

# Factors Contributing to Maternal Mortality in Bekasi Regency, Indonesia

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**Abstract**—Maternal mortality can still be prevented mainly if it is followed by changing patient behavior, quality health services by institutional providers, or health service system policies. Factors that cause maternal mortality that can still be prevented are patient factors, factors of health personnel, facilities and infrastructure factors, and referral factors. The number of maternal mortality in Bekasi District in 2015 was 36 cases. The purpose of this study was to analyze the causal factors that contribute to maternal mortality. The research design was descriptive analytic with a cross-sectional method. The research sample was obtained from 32 samples of OVM and RMM documents. The results of bivariate analysis using chi-square, the factors of maternal characteristics indicated that maternal age, parity, the distance of pregnancy, comorbidities did not contribute to maternal mortality that can be prevented. The level of education showed  $p$  value = 0.02 means that the level of maternal education contributes to maternal mortality which can be prevented. In the factor of health personnel, did not contribute to maternal mortality that can be prevented. In the referral factor; the referral case with a  $p$  value = 0.012 and the referral delay with a  $p$  value = 0.007 mean that the referral factor contributes to preventing maternal mortality. In terms of facilities and infrastructure; the place of delivery and availability of health facilities did not contribute to preventable maternal mortality. Cross-sectoral cooperation and strengthening of health service systems from various lines and community empowerment systems were essential to reduce maternal mortality in the future.

**Keywords**—Factors contributing, maternal mortality

## I. INTRODUCTION

Health development aims to increase the awareness, willingness, and ability of a healthy life of each person in order

to realize the highest degree of public health. The success of health development is primarily determined by the continuity between program and sector efforts, and sustainability with the efforts that have been carried out by the previous period [1]. Maternal Mortality Ratio (MMR) is one indicator that is sensitive to the quality and accessibility of healthcare facilities

[2]. Maternal mortality is the result of the interaction of various aspects, both clinical aspects, aspects of the health care system, and non-health factors that influence the delivery of clinical services and the delivery of a service system optimal health [3].

The World Health Organization (WHO) estimates that maternal mortality globally decreased by 43% from 532,000 in 1990 to 303,000 in 2015 [4]. Based on WHO data on maternal mortality is bleeding (35%), preeclampsia and eclampsia (18%), indirect causes (18%), characteristics of maternal and health behaviors (11%), abortion and abortion (9%), blood poisoning or sepsis (8%), and embolism (1%). The cause of maternal mortality due to complications of pregnancy in developed countries only reaches 8 to 1.2%, while in developing countries the cause of mortality of maternal mortality is the complication of pregnancy by 40–60% [5,6].

Data from the Indonesian Demographic Health Survey (SDKI, 2012), the Maternal Mortality Rate (MMR) in Indonesia is 359 / 100,000 live births, while the 2019 target, there is a decrease in MMR to 306 / 100,000 live births [7,5]. Indonesia is still dominated by three leading causes of mortality, namely bleeding (30.3%), hypertension in pregnancy (27.1%), and infection (7.3%) [8]. Some conditions that can cause complications in the mother include anemia, diabetes, hypertension, malaria, and four too (too young, too old, too close and too many children) [7].

Referral delays and late obtaining treatment at health facilities are factors that influence the high maternal mortality [9]. Delays in making decisions referring to the hospital occur due to the ignorance of the mother and family regarding the danger signs that should receive immediate treatment. As much as 53.6% of referral decisions made by families are related to late referral for complications of pregnancy and childbirth.

[10]. The most common delay is the delay in deciding and taking the mother to a health facility. Mother does not immediately go to a health facility because she considers signs of complications experienced by normal occur during

pregnancy, while other family members do not know of various signs of emergency in obstetric complications. In general, this occurs in mothers with more than one parity because they feel experienced in previous pregnancies [9].

Maternal mortality can be classified as unavoidable or unavoidable and has the potential to be prevented. Factors causing preventable maternal mortality were classified into four categories: health personnel factors (66%), patient factors (14.3%), administrative / supply/facilities and infrastructure factors (11.9%), and transportation/referral (7.1%) [10].

The causes of maternal mortality can still be prevented if followed by changes in patient behavior, quality health services through institutional practices, or health care system policies. The cause of mortality which can be prevented is needed an action plan, in order to avoid future mortality. In developing countries, to assess preventable causes of mortality must be based on the norms of care in the country and based on available resources, not based on standards used in more developed countries [10,11].

Health Profile of West Java Province in 2014, MMR was reported to be 78.6 / 100,000 live births with the number of maternal mortality as many as 748 people out of 951,319 live births and was the highest mortality case in Indonesia. In 2015 maternal mortality experienced an increase of 823 people from 950,541 live births with an AKI 86.6 / 100,000 live births with the most significant cause of mortality due to bleeding, HDK, and infection [12].

Bekasi Regency is one of the regencies in West Java and includes the top ten districts that have experienced maternal mortality. Geographically, Bekasi Regency is divided into two parts, namely the lowlands which cover parts of the northern part and the undulating terrain in the southern region. Bekasi Regency has 23 sub-districts and 187 villages with a total of 40 health facilities, 44 Community Health Center with 18 PONEK Community Health Center and 155 villages midwife [13,14].

MMR in Bekasi Regency still shows 44.3 / 100,000 live births in 2014 and 44.2/100,000 live births in 2015. Based on preliminary surveys conducted at the Bekasi District Health Office, 2013 maternal mortality cases were 42 cases, in 2014 that were 30 cases, and in 2015 there were 36 cases [12]. Based on these data, the number of maternal mortality in Bekasi District has not shown a significant decline, and there has been an increase in maternal mortality cases in 2015. Interventions to reduce maternal mortality can be done through improved antenatal services that can adequately detect and handle high-risk cases; clean and safe delivery assistance by skilled health workers, postpartum and birth services; Comprehensive and comprehensive (PONEK) obstetric and neonatal emergency services (PONEK) that can be reached in a timely manner by the people in need [14,15].

## II. METHODS

The design of this research is descriptive analytic with a cross-sectional method, where the research was conducted to

analyze the causal factors that contribute to preventable maternal mortality. The populations in this study were all pregnant, childbirth and postpartum women who died in Bekasi Regency from 1 January - 31 December 2015. The sample of this study was maternal mortality case data at the Bekasi District Health Office with the exclusion criteria for no Maternal Verbal Autopsy (OVM) document and Maternal Medical Record (RMM) to obtain a sample of 32 cases. Collecting data using secondary data obtained from OVM and RMM documents, data analysis was carried out in univariate and bivariate using chi-square statistical tests.

## III. RESULT

### 1. The Overview of Maternal Mortality in Bekasi District

The results of the univariate analysis showed that maternal mortality data in Bekasi District were found in 14 sub-districts and most occurred in Serang Baru District. The direct cause of maternal mortality in Bekasi Regency was due to bleeding by 31.25%, HDK 18.7%, and sepsis 6.3%. Some maternal mortality in Bekasi Regency was caused by other causes (43.8%). Other causes are tuberculosis, embolism, encephalitis, decomposition of cordis and brain tumors. The maternal mortality period mostly occurs during childbirth (62.5%), the place of mortality in health facilities (75%), and most of the causes of maternal mortality should still be prevented (78.1%).

### 2. Factors Contributing to Maternal Mortality

TABLE I. RESULTS FACTORS CONTRIBUTING TO MATERNAL MORTALITY

No	Factors	Maternal Mortality				P
		Cannot Be Prevented		Can Be Prevented		
		N	%	N	%	
1	<b>Patient factors:</b>					
a	Age					
	- <20 or >35 years	2	25.0	6	75.0	1.000
	- 20-35 years	5	20.8	19	79.2	
b	Parity					
	- ≤1 or >4	2	16.7	10	83.3	0.68
	- 2-4	5	25.0	15	75.0	
c	Pregnancy					
	Distance					
	- <2 years	2	40.0	3	60.0	0.29
	- ≥Two years	5	18.5	22	81.5	
d	Concomitant					
	Disease					
	Yes	2	16.7	10	83.3	
	No	5	25.0	15	75.0	0.68
e	Level of					
	Education					
	- Basic	4	17.4	19	82.6	
	- Medium	1	14.3	6	85.7	0.02
	- High	2	100	0	0	

2 Factors of Health Workers:					
Health Personnel Resources					
- Insufficient	0	0	8	100	
- Sufficient	7	29.2	17	70.8	0.15
3 Referral Factors:					
a Referral Case					
- Referral	3	11.5	23	88.5	0.012
- Not a referral	4	66.7	2	33.3	
b Referral Delay					
- Late	0	0	16	100	0.007
- Not late	7	43.8	9	56.3	
4 Factors for Health Infrastructure:					
a Place of delivery					
- Non Health Facility	1	50.0	1	50.0	0.462
- Health Facility	5	23.8	16	76.2	
b Availability of Health Facilities					
- Insufficient	0	0	10	100	0.069
- Sufficient	7	31.8	15	68.2	

Bivariate analysis was performed using chi-square. Statistical test results in Table 4.2 were obtained  $p$  value  $> 0.05$  in variables of maternal age, parity, the distance of pregnancy, co-morbidities, resources of health personnel, place of delivery and availability of health facilities, meaning that these variables did not play a role against preventable maternal mortality. Whereas in the mother's education level showed  $p$ -value = 0.02, referral case  $p$  value = 0.012 and delay in referral  $p$  value = 0.007 which means the level of maternal education, referral cases and delay in referral contributed to preventable maternal mortality.

#### IV. DISCUSSION

##### a. Patient Factors

The results of research in Bekasi District showed that the causes of maternal mortality were still preventable, most (79.2%) were in the age range of 20-35 years, 50% of mothers aged 20-35 years were bleeding; Maternal parity  $\leq 1$  or  $> 4$  (83.3%); Distance of pregnancy  $\geq 2$  years (81.5%); There is a comorbid disease (83.3%), and moderate education level (85.7%). The results of bivariate analysis on the variables of maternal age, parity, the distance of pregnancy, and disease were obtained  $p > 0.05$  so that maternal age, parity, the distance of pregnancy, and comorbidities did not contribute to maternal mortality.

In this study, maternal mortality occurs most often at the age of 20-35 years and are productive ages for pregnancy and childbirth so that the risk of suffering from the disease either directly from pregnancy or indirectly due to the illness. Age 20-35 years is considered a safe age to get pregnant and give birth, but this does not guarantee the safety of birth to mortality due to other risk factors. Another study has shown that mothers aged 15-19 have a risk of mortality of 7.4 per 1000 live births. Maternal mortality that occurs at the age of  $< 20$  years is 2-5 times higher than the age of 20-29 years and increases again after 30-35 years of age. Increasing maternal age can increase the incidence of preeclampsia and bleed so that maternal mortality tends to occur.

Some studies say parity 2-4 is the safest parity in terms of maternal mortality. Higher parity is higher; the mother is at risk of mortality. Parity is said to be a risk factor for maternal mortality if the number of children is equal to or more than five people. Mothers with high parity are associated with an increased risk of pregnancy complications such as hypertension, placenta praevia, and postpartum hemorrhage. The muscles of the uterus that are often stretched due to giving birth too often result in thinning of the uterine wall which eventually causes contraction of the uterus to become weak and consequently can cause uterine rupture. Maternal mortality due to illness before pregnancy can be prevented by early detection during antenatal examinations. A study conducted observations on antenatal care books and found that almost all did not include a history of the disease.

The results of the bivariate analysis at the level of maternal education showed a value of  $p = 0.02$ , meaning that the level of maternal education contributed to maternal mortality. This is in line with the research of Karlsen et al., that women without education have 2.7 times the risk of dying and women who have one to six years of education have twice the risk of maternal mortality from women with more than 12 years of education. The population of Bekasi Regency averages at 8.38 years. This means that residents of Bekasi Regency only have education up to junior high school level. A study states that educational factors, are the cause of marriage at a young age and are more common in rural areas. The level of education of the mother will affect the understanding and awareness of the mother of the importance of the meaning of health in general or during pregnancy, childbirth, and childbirth. Decision making can also be influenced by a low level of education [16,17].

##### b. Factors of Health Workers

The results of bivariate analysis on the variable resources of health workers showed a value of  $p > 0.05$  so that the resources of health workers did not contribute to maternal mortality. This can occur due to ignorance of the mother and family recognizing the danger signs and delay in deciding to refer the mother to the hospital. This research is different from the results of research conducted by Merali et al., That the health worker factor constitutes two-thirds of the causes of mortality that should be prevented, which is 66.7%. This relates to unskilled health workers, late in handling, delayed operative delivery, inadequate intrapartum monitoring and unavailability of expert teams. Maternal mortality can be prevented if the health workforce standard is carried out correctly. Training or courses are needed to improve the knowledge and skills of health workers to provide security to patients and quality of service that is guaranteed by the delivery of delivery service standards performed by health workers in each birth process. Trained birth attendants need strong collaboration with health care providers at secondary and tertiary levels. The provision of additional skills to health workers with the training being followed has proven effective in increasing the knowledge and skills of health workers.

Skilled health workers are expected to highlight this critical function in the health care system to save the lives of mothers and newborns [18].

#### c. Referral Factor

The results of the bivariate analysis on the reference case variables obtained by the value of  $\rho = 0.012$  and the referral delay obtained by the value of  $\rho = 0.007$ , meaning that the referral case and delay in referral contributed to maternal mortality that could be prevented. This is in line with research conducted by Pembe et al., Which states that referral cases occur at 12% due to obstetric history, 12% due to pregnancy complications and 5.5% due to postnatal complications. Mothers with parity of more than 5 and less than 20 years of age are the most common indications of referral. The mother who was recommended to be referred to, the level of compliance was 37%, and some said that due to lack of fees.

Most maternal mortality in Bekasi District is late referral cases, namely delays in recognizing danger signs and decision making in seeking help to health facilities and delays in reaching health facilities. 3T, namely generally cause referral delays: Delays in deciding to seek care for both individuals and families, the delay of mothers to be taken to the referral center (can be caused by health facilities. It is difficult to reach, long travel times, availability of transportation and road conditions). The delay of the mother to get help at the referral center (can be caused by the availability of referral systems, limited equipment, limited skills both in skill and amount).

Cases of bleeding as a direct cause of maternal mortality need to be treated in less than 2 hours. The travel time to make referrals dramatically determines the success of the referral process so that the existence of the PONE Community Health Center becomes indispensable in order to get immediate treatment. However, in some cases, there were still obstacles in finding adequate facilities.

#### d. Factors of Infrastructure Facilities

The results of bivariate analysis on the variable place of delivery and availability of health facilities, showed a value of  $p > 0.05$  so that the variable place of delivery and availability of health facilities did not contribute to maternal mortality that could be prevented. Based on data from the Bekasi District Health Office, several new hospitals have 2 beds in the ICU room, and some have only one bed. Only one hospital in Bekasi Regency has its blood transfusion unit, in addition to the blood supply directly taken at PMI located in Cibitung District. The distance from the regional general hospital to PMI is  $\pm 500$  meters.

The systemic review of 42 preventable causes of maternal mortality states that 11.9% is due to infrastructure facilities. Specific reasons for lack of accessibility to the blood bank, lack of material for blood collection, blood security problems, donor recruitment, and lack of infrastructure. A study illustrates how blood banks in one hospital are only open for 8 hours every day. At other times, blood must be taken from the larger hospital blood bank, which is 4 kilometers

away. Besides, the blood bank also experienced a lack of blood supply, and husbands and other relatives were not willing to donate blood [10].

## V. CONCLUSION

Maternal mortality that occurs in Bekasi Regency, most of the direct causes are due to bleeding. Maternal life, parity, the distance of pregnancy, co-morbidities, resources of health personnel, place of delivery and availability of health facilities, do not contribute to maternal mortality that can be prevented. The education level of mothers, referral cases and referral delays are factors that contribute to preventable maternal mortality. Strengthening the referral system by making planned referrals, quality health services by institutional practices, or health care system policies, cross-sectoral collaboration and strengthening health care systems from various lines as well as community empowerment systems are essential to reduce maternal mortality in the future.

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