANC pertama 88,25% dan ANC lengkap 80,2% di Provinsi Jawa Timur pada tahun 2018. Proporsi ANC lengkap provinsi tersebut lebih rendah dari pada nasional yaitu 95,2%. Jenis penelitian ini merupakan analisis data sekunder kuantitatif yang bersumber dari Profil Kesehatan Provinsi Jawa Timur tahun 2018. Penelitian ini ditujukan untuk mendeskripsikan kuat hubungan antara BBLR dengan AKB dan kunjungan ANC di Provinsi Jawa Timur menggunakan analisis korelasi pearson. Hasil penelitian menunjukkan terdapat hubungan yang kuat dan searah antara BBLR dengan AKB. Terdapat hubungan yang sedang antara kunjungan ANC lengkap dengan BBLR. Tidak ada hubungan signifikan antara kunjungan ANC pertama dengan BBLR. Pemerintah Provinsi Jawa Timur harus membuat solusi menaikkan cakupan ANC lengkap dengan mencari penyebab rendahnya angka cakupan tersebut.

Kata kunci: angka kematian bayi, berat badan lahir rendah, antenatal care, Jawa Timur, 2018

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INTRODUCTION

LBW is a weight at birth of regardless of gestational less than 2500 gram (<5.5 lbs). LBW newborns have a higher risk of dying in the first 28 days of life. The prevalence of LBW varied widely across regions from 7.2% in More Developed Regions to 17.3% in Asia. In Southern Asia, the prevalence of low birthweight was 26.4

percent in 2015, it's more than five times higher than the 5.1% prevalence in Eastern Asia. These two sub-regions of Asia had respectively the highest and lowest LBW prevalences of all sub-regions in the world (UNICEF and WHO, 2019).

There isn't much difference in Indonesia, especially in East Java Province. Based on the Indonesia Basic Health Research in 2018, the

proportion of national LBW was 6.2%. While the proportion of LBW of East Java was 6.61% (Indonesian Ministry of Health, 2018). In 2018, East Java's IMR reached 7 deaths per 1,000 births (East Java Provincial Health Office, 2019).

LBW affects adversely on health outcomes through out infancy. Compared with other infants, LBW infants especially those born weighing less than 1.50 kg have substantively higher mortality rates (O'Leary, 2017). Babies born with LBW have a higher risk of stunting, lower IQ and death in childhood. It also increasing the risk of adult onset chronic conditions such as obesity and diabetes (UNICEF and WHO, 2019). Morbidities were higher in LBW neonates compared to normal birth weight neonates. Difference was more significant in incidence of sepsis, Respiratory Distress Syndrome (RDS), Transient Tachypnea (TTN), hypoglycemia, feed intolerance and risk of major congenital malformation (Rasania, et al., 2018).

Based on the 2015 Sustainable Development Goals (SDGs), UNICEF has set one target to put an end to infant mortality worldwide by 2030, reducing neonatal deaths to a maximum of 12 deaths per 1,000 births (UNICEF, 2019). Reviewing from the East Java IMR in 2018, which is 7 deaths per 1,000 births, overall, the provincial IMR has met the SDGs target. However, not all districts and cities in East Java have met the target.

Determinant factors that affect LBW are heredity, demographic and psychosocial, obstetric, nutritional, morbidity, toxicant exposure and ANC. Hereditary factors include race, height, weight, comorbidities, and others in both parents, especially conditions before pregnancy. Demographic and psychosocial factors include the economic conditions and mental health of pregnant women. Obstetric factors are factors that affect the condition of maternity, such as parity, the distance of pregnancies between children, sexual activity, mother's age at the birth of the first child, abortion record, miscarriage record, or delivery failure record, infertility record. Nutritional factors include nutritional intake, weight gain, and physical activity of pregnant women. Morbidity factors are diseases that occur during pregnancies, such as malaria and genital infections. Toxicant exposure factors are smoking, consuming alcohol, drugs, coffee or caffeine, smoking, and other things that cause dependence. The last factor is ANC includes the

number of ANC visits and the quality of services received (Suriani, 2010).

ANC is health service for pregnant women from health professional worker. One of the benefits of ANC is to find various complications or disorders of pregnancy as early as possible so that they can be treated immediately with appropriate and detailed treatment in the maternal assistance delivery. Mother and fetus inside the womb is a unit that affects each other. It is vital to maintain health, especially for pregnant women. Mothers with optimal health will impact the health, growth, and development of the fetus (Aisyah, Rusmariana and Mujati, 2015). The ANC program policy specifies the number of visits at least four times during pregnancy. ANC visits are carried out once during the first trimester (K1), once during the second trimester (K2), and twice during the third trimester (K3 and K4) (Rachmawati, Puspitasari, and Cania, 2017).

Achievements in K1 and K4 illustrate the quality of health services for pregnant women. The proportion of ANC K1 in East Java was 88.25%, and ANC K4 was 80.2% in 2018 (Indonesian Ministry of Health, 2019). The proportion of K4 ANC in East Java is lower than the national K4 ANC proportion of 95.2% (East Java Provincial Health Office, 2019).

In relevance with this background, this study will analyze the correlation between LBW and IMR and the percentage of people who had ANC visits in East Java in 2018.

METHODS

This research is a quantitative secondary data analysis sourced from the East Java Health Profile in 2018. The scale of the ratio data is 38 districts and cities in the province. This study aimed to describe the strong correlation between LBW and IMR and ANC visits in the province. ANC visits consist of the first ANC visits (K1) and the complete ANC visits (K4).

Researchers directed a descriptive analyzed of LBW and analyzed the distribution of incidents for each variable to provide a broader explanation, before Pearson correlation analysis was conducted. The LBW percentage will be classified as not a public health problem and public health problem. The category is not a public health problem if LBW percentage $<5\%$, and the public health problem if LBW percentage $>5\%$. IMR > 12 is categorized as high and <12 is relatively low. ANC K1 and K4 achievements are categorized as high if $\geq 100\%$ and low if $<100\%$.

Pearson correlation analytic was done with the SPSS program. Pearson correlation aims to determine the strong correlation and direction of the correlation between variables. The requirement to use the Pearson test is the availability of typically distributed data and ratio scale. One of the assumptions of normality is the Kolmogorov Smirnov analytic.

The value of r / pearson's degree has function to decide the power of correlation between two variables. The + or - sign only indicates the direction of the correlation. The + sign means unidirectional and - sign isn't unidirectional or opposite. The interpretation of the value of r can be in the table below.

Table 1. Interpretation of Pearson's Correlation Degrees

| Value of r | Interpretation of Correlation Degrees |
|------------|---------------------------------------|
| 0.00-0.25 | none/weak |
| 0.26-0.50 | medium |
| 0.51-0.75 | strong |
| 0.76-1.00 | very strong/perfect |

(Wijayanto, 2008).

RESULT

Distribution of LBW, IMR and ANC

The figure 1 showed that the percentage of LBW in East Java was 3.7%. There were three

areas had the lowest percentage of LBW, they were Sidoarjo (district) (0.82%), Surabaya (city) (1.96%), and Bangkalan (district) (2.43%). Three districts wicth had the highest percentage of LBW were Situbondo (7.68%), Bondowoso (7.46%), and Madiun (6.29%).

The figure 2 showed that there were three areas wicth had the highest IMR. They were Bondowoso (district) had 17 deaths per 1,000 births, Probolinggo (district) and Blitar (city) each had 14 deaths per 1,000 births. The lowest IMR found in Sumenep (district), which was 0 death per 1,000 births. Followed by Pasuruan (district) had 1 death per 1,000 births also Sampang (district) had 1 death per 1,000 births.

The figure 3 showed that ANC K1 coverage in East Java has reached the target >100%, which was 100.1%. There were several areas in East Java which has relatively low coverage. Blitar (city and district), Pacitan (district) had the lowest K1 ANC coverage. Figure 4 showed that the K4 ANC achievement in East Java was 98.3%, so it has not yet reached the provincial target. The three districts and cities that had the lowest K4 ANC coverage were Blitar (city), Pacitan (district), and Nganjuk (district).

The frequency distribution on Table 2 showed that districts or cities with LBW that cause public health problems found in 9 districts and cities or occur in 23.7% of districts and cities.

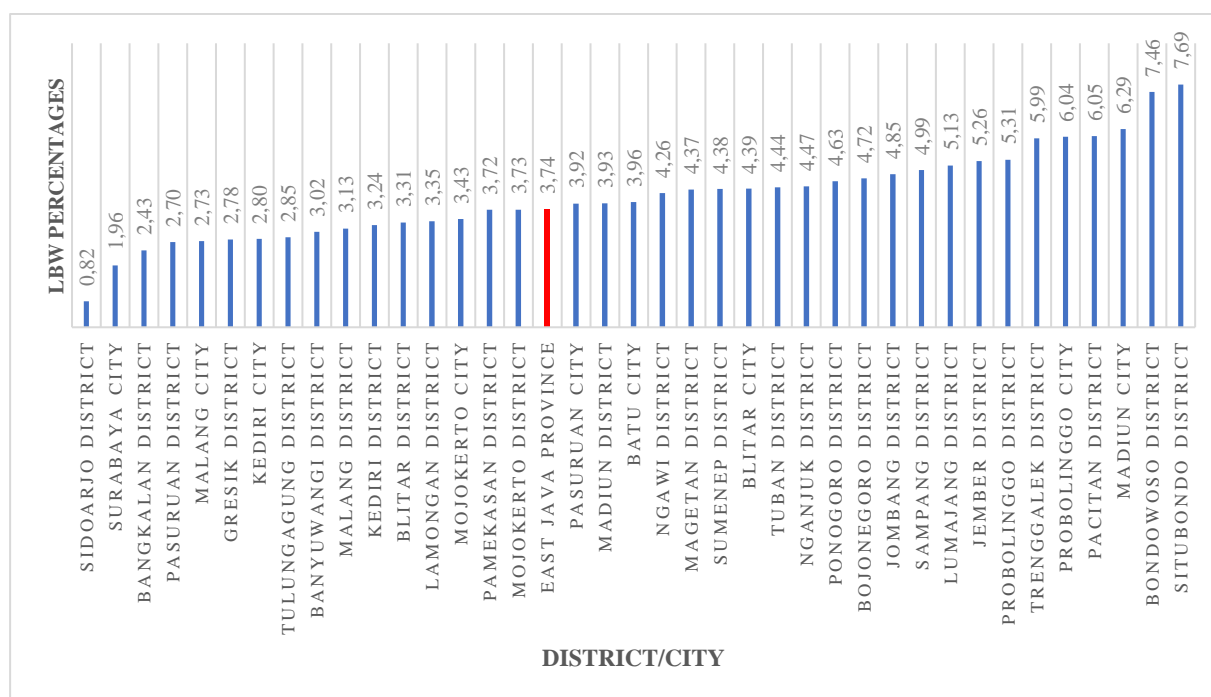


Figure 1. Distribution of LBW Percentages in East Java in 2018

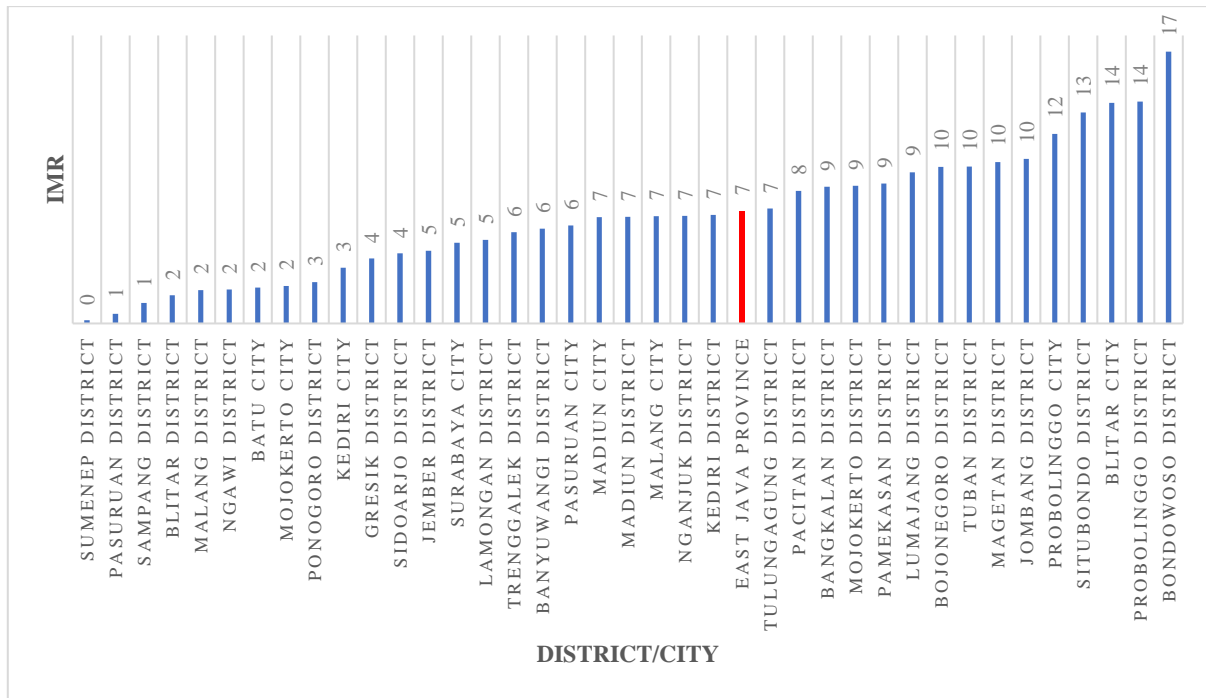


Figure 2. Distribution of IMR in East Java in 2018

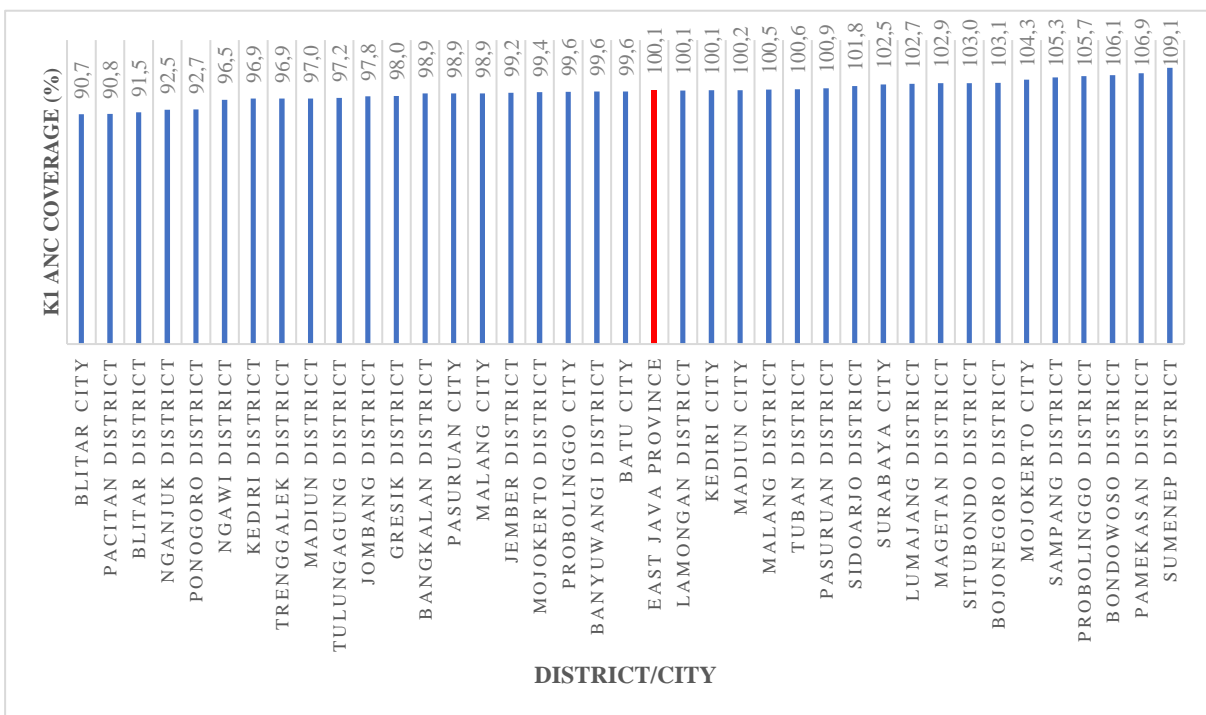


Figure 3. Distribution of K1 ANC Coverage in East Java in 2018

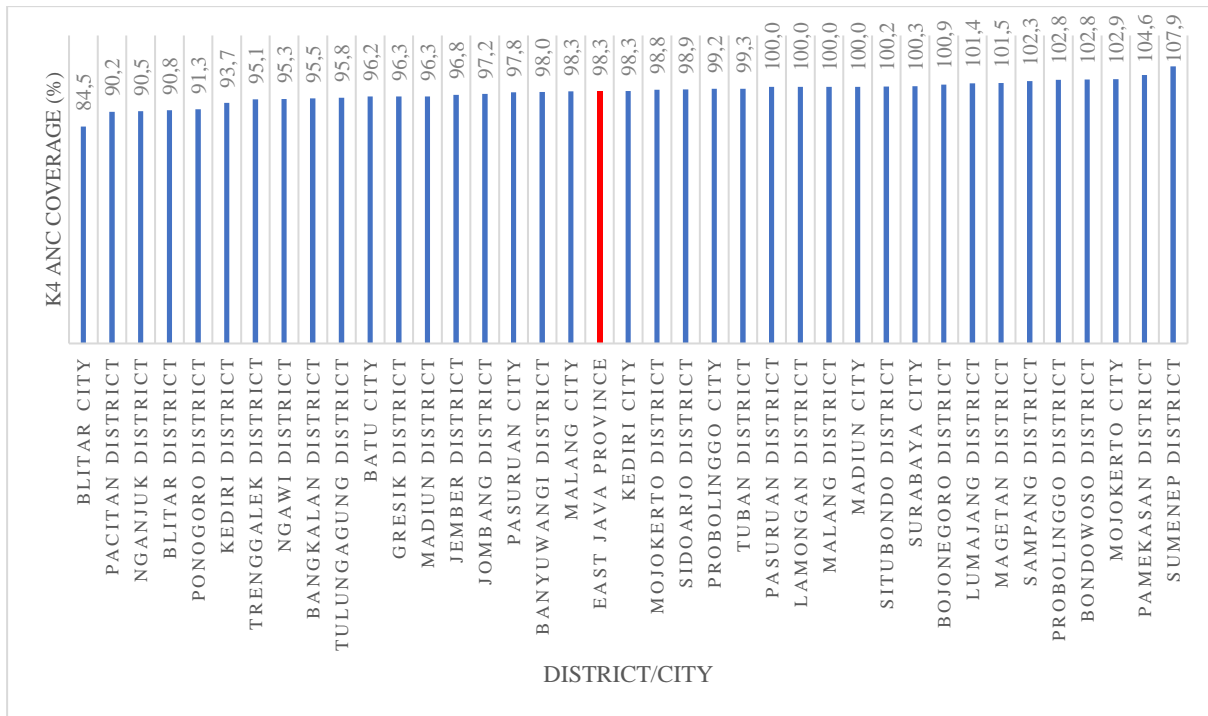


Figure 4. Distribution of K4 ANC Coverage in East Java Province in 2018

Table 2. Frequency Distribution

| Variable | f | % |
|---------------------------------------|----|-------|
| LBW | | |
| Public health problem ($\geq 5\%$) | 9 | 23.7% |
| Not public health problem ($< 5\%$) | 29 | 76.3% |
| IMR | | |
| Height ≥ 12 | 5 | 13.2% |
| Low < 12 | 33 | 86.8% |
| ANC K1 Coverage | | |
| Low $< 100\%$ | 20 | 52.6% |
| Height $\geq 100\%$ | 18 | 47.4% |
| ANC K4 Coverage | | |
| Low $< 100\%$ | 23 | 60.5% |
| Height $\geq 100\%$ | 15 | 39.5% |

in the province. The LBW did not cause public health problems were 76.3%. IMR was relatively high in 5 districts and cities, it was 13.2%. The percentage of IMR < 12 , so that IMR was classified as low occurred in 86.8% of districts and cities. The still low coverage of K1 ANC occurred in 52.6% or 20 districts and cities.

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public health problems were 76.3%. IMR was relatively high in 5 districts and cities, it was 13.2%. The percentage of IMR < 12 , so that IMR was classified as low occurred in 86.8% of districts and cities. The still low coverage of K1 ANC occurred in 52.6% or 20 districts and cities.

The coverage of K1 ANC that met the provincial minimum service standards (SPM) target was 47.4%. The low coverage of K4 ANC still occur in 60.5% or 23 districts and cities. K4 ANC coverage was classified as

fulfilling the provincial minimum service standards (39.5%).

Correlation Analytic Results

The Kolmogorov Smirnov test was performed to see the normal distribution of data, before the Pearson correlation analytic. If the value of $p > 0.05$, then the data is usually distributed. Based on the Kolmogorov Smirnov test, the results show that all variables are generally distributed to find the assumptions. Pearson correlation analytic performed to determine the strength and direction of the correlation between the studied variables, as follows:

Table 3. Pearson Correlation Analysis Results

| | LBW | |
|-----|-------|-------------------------|
| | P | Pearson Correlation (r) |
| IMR | 0.01 | 0.520 |
| K1 | 0.188 | 0.188 |
| K4 | 0.032 | -0.349 |

Based on the results of the analytic of the correlation between LBW and IMR obtained p-value (0.01) < 0.05 , then there is a correlation between LBW and IMR. The calculated r-value (0.520) for the two variables show a direct and robust correlation. Thus, the higher LBW incidence, the higher IMR. The analytic of the correlation between LBW with K1 ANC coverage shows the value of p (0.188) > 0.05 , which means the results are not significant, then there is not correlation between them. The analysis of the correlation between LBW and K4 ANC coverage displays a p-value (0.032) < 0.05 , the results are significant. The calculated r-value (-0.349) shows moderate strong correlation with the opposite direction between LBW and K4 ANC.

DISCUSSION

Overview of LBW

LBW in East Java Province, in 2018 occurred in 9 districts and cities or 23.6%. Situbondo, Bondowoso, and Madiun are the three districts with the highest percentage of LBW. Reviewing the Health Profile of Situbondo (district), Bondowosa (district), and Madiun (city) in 2014 and 2015, LBW occurrence in the three districts and cities were

mostly caused by morbidity in pregnant women including Chronic Energy Deficiency (CED), anemia, multiple pregnancies, and preeclampsia/eclampsia. The results of the study in Situbondo (district) obtained a significant relationship between maternal age during pregnancy and LBW occurrence (Susilo, 2017).

Based on research at the Bungatan Community Health Center, Situbondo, most respondents were mothers with a parity ≤ 3 , pregnant women not working, aged 20–35 years, had low levels of education, became pregnant with anemia, became pregnant with CED, became pregnant with a low weight condition and not pregnant with preeclampsia. LBW are affected by parity factors more than three times (Ekowati, 2019). There was correlation between LBW and hypothermia in infants in Abdoer Rahem Situbondo Hospital (Hikmah, 2016).

Overview of IMR

United States Agency of International Development (USAID) records that the IMR of East Java occupies the third-highest position in Indonesia. There are five districts and cities or 13.2% with a relatively high IMR. Three regencies or cities with the highest IMR level are Bondowoso (district), Probolinggo (district), and Blitar (city). IMR in Bondowoso caused by many factors, such as the access to health services that have not been reached by people due to geographic areas. The government was follow-up plans include reactivating the standby village, proposing a shelter (home for births), assisting pregnant women, and increasing cross-sector cooperation (Bondowoso District Health Office, 2019).

The direct causes of infant mortality at Probolinggo district were LBW, Congenital Abnormalities, Asphyxia, Pneumonias, and other causes (Probolinggo District Health Office, 2017). The causes of IMR in Blitar city among them are due to congenital abnormalities of the baby from birth with LBW and asphyxia. There are also factors from a high risk age of pregnant women, it less than 20 years old or more than 35 years old (Blitar City Communication Informatics and Statistical Office, 2016).

The results show that LBW is not the highest reason for IMR occurrence in all

districts and cities. Each district and city has the highest case for a different IMR. Nevertheless, overall in East Java, LBW is the most significant cause of IMR. The United States Agency for International Development (USAID) found that the biggest causes of infant mortality in East Java are LBW (42%), asphyxia (25%), and congenital abnormalities (16%).

Overview of ANC Coverage

The first ANC coverage was 52.6% and the complete one was 60.5% in East Java Province. They were classified as low or didn't achieve the target of local government. These results illustrate the low quality of ANC services in East Java, especially in Blitar (city), which has the lowest first and completes ANC coverage in East Java in 2018 (Natalia, Sumarmi, and Nadhiroh, 2016). The low coverage of ANC in Blitar (city) is caused by the implementation of the Maternal and Child Health (MCH) service policy that has not been well organized, especially in monitoring and evaluating cross-sectoral cooperation that has not been carried out continuously. Moreover, efforts to improve laboratory services are still low. This is related to aspects of culture and organizational systems (Mikrajab and Rachmawati, 2016).

Age, leadership, attitude, and motivation affect the performance of health workers in ANC services. Health workers aged >37 , have good leadership, positive, and have the right motivation to make better performance than health workers in general (Christiana, Sofowan and Fitriani, 2016).

The relationship of LBW with IMR

LBW percentage was 3.7%, and IMR reached 7 per 1,000 births in 2018 (East Java Provincial Health Office, 2019). Pearson correlation test results in table 3, obtained the existence of an unidirectional and robust correlation between the percentage of LBW and IMR.

LBW infants are 0.229 times more likely to be deceased than infants born with normal weight (Roifah, 2014). The correlation between LBW and miscarriages is influenced by the mother's education, family economic condition, pregnancy complications, and the frequency of ANC services. The level of maternal education indirectly causes early neonatal death. The level of maternal education will indirectly affect the

mother's knowledge about health during pregnancy, such as knowledge about food intake problems. Signs of complications and the importance of inspection services. These factors will increase LBW occurrence, if an LBW baby's condition isn't managed with standards, it will increase the incidence of early neonatal death (Noviani, 2011).

Relationship of ANC Visit with LBW

The first ANC coverage has reached 100.1%. While complete ANC coverage reaches 98.3%, only the first ANC coverage has reached the provincial SPM target of 100%, but the complete ANC coverage has not yet reached the target. Based on table 3 the results are obtained, namely: (1) there wasn't correlation between the first ANC with LBW, (2) there was correlation with medium strength that is the opposite of complete ANC with LBW, which means that the higher the achievement of complete ANC, the lower the percentage of LBW.

The results of statistical analytic showed that the benefits of the first ANC visits don't directly give significant results to reduce LBW. The new ANC visit program can provide significant results after being conducted at least four times following the antenatal care policy.

The frequency of ANC visits affects infant birthweight. Mothers who visited ANC four times or more during pregnancy, had the opportunity not to give birth to LBW babies. It was 1.8 times compared to pregnant women who visited ANC less than four times (Ernawati and Kartono, 2014).

Other studies have shown that inadequate ANC, poor weight gain of pregnant women, maternal gestational age at delivery are significant independent determinants of LBW. Based on research in Laos, only about one-third of mothers with LBW infants (cases) have completed ANC (≥ 4 times), while about half of mothers with normal weight babies (controls) have completed ANC (Oulay et al, 2018).

ANC services must meet the minimum visit requirements of 4 times and have an adequate quality that includes diagnosis, general or special physical examination, and proper laboratory examinations. Based on the results, the scope and services of ANC visits in East Java Province have been quite useful in reducing LBW in 2018. However, efforts to

increase the scope of ANC visits still need to be done.

CONCLUSIONS AND SUGGESTIONS

Conclusion

The percentage of LBW was 3.7%, there were 9 out of 38 districts and cities with LBW occurrence as a health problem in East Java Province in 2018. Three regencies and cities with the highest percentage of LBW were Situbondo, Bondowoso, and Madiun.

The provincial IMR of 7 deaths per 1,000 births, the highest IMR was in Bondowoso, Probolinggo (districts) and Blitar (city). The first ANC coverage reached 100.1%. Complete ANC coverage only reached 98.3%.

There is a correlation with a strong and unidirectional force between LBW and IMR. Thus, the higher the LBW incidents, the higher the IMR in the province. There is not relationship between the first ANC visit with LBW. Meanwhile, there is a moderate correlation between ANC visit and LBW. Thus, the higher the complete ANC incidents, the lower the LBW incidents. This result showed that the benefits of the first ANC visit don't directly give significant results to reduce LBW. The new ANC visit program can provide significant results after it has been conducted at least four times following the policy of ANC.

Suggestion

Health workers with sufficient competence are needed to overcome health problems, including LBW problems in Indonesia. Health workers need to be given regular training related to LBW management, especially in districts or cities with the highest LBW percentage and tend to increase.

The government must make research to find the factors that influence low proportion of K4 ANC, by knowing that they can make solution and regulation to increase it. In addition, the use of technology can be maximized for recording and handling LBW problems. The East Java Provincial Health Office is expected to facilitate the handling of LBW so that it can reduce the IMR in East Java.

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