



DOES HUSBAND AFFECT MATERNAL MORTALITY? A CASE CONTROL STUDY IN INDONESIA

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Abstract

Maternal Mortality Rate is still reported high in Brebes Regency, Indonesia despite many attempts having been taken by the government. The Determinant of maternal mortality should be studied to find out the appropriate preventive intervention. Many researches conducted using 3 delays need more comprehensive study. This research aimed to analyze the determinant of maternal mortality. This research used case control design with 29 cases and 116 controls. The sample was taken

purposively using government's documentation, while control was selected randomly from the village midwife's record. Data was collected from the result of interview with respondents using questionnaire and seeing maternal health records. Data was analyzed using multivariate analysis with SPSS 21 help with logistical regression test. The determinants of maternal mortality are social-economic in the form of husband's education (OR 0.126; 95%CI 0.026-0.614; $p=0.010$), husband's support (OR 0.387; 95% CI 0.129-1.159; $p=0.090$), house status (OR 5.980; 95% CI 1.535-23.304; $p=0.010$), and decision making (OR 0.343; 95% CI 0.108-1.093; $p=0.070$); maternal reproductive status in the form of pregnancy interval (OR 5.806; 95% CI 1.609-20.946; $p=0.007$), and parity (OR 33.949; 95% CI 3.876-297.354; $p=0.001$); and maternal health status in the form of disease history (OR 3,322. 95% CI 0.885-12,473; $p=0.075$). Government should improve maternal health and reproductive status, and social-economic status of family particularly by involving husbands in maternal health intervention.

Keywords: delivery, determinant, case control, complication, maternal mortality.

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Introduction

Maternal mortality reflects health system quality. While nearly all maternal mortality cases occur in developing countries, South East Asia is the second largest contributor following Sub Saharan Africa. Indonesia has highest maternal mortality rate in South East Asia.(Alkema *et al.*, 2016) Central Java is on the second rank in Indonesia.(Agushybana, 2016) Although government has taken many attempts, maternal mortality rate in Brebes is the highest one in Central Java during 2014-2018. (Central Java Provincial Health Office, 2015, 2016a, 2016b, 2017, 2019)

Majority maternal mortality occurs in developing countries, including the one that can be prevented through appropriate intervention according to its determinant.(Say *et al.*, 2014) Therefore, the determinant of maternal mortality is important to study. Many studies have been conducted using 3-D (delayed) and 4-T (Too) approaches. (Cham, Sundby and Vangen, 2005; Killewo *et al.*, 2006; Laddunuri, 2013; Hutchinson *et al.*, 2018) However, only few studies used comprehensive approach. Therefore, the research on determinant of maternal mortality using contextual, intermediate and proximate approach is important.(Maine, 2017) This research aims to analyze the determinant of maternal mortality.

Methods

This case control research was conducted in Brebes Regency, Central Java Province, Indonesia on December 2019-January 2020. The population was mothers with obstetric complication. Inclusive criterion of case is maternal mortality in 2018 with family being respondents. That of control is living in the same village and complication time is near the case. The sample size of 29 mothers results from Lemeshow at significance level of 5%, test strength of 80%, OR and case and control proportion of previous studies.(Lemeshow *et al.*, 1997) Case-to-control ratio is 1 : 4.(Gordis, 2014) The sample consisted of 145 persons. Governmental record was used to select case group deliberately. Village midwife's record is used to select the control group randomly. Data was collected through interviewing using questionnaire and mom



and kid health book. Data analysis was conducted using SPSS 21. Bivariate analysis was conducted using chi-square; multivariate analysis using logistic regression. This study has been approved by Ethical Commission of Health Research, Faculty of Public Health, Diponegoro University, number 538/EA/KEPK-FKM/2019, on November 27, 2019.

Maternal mortality scores 0 if alive and 1 if die, code 0: graduated from Senior High School/Undergraduate/graduate program and 1= graduated from Junior High School/Elementary School/no school. Woman's occupation means the main job resulting money, code 0: not working and 1 working. Husband's occupation is coded 1: blue, 2: gray, and 3: white collars. Monthly income resulting from main job is coded 1: > Brebes minimum wage of 2018 (>1,542,000) and 2: otherwise. House status is the status of house resided daily, code 1: own house and 1: family/rented house. Social capital results from item "in dealing what problem do people cooperate with each other?" and etc, with scores 1: can mention and 0 = cannot mention. Good social capital scores totally ≤ 5 and otherwise scores lower. Decision maker means "who does make decision", scoring 0 = mother herself and 1= husband/parent/others. Total score < 8 means the decision is made by mother herself and >8 made by husband/parent. Husband support is seen from husband's assistance during delivery, coded 0 = he accompanies wife during delivery, and 1 = not.

House-to-midwife distance is an actual distance of mother's house to village midwife's house, code of 0 if it is near (≤ 600 meter) and 1 if otherwise. House-to-Puskesmas (Public Health Center) distance is coded 0 = near (≤ 3 km) and 1 = otherwise. House-to-hospital distance is coded 0 = near (≤ 13.3 km) and 1 = otherwise. Delayed decision making is viewed from time interval between decision making and symptom appearance' coded 0 = not delayed (≤ 30 minutes) and 1 = otherwise. Delayed trip is viewed from the time interval between arrival at healthcare facility and decision making, coded 0 = not delayed (≤ 2 hours) and 1 = otherwise. Delayed management is viewed from the time interval between treatment given and mother's arrival in healthcare facilities, coded 0 = not delayed (≤ 30 minutes) and 1 = otherwise. Contraceptive use is viewed from the question of whether or not contraceptive is used, coded 0=



yes and 1= no. Antenatal care is viewed from its quantity and quality, coded 0= ≥ 24 totally and complete examination (weight, tension, fundus high, tetanus toxoid, blood supplement tablet, consultation, and laboratory test) and 1= otherwise. Delivery helper is viewed from the first helper when mother is giving birth, coded 1= obstetrician & gynecologist, 2= general practitioner, 3= midwife, and 4= traditional midwife.

Pregnancy age is the age when a woman is pregnant in 2018, coded 1= < 20 , 2= 20-35, and 3= > 35 years. Parity is the number of children born, coded 1= primipara or 0, 2= 1-3, and 3= ≥ 4 . Pregnancy interval is the interval of pregnancy in 2018 and previous one, coded 1= < 2 (too close), 2= 2-10, 3= ≥ 10 years (too far), and 4= no child. Unexpected pregnancy is indicated with question “whether or not the pregnancy is expected”, coded 0= yes and 1= no. Nutrition status during pregnancy is indicated with upper arm circumference measurement, coded 0= no chronic energy deficiency (≥ 23.5 cm), and 1= otherwise. Anemia status during pregnancy is taken from Hb measurement, coded 0= ≥ 12 g/dL and 1= otherwise. History disease including infectious or chronic disease during or before pregnancy in 2018, code 0= none and 1= present. Complication history is obstetric complication during pregnancy before 2018, coded 0= none and 1= present. Pregnancy complication, delivery, and post-partum is measured from obstetric complication developing, code 0 = can mention it and 1= otherwise.

Results

Table 1 shows the majority mortality rate of case group women (mother) viewed from mother’s lower-middle education, husband’s lower-middle education, family-owned/rented house status, delayed decision making, non-supporting husband, having disease history, and developing pregnancy complication. Meanwhile, that of control group is viewed from mother’s lower-middle education, husband’s lower-middle education, husband/parent as decision maker, delayed decision making, non-supporting husband, having disease history and developing pregnancy complication. Table 1 also shows that there a difference of husband’s education, delayed management, and delivery helper selection between case and control groups at



significance level of 5%. Meanwhile, there is a difference of diseases history between case and control group, at significance level of 10%.

Table 1. Univariate and Bivariate analysis on Determinant of Maternal Mortality

Independent Variable	Case		Control		p value
	n	%	n	%	
Contextual Determinant					
Mother's education					0.166
>Junior High School	8	27.6	19	16.4	
≤Junior High School	21	72.4	97	83.6	
Husband's education					0.052
>Junior High School	11	37.9	24	20.7	
≤Junior High School	18	62.1	92	79.3	
Mother's occupation					0.303
Not working	19	65.5	87	75	
Working	10	34.5	29	25	
Husband's occupation					0.673
White collar	5	17.2	13	11.2	
Gray collar	15	51.7	63	54.3	
Blue collar	9	31.0	40	34.5	
Family's income					1.000
> UMR (Minimum Regional Wage)	17	58.6	68	58.6	
≤ UMR (Minimum Regional Wage)	12	41.4	48	41.4	
House status					0.406
Own status	12	41.4	58	50	
Family/rented house	17	58.6	58	50	
Social capital					0.489
Good	17	58.6	76	65.5	
Poor	12	41.4	70	34.5	
Decision maker					0.453
Mother herself	15	51.7	51	44	
Husband/parent/others	14	48.3	65	56	
Husband's support					0.449
Supporting	14	48.3	47	40.5	
Not supporting	15	51.7	69	59.5	
Intermediate Determinant					
House-to-midwife house distance					0.716
Near	16	55.2	61	52.6	



Independent Variable	Case		Control		p value
	n	%	n	%	
Far	16		55.2	52.6	0.859
House-to-Puskesmas distance					
Near	16	55.2	58	50	0.724
Far	13	44.8	58	50	
House-to-hospital distance					0.461
Near	15	51.7	58	50	
Far	14	48.3	58	50	0.161
Delayed decision making					
No	8	27.6	34	29.3	0.039
Yes	21	72.4	82	70.7	
Delayed trip					0.598
No	25	86.2	102	87.9	
Yes	4	13.8	14	12.1	0.932
Delayed management					
No	25	86.2	102	87.9	0.028
Yes	4	13.8	14	12.1	
Contraceptive use					0.586
Yes	18	62.1	78	67.2	
No	11	37.9	38	32.8	0.847
Antenatal Care (ANC)					
Good	18	62.1	73	62.9	0.793
Poor	11	37.9	43	37.1	
Delivery Helper choice					0.586
Obstetrician & gynecologist	14	48.3	52	44.8	
Midwife	0	0	3	2.6	0.847
Traditional midwife	13	44.8	61	52.6	
	2	6.9	0	0	0.586
Pregnancy age					
< 20 years	2	6.9	11	9.5	0.847
20 – 35 years	20	69	71	61.2	
>35 years	7	24.1	34	29.3	0.793
Parity					
Primipara	8	27.6	30	25.9	0.793
1-3 parities	18	62.1	83	71.6	
≥ 4 parities	3	10.3	3	2.6	0.793
Pregnancy interval					
Too close	0	0	4	3.4	0.793
2-10 years	13	44.8	60	51.7	



Independent Variable	Case		Control		p value
	n	%	n	%	
Too far	8	27.6	22	19	0.574
Irrelevant	8	27.6	30	25.9	
Unexpected pregnancy					
Non unexpected pregnancy	27	93.1	104	89.7	0.464
Unexpected pregnancy	2	6.9	12	10.3	
Nutrition status during pregnancy					
Non-chronic energy deficiency	19	65.5	84	72.4	0.739
Chronic energy deficiency	10	34.5	32	27.6	
Anemia status during pregnancy					
Non-anemic	16	55.2	60	51.7	0.382
Anemic	13	44.8	56	48.3	
Disease history					
None	8	27.6	42	36.2	0.095
Present	21	72.4	74	63.8	
Complication History					
None	6	20.7	43	37.1	0.855
Present	23	79.3	73	62.9	
Proximate Determinant					
Pregnancy Complication					0.927
None	8	27.6	34	29.3	
Present	21	72.4	82	70.7	
Delivery Complication					0.616
Non	21	72.4	83	71.6	
Present	8	27.6	33	28.4	
Post-partum complication					0.616
None	29	100	115	99.1	
Present	0	0	1	0.9	



Table 2. Result of multivariate analysis on the determinant of maternal mortality

No	Risk Factor	OR adjusted	95% CI		p
			Lower	Upper	
1	Husband's education (ref:≤ Junior High School)	0.126	0.026	0.614	0.010
2	House status (ref: family house/rented)	5.980	1.535	23.304	0.010
3	Decision making (ref: husband/parent)	0.343	0.108	1.093	0.070
4	Parity (ref : parity >4)	33.949	3.876	297.354	0.001
5	Pregnancy interval (ref:<2 years)	5.806	1.609	20.946	0.007
6	Husband's support (ref: None)	0.387	0.129	1.159	0.090
7	Disease history (ref: present)	3.322	0.885	12.473	0.075

Table 2 shows determinant of maternal mortality including: husband's education, house status, parity and pregnancy interval at significance of 5% and decision maker, husband's support and disease history at significance level of 10%. Compared with husband with lower-middle education, mother with upper-middle education has probability of 1/0, 1.26 or 7.93 times higher to die. Mother living in family-owned or rented house has 5,980 risk of death higher than those living in their own house. The higher the mother's parity, the higher is the maternal mortality probability. The narrower the pregnancy interval, the more is the maternal mortality probability. Compared with mothers dependent on husband/parents in decision making; those making their own decision has maternal mortality risk of 1/0.343 or 2.915 higher. Mothers with supporting husband have 1/0.367 or 2.583 risk of mortality higher than those with non-supporting husband. Those with disease history have 3.322 risk of maternal mortality higher than those without disease history.



Discussion

The effect of husband's education on maternal mortality in this study is in line with the one using SDKI 2012 data finding that women with highly-educated husband has 1.99 risk of developing maternal mortality-related complication higher than those with non-educated husband.(Agushybana, 2016) It is because the higher the husband's education, the more motivated is the woman to undertake antenatal care, and the more identified is the complication and the risk of maternal mortality. However, it is not in line with a study in Tanzania finding that Husband's poor education is the risk factor of maternal mortality.(Evjen-Olsen *et al.*, 2008)

Mothers living in family-owned house have higher mortality risk likely because they are more dependent on husband/parents in deciding medical help. It is confirmed with some studies conducted in Niger, Ethiopia, Tunisia, India, and Korea finding that many women cannot make decision themselves to find medical help as they are dependent on older family members. (Thaddeus, 2017) Similarly, a study in Nepal found that women's participation is still low in identifying and solving their health problem. (Np *et al.*, 2011) Woman's lower status in family leads to her limited access to healthcare service. This finding implies that the lower the social-economic status of family, the more is the maternal mortality risk.

The effect of high parity on maternal mortality in this study is in line with the studies using SDKI 2002, 2007 and 2012 finding that parity is a risk factor of severe maternal morbidity .(Widyaningsih, 2017) Too-many parity condition makes women vulnerable to pregnancy, delivery, and post-partum complications such as his abnormality, long partum, hemorrhage, infection, preeclampsia, and etc. however, this finding is not in line with the results of research conducted in Nepal tertiary hospital finding that primipara dominates maternal mortality case (20). Similarly, the study using SDKI 2012 data also found higher mortality risk in primipara than in multipara. .(Widyaningsih, 2018)

The finding that the narrower the pregnancy interval, the higher is the probability of maternal mortality is in line with some recent studies showing that the narrow interval of birth leads to the increased maternal mortality rate in developing countries. (Rizvi, Khan and Pak,



2011) Too-narrow pregnancy interval (< 2 years) can contribute to maternal mortality as it increases maternal depletion syndrome risk, a set of maternal and fetal nutrition deterioration symptoms due to inadequate time of recovery from previous pregnancy nutrition burden (Bigiu *et al.*, 2015).

In this study, majority mothers in case and control groups have low education and no job, thereby dependent on husband considerably, particularly in decision making. It implies that mothers whose decision making is dependent on husband/parents are more motivated not to undertake antenatal care because of their husband low-education background and low support to wife during delivery.

This finding is in line with a study using SDKI 2012 data finding that mothers with husband's support has 1.3 risk of maternal mortality-related pregnancy and delivery complications higher than those without it. (Agushyana, 2016) It likely occurs because they do not get husband's support, thereby more likely to be identified for developing complication. The effect of husband on mother also evidently improves woman's knowledge when her husband accompanies her in antenatal health education in Nepal. (Bc *et al.*, 2010)

The increased maternal mortality risk in those with disease history found in this study is in line with a study conducted in Kenyan tertiary hospital finding that mothers with comorbidity has 3.9 mortality risk higher than those without it. (Yego *et al.*, 2014) In this research, disease history developed by majority cases and controls is hypertension, and the minority is HIV.

Conclusion and Recommendation

Social-economic status, including husband education, house status, decision makers, is evidently a distant determinant of maternal mortality. Meanwhile mother's reproductive status, including parity, pregnancy interval, and husband support, and health status or history disease are between-determinant of maternal mortality. In addition to improved social-economic factor, the control of mothers' reproductive and health factor involving husband in maternal health intervention should be attempted to minimize maternal mortality.



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