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Original Research

# Factors associated with the incidence of low birth weight (LBW) in pregnant women with HIV/AIDS

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## Abstract
The high number of HIV/AIDS cases in pregnant women has an impact on maternal and infant mortality. Based on data on new HIV/AIDS cases recorded in the HIV/AIDS Information System at Bhayangkara Indramayu Hospital, the number of pregnant women with HIV/AIDS in 2023 is 62 people and LBW is 31 babies. The purpose of this study is to find out the factors related to the incidence of LBW in pregnant women with HIV/AIDS at Bhayangkara Hospital. The research method uses quantitative research with a cross-sectional approach. The population is all maternity mothers with HIV/AIDS for the January-December 2023 period at Bhayangkara Hospital, with as many as 62 people. Sampling uses total sampling. Data collection uses secondary data by looking at HIV/AIDS reactive maternal medical records. Data analysis uses univariate and bivariate analysis with the Chi-Square test. The results showed that the factors related to the incidence of LBW in pregnant women with HIV/AIDS were the number of CD4 (p-value = 0.038), clinical stage (p-value = 0.029), haemoglobin level (p-value = 0.042), and comorbidities during pregnancy (p-value = 0.042). Pregnant women are advised to do voluntary HIV testing, make regular ANC visits to health facilities, conduct Voluntary Counseling and Testing, and consume antiretroviral drugs regularly and regularly to suppress the multiplication of the HIV in the body.

**Keywords:** HIV/AIDS; LBW; maternity

## 1. Introduction

Pregnancy is an important event in a woman's life and the family in general. The pregnancy expected by a woman is normal, healthy and does not cause difficulties for both the mother-to-be and the baby. Diseases experienced during pregnancy will have a bad impact on the mother and fetus. One of the maternal infections that can cause LBW is HIV/AIDS. In pregnant women infected with HIV, the immune system gradually weakens, making mothers more susceptible to infection. When an infection occurs, inflammatory cells accumulate in the placenta, disrupting nutrient absorption, disrupting fetal growth, and potentially causing babies to be born with low birth weight. (Indasyah, 2020).

Low birth weight babies (LBW) contribute to 60-80% of all neonatal deaths. The global prevalence of LBW is 15.5%, which amounts to about 20 million LBW born every year and 96.5% comes from developing countries. (WHO, 2023). LBW can have a negative impact on the health of babies, including stunting. Referring to the 2022 Indonesian Nutrition Status Survey (SSGI), the prevalence of LBW in Indonesia is 6.0%. In addition, based on estimates by WHO and UNICEF, the prevalence of prematurity in Indonesia is around 10% (Kementerian Kesehatan RI, 2023).

Data from the Ministry of Health shows that of the 590,430 pregnant women who underwent HIV testing, 1,360 of them were positive for HIV infection. The results of the Ministry of Health's mathematical modelling of the HIV epidemic in 2022 show that the prevalence of HIV in the population aged 15-49 years and the prevalence of HIV in pregnant women in Indonesia are increasing. The

causative factor is that the behavior of pregnant women in carrying out government programs related to early detection of HIV is still low, so efforts are needed to prevent HIV transmission from pregnant women to babies, namely with the Prevention of Mother to Child Transmission (PMTCT). FMD is a strategy to provide hope for children to be born HIV-free from infected mothers. With quality prevention, this figure can be reduced to around 2%-5% (WHO, 2023).

The development of HIV/AIDS in Indonesia tends to fluctuate. West Java is one of Indonesia's 4th highest rankings out of 34 provinces (Kementerian Kesehatan RI, 2022). Indramayu is one of the districts with a fairly high number of HIV/AIDS cases, ranking third highest in West Java after the city of Bandung in the first position and Bekasi Regency in the second position. Based on data from 1993 to 2022, a total of 28,000 pregnant women, as many as 17,000 of whom have undergone HIV testing. Thus, 11,000 pregnant women have not undergone HIV testing. Pregnant women with HIV in Indramayu Regency are still high; from January to October 2023, there were 80 pregnant women with HIV/AIDS. (Diskominfo Kabupaten Indramayu, 2023).

One of the HIV/AIDS referral hospitals in Indramayu Regency is Bhayangkara Hospital. This hospital is classified as a hospital with a high number of visitors to HIV/AIDS respondents. Based on the data on new HIV/AIDS cases recorded in the HIV and AIDS Information System (SIHA) at Bhayangkara Indramayu Hospital, the number of pregnant women with HIV/AIDS in 2023 is 62 people with the number of LBW as many as 31 babies with HIV/AIDS-positive mothers (Rekam Medis RS. Bhayangkara Indramayu, 2023).

HIV/AIDS is one of the infectious diseases that threatens Indonesia and many countries in the world. This is because there is no vaccine to prevent HIV/AIDS and the treatment has not yet been found. (WHO, 2023). The results of the study stated that mothers with HIV will be at greater risk of preterm labor, low birth weight babies and APGAR scores of <7 (Yang et al., 2019). Women infected with HIV have a higher risk of giving birth to babies with low birth weight or babies born prematurely compared to women who are not infected (Xiao et al., 2015). LBW has a 2.3 times higher risk of mortality from infection than babies with normal birth weight (Singh Meharban, 2017).

The Government's efforts in HIV/AIDS cases are to improve HIV prevention and screening programs to accelerate the reduction of morbidity and mortality. This is based on several considerations, including HIV/AIDS cases among women of productive age tend to increase so that they become a potential threat to public health in Indonesia. All pregnant women who have their pregnancy check-ups must take HIV diagnostic tests with tests and counseling, namely Voluntary Counseling And Testing (VCT). Therefore, the prevention of HIV transmission from mother to child is one of the efforts to overcome HIV and AIDS that is integrated with health services, increasing HIV testing services, providing Provider Initiative Testing and Counseling (PITC) for pregnant women with Sexually Transmitted Infections (STIs), and children born to HIV-positive mothers. (Permenkes Number 23, 2022).

HIV is an infection by a retrovirus that is still one of the global problems to this day. Perinatal transmission plays a role in around 50-80% of HIV transmission, both intrauterin, through the placenta, during childbirth through exposure to blood or secretions of the birth canal, and those that occur after birth through breast milk. In healthy babies whose mothers are infected with HIV, virology tests are carried out at 6 weeks of age and zidovudine therapy is immediately given as prophylaxis (Liansyah, 2018).

Complications experienced by mothers during pregnancy such as bleeding, pre-eclampsia, and severe abdominal pain are related to the incidence of LBW (Lestari et al., 2021). LBW is the main risk factor for neonatal death and the still high cases of HIV/ADS in pregnant women which have an impact on maternal and infant mortality need attention. Therefore, it is necessary to study this phenomenon through research. The purpose of this study is to find out factor related to the incidence of LBW in

Maternity Mothers with HIV/AIDS at Bhayangkara Hospital, Indramayu Regency.

## 2. Research Methods

The design of this study uses quantitative research with a cross-sectional approach. This research method was chosen to determine the relationship between independent variables such as maternal characteristics, CD4 count, hemoglobin levels, comorbidities in pregnancy and clinical stage with the bound variable, namely the incidence of LBW. This research has received ethical clearance: 92/KEPK/STIKesIM/O/I/2024. This study used a total sampling of 62 women who gave birth with HIV/AIDS in the January-December 2023 period at Bhayangkara Indramayu Hospital. This research was conducted at Bhayangkara Indramayu Hospital in January-February 2024. The data taken is secondary data by looking at the medical records of HIV/AIDS reactive mothers at Bhayangkara Indramayu Hospital for the period January–December 2023. The data collection tool uses an Excel form created by the researcher. The medical record data obtained was then distributed and analysed bivariately using Chi-Square.

## 3. Results and Discussion

### 3.1.Results

#### 3.1.1. Univariate Analysis

Univariate analysis was carried out to determine the frequency of each dependent and independent variable. Based on the results of data collection on 62 respondents, the following data were obtained:

**Table 1.** Frequency Distribution Based on Respondent Characteristics

| Variable | Frequency (f) | Percentage (%) |
|---|---|---|
| **Age** | | |
| < 20 years | 10 | 16.1 |
| 21 – 40 years old | 47 | 75.8 |
| > 40 years | 5 | 8.1 |
| **Total** | **62** | **100** |
| **Education** | | |
| High | 19 | 30.6 |
| Low | 43 | 69.4 |
| **Total** | **62** | **100** |
| **Work** | | |
| Work | 33 | 53.2 |
| Not Working | 29 | 46.8 |
| **Total** | **62** | **100** |
| **Marital Status** | | |
| Marry | 36 | 58.1 |
| Not Married | 26 | 41.9 |
| **Total** | **62** | **100** |
| **CD4 count** | | |
| Abnormal (<500 cells/mm3) | 51 | 82.3 |
| Normal (500 – 1500 cells/mm3) | 11 | 17.7 |
| **Total** | **62** | **100** |
| **Clinical Stage** | | |
| Early (stages 1-2) | 28 | 45.2 |
| Advanced (stages 3-4) | 34 | 54.8 |
| **Total** | **62** | **100** |

| Variable | Frequency (f) | Percentage (%) |
|---|---|---|
| **Haemoglobin Levels** | | |
| Anemia | 33 | 53.2 |
| Non-Anemia | 29 | 46.8 |
| **Total** | **62** | **100** |
| **Comorbidities in pregnancy** | | |
| Exist | 26 | 41.9 |
| None | 36 | 58.1 |
| **Total** | **62** | **100** |

Source: Primary Data, 2023

In the age variable of 62 respondents, 10 (16.1%) mothers gave birth at the age of < 20 years old, 47 people (75.8%) aged 20-40 years, and five people > 40 years old (8.1%). In the educational variable, 19 (30.6%) pregnant women were highly educated and 43 (69.4%) were poorly educated. In the occupational variable, 33 working mothers (53.2%) and 29 people (46.8%) did not work. In the marital status variable, 36 mothers gave birth with married status (58.1%) and unmarried status as many as 26 people (41.9%). In the variable of CD4 count, 51 mothers (82.3%) had abnormal CD4 counts and 11 (17.7%) had normal CD4 counts. In the clinical stage variable, mothers gave birth with an early stage (stage 1-2) as many as 28 people (45.2%) and an advanced stage (stage 3-4) as many as 34 people (54.8%). In the hemoglobin level variable, 33 (53.2%) anemic mothers and 29 (46.8%) non-anaemic mothers were present. In the variable of comorbidities in pregnancy, 26 (41.9%) mothers had comorbidities and 36 (58.1%) did not have comorbidities.

Age is one of the risk factors that is significantly related to the incidence of LBW; this is associated with its effect on fertility. Anaemia in pregnancy has an impact on the reduced flow of oxygen and nutrients from the mother to the fetus, which can interfere with the growth and development of the fetus in the womb. The occurrence of signs of complications during pregnancy is an indication of disturbances during pregnancy that negatively affect the mother and fetus. In the systematic review study, there are maternal risk factors that play a significant role in the occurrence of babies with LBW, including maternal age, parity, haemoglobin levels, and complications during pregnancy (Lestari et al., 2021).

### 3.1.2. Bivariate Analysis

Bivariate analysis is an analysis carried out to determine the relationship between variables independent with dependent, the extent to which the relationship is statistically significant (Notoadmodjo, 2015). Bivariate analysis in this study correlates CD4 count, clinical stage, haemoglobin levels and comorbidities in pregnancy with the incidence of LBW.

**Table. 2** Relationship Between CD4 Total, Clinical Stage, Hemoglobin Levels and Comorbidities with The Incidence of LBW in Mothers with HIV/AIDS

| Variable | LBW | | | | Sum | | P value |
|---|---|---|---|---|---|---|---|
| | Yes | | Not | | | | |
| | N | (%) | n | % | n | % | |
| **CD4 count** | | | | | | | |
| Abnormal (<500 cells/mm3) | 27 | 57,4 | 20 | 42,6 | 47 | 100 | 0,038 |
| Normal (500-1500 cells/mm3) | 4 | 26,7 | 11 | 73,3 | 15 | 100 | |
| **Clinical Stage** | | | | | | | |
| Early (stages 1-2) | 10 | 76,9 | 3 | 23,1 | 13 | 100 | 0,029 |
| Advanced (stages 3-4) | 21 | 42,9 | 28 | 57,1 | 49 | 100 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Hemoglobin Levels** | | | | | | | |
| Anemia | 12 | 37,5 | 20 | 62,5 | 32 | 100 | 0,042 |
| Non Anemia | 19 | 63,3 | 11 | 36,7 | 30 | 100 | |
| **Comorbidities in pregnancy** | | | | | | | |
| Exist | 12 | 37,5 | 20 | 62,5 | 32 | 100 | 0,042 |
| None | 19 | 63,3 | 11 | 36,7 | 30 | 100 | |

Source: Primary Data, 2023

## 3.2.Discussion

### 3.2.1. Relationship between CD4 Count and LBW Incidence

Based on the results of research from 47 respondents with abnormal CD4 counts, there were 57.4% experienced LBW, while from 15 respondents with normal CD4, 26.7% experienced LBW. The results of statistical tests using Chi-Square obtained a value of p= 0.038, smaller than the alpha value (0.05), so it can be concluded that there is a relationship between the number of CD4 and the incidence of LBW in pregnant women with HIV/AIDS at Bhayangkara Indramayu Hospital. The results of this study are in line with the results of research conducted by (Xiao et al., 2015) , showed that women with CD4 cell counts <350 had a high risk of LBW and premature birth. This is because the main function of CD4 cells is to fight infections caused by various harmful microorganisms (bacteria, viruses, parasites, fungi, and so on). In healthy people, the normal range of CD4 cell count is around 500-1500. If the number of CD4 cells is decreasing, this is a sign that the immune system is getting damaged (Spiritia, 2016).

The relationship between CD4 count in pregnant women with HIV/AIDS and the incidence of LBW is due to progressive immune deficiency characterized by thinning of CD4 T lymphocyte cells (CD4). This can affect the function of the placenta during pregnancy and limit fetal development. The HIV virus enters the body and attacks the immune system, especially CD4. With a decrease in CD4, the body is more susceptible to disease, even harmless diseases can become dangerous for the body because the body has lost its defense system to fight the cause of infection. To increase the number of CD4, pregnant women are recommended to take antiretroviral drugs regularly and regularly to suppress the multiplication of the HIV virus in the body. The less the amount of HIV virus in the body, the less CD4 will be damaged, so the number in the body will increase (Liansyah, 2018). Mothers with low CD4 cell counts are more at risk of transmitting HIV to their babies. The lower the number of CD4 cells, the greater the risk of HIV transmission.

### 3.2.2. Relationship of Clinical Stadium with LBW Incidence

WHO has set four clinical stages in patients infected with HIV/AIDS, namely stage 1 (asymptomatic), namely no weight loss and no symptoms or only enlarged lymph nodes. Stage 2 (mild pain) such as weight loss of 5-10%, recurrent ispa, shingles in the last 5 years, sores around the lips, itchy skin rashes, and fungal infections. Stage 3 (moderate pain) is >10% weight loss, diarrhea, fever of unknown cause for more than one month, oral or vaginal candidiasis. Pulmonary TB in the last 1 year, severe bacterial infections, lymphanopathic TB, gingivitis, anemia. Stage 4 (severe illness/AIDS) (WHO, 2023).

Based on the results of the study from 13 respondents with low clinical stage (stage 1 - 2), there were 76.9% who experienced LBW, while from 49 respondents with high clinical stage (stage 3 - 4) 42.9% experienced LBW. The results of statistical tests using Chi Square obtained a value of p= 0.029 smaller than the alpha value (0.05), so it can be concluded that there is a relationship between clinical stage and the incidence of LBW in pregnant women with HIV/AIDS at Bhayangkara Indramayu Hospital. The results of this study are in line with the research that has been carried out by (Fentie et

al., 2022) which states that advanced HIV disease is a factor that affects the occurrence of poor birth outcomes. In stages 3 and IV, there is a severe decrease in immunity and does not have enough CD4 cells, making it easier for opportunistic infections to occur (Spiritia, 2016).

People with HIV have more CD4 counts < 200. This happens because the HIV virus attacks the immune system, especially CD4. The lower CD4 levels in HIV patients will increase the risk and severity of opportunistic infections so that pregnant mothers with HIV with early or advanced stages are at risk of giving birth to LBW babies. Therefore, ARV therapy is given as soon as the patient tests positive for HIV regardless of the clinical stage or CD4 count (Prasetyo & Kurwiyah, 2021).

The HIV incubation period is a time lag when you are first infected with the HIV virus until the appearance of the first symptoms. The length of the pause varies for each person with HIV, depending on the body's immunity and the number of viruses that attack their body. Therefore, pregnant women who are at high risk of HIV infection are encouraged to visit counseling services and voluntarily undergo HIV testing to assess risk and monitor the presence or absence of HIV/AIDS symptoms so that treatment can be provided immediately if needed.

### 3.2.3. Relationship of Haemoglobin Levels with The Incidence of LBW

Based on the results of the study of 32 respondents with anemia, 37.5% experienced LBW, while from 30 respondents who did not suffer from anemia, 63.3% experienced LBW. The results of statistical tests using Chi-Square obtained a value of p= 0.042 less than the alpha value (0.05), so it can be concluded that there is a relationship between hemoglobin levels and the incidence of LBW in pregnant women with HIV/AIDS at Bhayangkara Indramayu Hospital. The results of this study are in accordance with the research (Devaguru et al., 2023) which states that anemia during pregnancy can be a predisposing factor for giving birth to LBW Similar research was also conducted by (Sholihah & Rakhma, 2023) that there is a relationship between anemia and KEK in pregnant women with the incidence of LBW. Also supported by research (Wahyuni et al., 2022) that there is a relationship between anemia and the incidence of LBW. However, it is not in line with research (Ulva et al., 2022) which shows that anemia is not related to LBW. Anemia in the last trimester of pregnancy has no effect on LBW. A systematic review of studies showed that there is not enough evidence that anemia can lead to poor birth outcomes such as LBW. Varied diets were at a lower risk of LBW incidence but were not significantly related. Therefore, it is necessary to make efforts to improve the nutrition of pregnant women through a diverse and balanced diet.

The increasing need for nutrients needed for the formation of red blood cells is one of the groups that are more susceptible to anemia. Pregnant women are said to be anemic if the hemoglobin level is less than 11 g/dl (Manuaba, 2017). Anemia during pregnancy can occur because hemoglobin levels in the blood decrease due to increased plasma volume (Manuaba, 2017). During pregnancy, the mother experiences physiological changes that cause an imbalance in the volume of plasma and red blood cells in the form of decreased hemoglobin levels (Harna et al., 2020). Insufficient Hb levels in red blood cells reduce the supply of oxygen to the uterus, prevent the formation of the placenta, and reduce the supply of nutrients to the fetus. This causes inadequate fetal weight gain. The peak of hemodilution occurs in the third trimester, when the development needs of the fetus increase and the fetus needs more nutrients through the placenta. An imbalance in the body characterized by a decrease in hemoglobin concentration disrupts the flow of oxygen in the uterus so that it can damage the organs in the womb, especially the placenta, and lead to impaired growth and development in the fetus (Sarwono, 2020).

HIV and HIV drugs themselves can interfere with the normal production of red blood cells in the bone marrow, causing anemia. Insufficient hormone secretion can lead to anemia. The amount of erythropoietin produced by the kidneys is not enough to stimulate normal red blood cell production.

Anemia in pregnancy can increase the risk of maternal death, premature birth, low birth weight, and perinatal death (Musdja, 2017).

Efforts are made to prevent anemia in pregnant women by providing education to increase maternal knowledge about the impact of anemia which is one of the risk factors for LBW. This can be done with village midwives to monitor pregnant women to take Fe tablets regularly. In addition to taking Fe tablets regularly, pregnant women should also increase their knowledge about the prevention and management of anemia by increasing iron intake from natural sources, especially from easily absorbed animal sources such as liver, meat, and fish. It is also important to increase the consumption of foods rich in vitamin C and vitamin A (fruits and vegetables) as well as implement a healthy lifestyle, exercise and eat foods with balanced nutrition.

### 3.2.4. Relationship of Comorbidities with The Incidence of LBW

Based on the results of research from 32 respondents who had comorbidities during pregnancy, 37.5% experienced LBW, while from 30 respondents who did not have comorbidities in pregnancy, 63.3% experienced LBW. The results of statistical tests using Chi-Square obtained a value of p= 0.042, smaller than the alpha value (0.05), so it can be concluded that there is a relationship between comorbidities during pregnancy and the incidence of LBW in pregnant women with HIV/AIDS at Bhayangkara Indramayu Hospital. A complication that occurs during pregnancy can increase the risk of LBW. This study is in accordance with the research that there is a relationship between disease history and nutritional status during pregnancy and LBW, also in line with the research (Helena et al., 2021) which states that there is a relationship between comorbidities and the incidence of LBW. Mothers who have pregnancy comorbidities are 10 times more likely to cause LBW than mothers who do not have pregnancy comorbidities (Triana, 2014). However, it is not in line with the research (Devaguru et al., 2023). which states that maternal infections, poor obstetric history, and the presence of systemic diseases have no significant impact on LBW.

Biologically, mothers who have complaints or diseases during pregnancy will experience metabolic disorders so that they can affect weight gain disorders during pregnancy that have an impact on the fetus. Mothers who suffer from various diseases during pregnancy such as infectious diseases, non-communicable diseases, and hypertension can harm the condition of the mother and fetus. This disease interferes with the physiological processes of fetal metabolism and gas exchange, which can lead to the risk of LBW. (Sarwono, 2020). Therefore, pregnant women who have comorbidities should do a minimum of four routine ANC checks during pregnancy. This is done to properly monitor the health of the mother and fetus and prevent the occurrence of LBW. For early identification of emergencies due to comorbidities during pregnancy, midwives conduct home visits for pregnant women who do not have regular ANC visits to health facilities to prevent complications during childbirth.

## 4. Conclusion

Babies with LBW have a poor long-term or short-term quality of life. One of the infectious diseases in mothers that can cause LBW in babies is HIV/AIDS. Based on the results of the study, the CD4 count in mothers with HIV/AIDS was related to the incidence of LBW (p=0.038), the clinical stage was related to the incidence of LBW (p=0.029), haemoglobin levels were related to the incidence of LBW (p=0.042), and comorbidities during pregnancy in mothers with HIV/AIDS were related to the incidence of LBW (p=0.042). The limitation of this study is that the researcher only conducted research on pregnant women with HIV/AIDS at Bhayangkara Indramayu Hospital, so further research is needed by adding variables and a wider sample of pregnancy and childbirth complications in mothers with HIV/AIDS. The researcher stated that there was no conflict of interest in the results of this study.

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