

AN ANALYSIS OF MATERNAL MORTALITY CAUSES IN INDONESIA

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ABSTRACT

Background: The maternal mortality rate is an indicator that reflects the health status of mother, especially the risk of death for the mother during pregnancy and childbirth. Maternal mortality in Indonesia is still dominated by the three main causes of death, such as hemorrhage, hypertension in pregnancy, and infection. This study was aimed to analyze the factors that influence maternal mortality in Indonesia.

Subjects and Method: This was an analytical study with a retrospective cohort study design conducted in 34 provinces in Indonesia, 2020. A sample of 4.627 study subjects was selected by total sampling. The dependent variable was maternal mortality. The independent variables were hemorrhage, hypertension in pregnancy, and infection. The data were collected by secondary data and analyzed using multiple linear regression.

Results: Maternal mortality was affected by hemorrhage ($b = 0.47$; 95% CI = -0.05 to 0.10 ; $p = 0.073$), but it was not significantly statistics. Hypertension in pregnancy ($b = 2.66$; 95% CI = 2.17 to 3.16 ; $p < 0.001$), and infection ($b = 3.55$; 95% CI = 1.73 to 5.37 ; $p < 0.001$), it was significantly statistics.

Conclusion: The number of maternal mortalities in 34 provinces was affected by hemorrhage, hypertension in pregnancy, and infection.

Keywords: hemorrhage, hypertension in pregnancy, infection, maternal mortality

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BACKGROUND

Health development is an investment in improving the quality of human resources (Khatri, 2017; Kia et al., 2021). In the 2005-2025 National Long-Term Development Plan, the Maternal Mortality Rate and the Infant Mortality Rate are indicators of the degree of health and the success of implementing Health development. The 2005-2025 National Long-Term Development Plan places the Mater-

nal Mortality Rate (MMR) and Infant Mortality Rate (IMR) as indicators of health status and the success of implementing health development. Furthermore, MMR and IMR have always been targets and targets for health development, reinforced in the 2022 Draft Government Work Plan (RKP), which places MMR and IMR in the 2022 national health system targets. This shows that maternal and child health problems are indicated by the

MMR indicator, and IMR are still a concern of the government (Ministry of Health, 2019).

MMR is one indicator of the success of maternal health efforts (Alkema et al., 2016; Cameron et al., 2019). AKI is the ratio of maternal deaths during pregnancy, childbirth, and the puerperium caused by pregnancy, childbirth, and the puerperium or their management but not due to other causes such as accidents or falls in every 100,000 live births. Maternal mortality is still one of the most important reproductive health problems (Horwood et al., 2020). Indonesia's Maternal Mortality Rate (MMR) is still very high compared to other ASEAN countries (Anindya et al., 2020).

During the COVID-19 pandemic, maternal and infant mortality rates have soared. Maternal mortality caused by various causes related to pregnancy is a public health problem and a social problem because it affects families, especially children (Jeong et al., 2020). The Ministry of Health (Kemenkes) noted that the number of maternal deaths in Indonesia was 4,627 people in 2020. This number increased by 8.92% from the previous year of 4,197 people. By province, as many as 745 mothers died in West Java. The proportion reaches 16.1% of the total maternal mortality in the country. The second highest maternal deaths were in East Java, which was 565 people. Central Java and Banten followed with 530 and 242 maternal deaths, respectively (Ministry of Health, 2020).

The maternal deaths in North Sumatra and Aceh were 187 and 173,

respectively. Then, there were 151 maternal deaths in East Nusa Tenggara in 2020. Maternal deaths in South Sulawesi were recorded at 133 people. Meanwhile, the number of maternal deaths in Riau and South Sumatra was 129 people and 128 people, respectively. Meanwhile, as many as 1,330 cases, or 28.39% of maternal deaths in Indonesia, were caused by bleeding. Maternal mortality due to hypertension in pregnancy was 1,110 cases or 23.86%. Based on this description, researchers are interested in analyzing the factors causing maternal death in Indonesia.

SUBJECTS AND METHOD

1. Study Design

This was a retrospective cohort study conducted in 34 provinces in Indonesia in 2020. Data collection in this study was obtained through the 2020 Indonesia Health Profile.

2. Population and Sample

The study population were all cases of death of pregnant women, childbirth, and childbirth. The study sample is 4,627 cases of maternal death in Indonesia.

3. Study Variables

The dependent variable is maternal death. Independent variables include bleeding, hypertension in pregnancy, and infection.

4. Operational Definition of Variables

Maternal death was the death of a mother while pregnant or within 42 days after the end of pregnancy, regardless of the place or age of the pregnancy.

Bleeding is all bleeding that occurs after the birth of the baby, before, du-

ring, and after the expulsion of the placenta. Bleeding that can cause maternal death includes bleeding due to abortion, disturbed ectopic bleeding, antepartum bleeding, and postpartum bleeding.

Gestational hypertension is a condition of systolic blood pressure of ≥ 140 mmHg or diastolic blood pressure > 90 mmHg.

Infection is tissue invasion by pathogenic microorganisms causing illness due to virulence and the number of pathogenic microorganisms that can occur during pregnancy, childbirth (inpartu), or the puerperium.

Table 1. Number of Maternal Mortality in 2020

No	Province	Number of maternal deaths
1	Aceh	173
2	Sumatera Utara	187
3	Sumatera Barat	125
4	Riau	129
5	Jambi	62
6	Sumatera Selatan	128
7	Bengkulu	32
8	Lampung	115
9	Kepulauan Bangka Belitung	26
10	Kepulauan Riau	38
11	DKI Jakarta	117
12	Jawa Barat	745
13	Jawa Tengah	530
14	DI Yogyakarta	40
15	Jawa Timur	565
16	Banten	242
17	Bali	56
18	Nusa Tenggara Barat	122
19	Nusa Tenggara Timur	151
20	Kalimantan Barat	115
21	Kalimantan Tengah	68
22	Kalimantan Selatan	97
23	Kalimantan Timur	92
24	Kalimantan Utara	18
25	Sulawesi Utara	48
26	Sulawesi Tengah	81
27	Sulawesi Selatan	133
28	Sulawesi Tenggara	61
29	Gorontalo	56
30	Sulawesi Barat	46
31	Maluku	70
32	Maluku Utara	39
33	Papua Barat	48
34	Papua	72

5. Study Instruments

Collecting data in this study using secondary data.

6. Data Analysis

Bivariate analysis in this study used the Pearson correlation test, while multivariate analysis used multiple linear regression.

RESULTS

Based on the data in Table 1, the highest cases of maternal death were in West Java Province (745 cases), then East Java (565 cases), and Central Java (530 cases).

Table 2. Results of Bivariate Analysis

Variable	r	p
hemorrhage	0.96	<0.001
hypertension in pregnancy	0.99	<0.001
infection	0.91	<0.001

Multivariate analysis in this study was used to examine whether or not there was an influence between the independent variables, namely bleeding,

hypertension in pregnancy, and infection, on the dependent variable, namely maternal mortality.

Table 3. Multivariate analysis of the effect of bleeding, hypertension in pregnancy, and infection on maternal mortality

Independent variables	b	95 % CI		p
		Lower Limit	Upper Limit	
hemorrhage	0.47	-0.05	0.10	0.073
hypertension in pregnancy	2.66	2.17	3.16	<0.001
infection	3.55	1.73	5.37	<0.001

N Observation = 4.627
p = <0.001
Adj R² = 0.99

Table 3 shows that bleeding (b= 0.47; 95% CI = -0.05 to 0.10; p = 0.073), hypertension in pregnancy (b= 2.66; 95% CI = 2.17 to 3.16; p<0.001), and infection (b= 3.55; 95% CI = 1.73 to 5.37; p <0.001) affects maternal mortality.

men, causing more severe complications, complications that are not correctly detected and inadequate treatment caused by birth attendants, or delays in getting immediate help. The causes of direct maternal death in Indonesia are dominated by postpartum hemorrhage, hypertension/eclampsia, and infection (Indarti et al., 2021).

DISCUSSION

Maternal death is caused by direct or indirect factors (Aden et al., 2019; Nair et al., 2017). The natural causal factors are complications that occur during pregnancy, childbirth, and postpartum. Indirect causal factors are deaths in pregnant women due to a previous disease or developing during pregnancy. Indirect causes of death include maternal nutritional status, infection, antenatal care, obstetric history, transportation, family social and economic status, education, and culture. These factors will affect the condition of pregnant wo-

Postpartum hemorrhage is the most common cause of maternal death. All women who are pregnant have a risk of postpartum hemorrhage. As much as 45% of postpartum hemorrhage, which causes maternal death occurs in the first 24 hours after the baby is born, 68-73% within one week after the baby is born, and 82-88% within two weeks after the baby is born. If postpartum hemorrhage is not treated quickly and precisely, shock and loss of consciousness can occur due to a large amount

of blood that comes out. This disrupts blood circulation throughout the body and can cause severe hypovolemia and maternal death (Pacagnella et al., 2013).

Hypertension in pregnancy is still the leading cause of maternal death in Indonesia and is a frequent complication of pregnancy, and is one of the deadly triads, along with bleeding and infection. Hypertension in pregnancy also determines the rate of perinatal mortality, complications to the fetus that often occur include; Low Birth Weight (LBW), asphyxia, fetal death, and premature birth. Hypertension in pregnancy is not like hypertension that occurs in general. If it is not handled correctly, it can develop into preeclampsia, increasing morbidity and mortality in the mother and fetus. Morbidity in the mother includes eclamptic seizures, brain hemorrhage, pulmonary edema, acute kidney failure, and blood clots in the blood vessels (Braunthal and Bra-teanu, 2019).

Infection is tissue invasion by pathogenic microorganisms to cause disease conditions due to virulence and the number of these pathogens. Infection can occur during pregnancy, labor (inpartu), or puerperium. Infection in pregnancy is an infection of the birth canal during both young and old pregnancies. This state of infection is dangerous because it can lead to sepsis, which may result in the mother's death. Puerperal infection is a bacterial infection originating from the reproductive tract during childbirth. The most significant cause of puerperal infection is birth attendants, who carry germs into the mo-

ther's womb by taking germs already in the vagina. Infection during the puerperium can cause maternal death due to the spread of germs into the bloodstream (septicemia), which can cause abscesses in organs, such as the brain and kidneys. Germs that cause infection can also enter the genital tract in various ways, for example, by birth attendants with unclean hands or using dirty instruments. In addition, an infection can also come from the air or the mother, who can move the organisms that cause infection from various places, especially the anus. Early detection of infection during pregnancy, safe delivery, and proper postpartum care can overcome infection problems (Schrey-Petersen et al., 2021; Saiman et al., 2020).

Efforts to accelerate the reduction of MMR are carried out by ensuring that every mother can access quality maternal health services, such as health services for pregnant women, delivery assistance by trained health workers at health service facilities, postpartum care for mothers and babies, special care and referrals if complications occur, and family planning services, including postpartum family planning.

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AUTHOR CONTRIBUTION

The authors confirm contribution to the paper as follows: PSA: study conception and design; SIP: analysis

and interpretation; J: Data collection; ZR: draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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None.

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