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Factors Related to Maternal Mortality in Sintang Regency 2019-2023

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Abstract. *Approximately 287,000 cases of maternal death occur during pregnancy, childbirth, and postpartum. One of the targets in the global* Sustainable Development Goals *(SDGs) is to reduce MMR to 70 per 100,000 live births by 2030. WHO data shows that 72.5% of maternal deaths are caused by direct factors, while the remaining 27.5% are caused by indirect factors. This study aims to determine the factors associated with maternal death in Sintang Regency in 2019-2023. The research design uses quantitative with a Cross Sectional approach. The study population is all data on maternal death cases from pregnancy, childbirth and postpartum periods from January 2019 - December 2023 obtained from the Sintang Regency Health Office. The sampling technique uses total sampling . The results of the study obtained variables of bleeding (p value 0.017), infection (p value 0.847), eclampsia (p value 0.026), age (p value 0.018) and parity (p value 0.900). There is a relationship between bleeding, eclampsia and age with maternal mortality in Sintang Regency in 2019-2023. There is no relationship between infection and parity with maternal mortality in Sintang Regency in 2019-2023. It is hoped that the relevant health services will improve health service efforts to reduce MMR.*

Keywords: *Causes of Maternal Death, SDGs, MMR*

1. BACKGROUND

Efforts to reduce the Maternal Mortality Rate (MMR) are one of the main indicators in improving maternal health and are a priority focus in developing countries. Maternal mortality is defined as the death of a mother during pregnancy, childbirth, or the postpartum period per 100,000 live births, with the exception of deaths caused by accidents or incidental factors (ICD 11, 2018). Based on global data from WHO, there are around 287,000 cases of maternal death that occur during pregnancy, childbirth, and the postpartum period. One of the targets in the global *Sustainable Development Goals* (SDGs) is to reduce the MMR to 70 per 100,000 live births by 2030 (Ministry of Health of the Republic of Indonesia, 2023).

The Central Statistics Agency (BPS) reported in 2020 that the MMR reached 189 per 100,000 live births, which is still far from the SDGs target (Ministry of Health of the Republic of Indonesia, 2023). Globally, the WHO report noted that the MMR was 287 per 100,000 live births in 2020, with an average of almost 800 women dying every day from preventable causes related to pregnancy and childbirth. The target of reducing the global MMR to below 70 per 100,000 live births by 2030 requires a significant annual decline of 11.6%.

Maternal deaths can be caused by various factors, both direct and indirect. WHO data shows that 72.5% of maternal deaths are caused by direct factors, while the remaining 27.5% are caused by indirect factors. Direct factors include obstetric complications during

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pregnancy, childbirth, and the postpartum period, while indirect factors include pre-existing diseases that develop during pregnancy, without involving obstetric complications directly (World Health Statistics, 2024).

Research by Putu Ayu revealed that the causes of Maternal Mortality Rate (MMR) in developing countries vary between regions during pregnancy, childbirth, and postpartum. The most common main risk factors are bleeding and hypertension in pregnancy. Indonesia ranks third highest in the number of MMR in the ASEAN region compared to other countries. Based on the 2023 *Indonesian Health Profile* , the number of maternal deaths recorded through reporting reached 4,482 cases, an increase from 2022 which amounted to 3,572 cases. The main causes of maternal death in 2023 included hypertension in pregnancy (412 cases), obstetric hemorrhage (360 cases), and other obstetric complications (204 cases) (Ministry of Health of the Republic of Indonesia, 2023).

Data in West Kalimantan Province shows that from 2019 to 2023, Kubu Raya Regency, Ketapang Regency, and Sintang Regency have consistently been the areas with the highest maternal mortality rates. In 2020, Sintang Regency recorded the highest number of maternal deaths in West Kalimantan with 17 cases, followed by Ketapang Regency with 16 cases. Maternal mortality cases in Sintang Regency increased in 2021 to 24 cases, making it the district with the second highest maternal mortality rate in the province. The increasing trend in maternal mortality cases in Sintang Regency during the 2017–2021 period led to this region being designated as one of 200 national priority districts/cities to reduce maternal and infant mortality rates in 2021 (Sintang Regency Health Office, 2023).

The results of an initial study conducted by the Sintang District Health Office, Maternal and Child Health (Kesga) and Public Health (Kesmas) divisions, showed that maternal mortality in Sintang District from 2019 to 2023 fluctuated and tended to stagnate. In 2019, there were 15 cases of maternal death; this number increased to 17 cases in 2020 and jumped to 24 cases in 2021 due to the COVID-19 pandemic. However, in 2022 the number of cases decreased to 10 cases, before increasing again to 13 cases in 2023. The main direct causes of maternal death during the five years were bleeding, followed by hypertension in pregnancy and eclampsia. Indirect causes include the high number of deliveries with too close a gap and high-risk maternal age (Sintang District Health Office, 2023).

The main causes of maternal death in Indonesia are direct complications such as postpartum hemorrhage, hypertension, and infection. Meanwhile, indirect causes are dominated by the "4 Too" and "3 Too Late" cases. The "4 Too" cases include: too young (maternal age < 20 years), too old (maternal age > 35 years), too often (number of children

more than four), and too close (birth interval between children less than two years). While the "3 Too Late" include: late in making a decision to give birth, late in reaching a health facility, and late in getting treatment after arriving at a health facility (Andriani, 2019).

McCharty and Maine (1992), as cited by Rohati (2023), identified three main determinants that influence maternal mortality, namely proxy, intermediate, and distant determinants. Proxy determinants include management of complications and referrals during pregnancy, childbirth, and the postpartum period. Intermediate determinants involve access and quality of pregnancy care, including birth attendants, maternal age, number of children, medical history, and ANC (antenatal care) visits. Meanwhile, distant determinants are related to demographic and sociocultural factors, such as low public awareness of maternal health, lack of women's empowerment, education level, socioeconomic status, and community environmental conditions (Rohati, 2023).

Rohati's (2023) study found that bleeding was a significant direct cause of maternal death with a p-value of 0.0002. Meanwhile, related indirect causes included a history of ANC examination (p-value 0.002) and a history of previous illnesses (p-value 0.037). Meanwhile , Maraschini's (2024) study also showed that obstetric hemorrhage, sepsis, and cardiovascular disease were the main causes of maternal death. However, various studies have shown that the causes of maternal death vary by region and there has been no definitive conclusion regarding a consistent cause.

Various efforts to reduce maternal mortality in Sintang Regency have been carried out through various programs, but the maternal mortality rate for the past five years (2019-2023) is still fluctuating. Maternal Perinatal Audits (AMP) are routinely carried out at the district level to review maternal mortality cases, but the available data have not been statistically analyzed to identify direct and indirect causal factors related to maternal mortality during pregnancy, childbirth, and postpartum (Sintang Regency Health Office, 2023).

2. THEORETICAL STUDY

Maternal death is the death of a woman during pregnancy, childbirth, or within 42 days of termination of pregnancy, from any cause related to pregnancy or obstetric complications, except deaths resulting from accidents or unrelated events (WHO, 2018).

Maternal mortality is an important indicator in assessing the level of public health of a country, because it reflects access to and quality of maternal health services as well as the socio-economic conditions of the community (Rohati, 2023).

Bleeding is reason main death Mother globally , especially postpartum hemorrhage (Maraschini , 2024). Condition like preeclampsia and eclampsia that are not handled can leading to death (Andriani, 2019). Postpartum sepsis is one of the reason significant , especially in developing countries with access limited to services cleanliness medical . Complications obstetrics others , including uterine rupture , dystocia , and amniotic embolism.

AKI reduction can achieved through improvement access and quality service health mother . Facilities health need equipped with comprehensive maternal and neonatal services , including inspection pregnancy (antenatal care), services safe delivery , and care postpartum . In addition , training periodic for power health like midwives and doctors it is very important that they capable handle complications obstetrics like postpartum hemorrhage and preeclampsia in a way effective .

Empowerment society also plays a role important in reduce maternal mortality. Education health need done in a way continuous For increase awareness Mother pregnant about importance inspection pregnancy , good nutrition , and detection early complications .

In addition , strengthening system reference become priority For ensure Mother pregnant with complications can quick get adequate care . Provision of ambulance , upgrade access transportation emergency , and integration facility health between health center and home Sick reference is step important things to do implemented . System This will more effective If supported with network good communication between facility primary and secondary health .

Problem financial is also one of the inhibitor access Mother pregnant to service health . Programs such as National Health Insurance (JKN) in Indonesia has help reduce burden cost for Mother pregnant , but need expanded coverage . In addition , support from government and also non- governmental organization For provide help social for family not enough capable can more push use service health by mother pregnant .

Other efforts that are not lost important is improvement nutrition Mother pregnancy and prevention of anemia. Supplementation program substance iron and acid folat must Keep going done in a way intensive , especially in areas with number high incidence of anemia . Empowerment program public For increase resilience food and access food nutritious is also necessary reinforced , considering the nutritional status Mother pregnant own impact direct to health mother and baby being born .

Support policy a strong government is also foundation main in reduce maternal mortality rate. Government need allocate adequate budget for health programs mother , at the same time ensure implementation of the program is running in accordance plan through

monitoring and evaluation periodically . Supportive policies , such as regulation about prohibition wedding early and strengthening service primary health , can speed up achievement of the target of reducing maternal mortality rate.

3. RESEARCH METHODS

This study was conducted quantitatively correlation with descriptive analytical methods through secondary data of medical records of maternal death cases. This study aims to determine the relationship between direct and indirect causal factors (independent) during pregnancy, childbirth and postpartum period with maternal death (dependent) that occurred in Sintang Regency from 2019-2023. The population in this study was all data on maternal death cases from pregnancy, childbirth and postpartum period from January 2019 - December 2023 obtained through health information recording data on maternal death cases at the Sintang Regency Health Office, Kesga and Kesmas section, while the sample of this study was the entire population or using *total sampling* . (Notoatmodjo, 2018).

Data analysis was performed univariately to display the frequency distribution of variables (*independent*) of direct causes of maternal death cases including bleeding, infection, eclampsia and indirect causes of maternal death namely parity and maternal age which have a risk with the variable (*dependent*) of maternal death. Further data analysis used bivariate analysis to relate variables with *Chi Square* .

4. RESULTS AND DISCUSSION

Table 1. Univariate Analysis Results

Variables	Category	N	%
Death Mother	Before labor	21	38.9
	After labor	33	61.1
Reason Direct			
Bleeding	No bleeding	25	46.3
	bleeding	29	53.7
Infection	No infection	43	79.6
	Infection	11	20.4
Eclampsia	No Eclampsia	43	79.6
	Eclampsia	11	20.4
Reason No direct			
Age	No risk	18	33.3

	risk	36	66.7
Parity	No risk	24	44.4
	risk	30	55.6

Based on the frequency distribution table above, it shows that the cases of maternal death of 54 respondents before and after childbirth due to the highest direct cause from 2019-2023 in Sintang Regency were cases of bleeding at 53.7%, and the highest indirect cause of maternal death from 2019-2023 in Sintang Regency was due to the age risk factor of 66.7%.

Table 2. Bivariate Analysis Results

No	Variables	p-value	Information
Reason direct death Mother			
1.	Bleeding	0.017	There is a Relationship
2.	Infection	0.847	No connection
3.	Eclampsia	0.026	There is a Relationship
Reason No direct death Mother			
1.	Age	0.018	There is a Relationship
2.	Parity	0.900	No connection

Based on the table of bivariate analysis results above, it can be shown that of the three variables of direct causes of maternal death, there are two variables related to maternal death, namely bleeding with a p-value of 0.017 and eclampsia with a p-value of 0.010. While the variables of indirect causes of maternal death, there is one variable related to maternal death, namely age with a p-value of 0.018.

Research result This show that there are two variables reason directly related significant with death mother , namely bleeding with a p-value of 0.017 and eclampsia with a p-value of 0.010. Apart from that , there are One variable reason No directly , namely age mother , who has connection significant with death Mother with a p-value of 0.018. Findings This in line with theory and research previously placed bleeding , eclampsia , and factors age as determinant main maternal death .

Postpartum hemorrhage is one of the reason direct main death mother who often occurs , especially in developing countries . Delayed handling or No adequate to postpartum hemorrhage can cause hypovolemia acute , leading to shock , multiple organ dysfunction , and death . According to Cunningham et al. (2018) in *Williams Obstetrics* , postpartum hemorrhage is caused by factors such as uterine atony (inability of the uterus to contracted),

road trauma birth (perineal rupture or tear cervix), retention network placenta , and disorders freezing blood . Intervention like management active management of the third stage of labor (AMTSL), including giving uterotonic like oxytocin , is step important For prevent postpartum hemorrhage . A study by Calvert et al. (2012) confirmed that service Quality maternal health at the primary and tertiary levels is essential For lower number death consequence postpartum hemorrhage .

Eclampsia was also found as one of the reason significant direct to death mother . Eclampsia is complications from preeclampsia , namely condition hypertension that occurs during pregnancy and can cause organ damage such as liver , kidneys , and brain . Seizures in the mother pregnant with eclampsia often causes bleeding brain and pulmonary edema , which are reason direct death . A study by Sibai (2012) stated that preeclampsia weight that is not detected or No handled with Good is factor main development eclampsia . Prevention eclampsia can done through monitoring pressure blood Mother pregnant routinely , detect early signs preeclampsia such as edema and proteinuria, as well as administration of magnesium sulfate as therapy prophylaxis in mothers pregnant with risk tall .

Variables reason No directly found in study This is age mother , who is significant relate with maternal death . Age too young (<20 years) or too old (>35 years) is factor risk main complications during pregnancy and childbirth . In mothers with age under 20 years , risk the occurrence complications increase because the reproductive organs are not yet ripe completely and lack of readiness physique and mental. On the other hand , in mothers with age over 35 years , risk complications increase Because existence disease accompanying like hypertension chronic , gestational diabetes , and abnormalities placenta . Research by Say et al. (2014) in *The Lancet Global Health* mention that risk maternal mortality increases in a way significant in the group age outside optimal range 20–35 years.

Research result this also highlights importance detection early and intervention appropriate time For prevent complications . Quality antenatal care (ANC) services become key in monitor health Mother pregnant and detect risk complications like bleeding and preeclampsia . According to WHO, mothers pregnant recommended For undergo a minimum of eight ANC check- ups during pregnancy . However , challenges in the field often in the form of limitations access to facility health , especially in the areas isolated , as well as limitations power trained health .

From the side government policy need strengthen system maternal health through health program development comprehensive reproduction . Education public about ideal age for married and pregnant , danger hypertension in pregnancy , as well as importance detect signs

beginning complications must intensified . In addition , the system effective referrals , including provision ambulance and facilities reference obstetric neonatal emergency comprehensive (PONED), is very necessary For handle complications that require action quick .

Findings This confirm that strengthening service maternal health and policy based on proof is step important in lower number death mother . With effort together from government , manpower health , and society , the targets of the Sustainable Development Goals (SDGs) in reduce maternal mortality rate significant can achieved .

5. CONCLUSION AND SUGGESTIONS

In 2019–2023, in Sintang Regency, 38.9% of maternal deaths occurred before delivery, while 61.1% occurred after delivery. The dominant direct causative factor was bleeding (46.3%), followed by infection (20.4%) and eclampsia (20.4%). Based on statistical analysis, bleeding (p-value = 0.017) and eclampsia (p-value = 0.026) were proven to be associated with maternal death. The main indirect cause was age at risk (<20 years and >35 years) at 66.7% (p-value = 0.018), which showed a significant association with maternal death.

The Sintang District Health Office is advised to improve the competence of health workers in remote areas, maximize referral tools and transportation, conduct maternal and neonatal audits based on medical record data, and strengthen cross-sectoral cooperation and routine evaluations to reduce maternal mortality rates (MMR).

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