

Maternal Mortality Risk Factors in Dr. Hasan Sadikin General Hospital, Bandung in 2009–2013

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Abstract

Objective: To discover the factors affecting the occurrence of maternal deaths. The high maternal mortality rate (MMR) in Indonesia is still a common problem which needs urgent solution.

Methods: This is an analytic observational, cross-sectional study using a case control approach. Fifty two cases were selected as cases, another 52 were selected as control. The sampling was performed by simple random sampling. The instruments used in this study were the medical records of mothers who gave birth in Dr. Hasan Sadikin General Hospital Bandung from 1 January 2009–31 December 2013. Data analysis was performed using chi-square test.

Results: In this study, the results showed that the risk factors contributing to maternal deaths were pregnancy complication ($p < 0.001$), delivery complication ($p < 0.001$), puerperal complication ($p = 0.022$), age ($p = 0.030$), parity ($p = 0.427$), prior medical history ($p < 0.001$), antenatal care ($p = 0.007$), maternal education ($p = 0.527$), and area of residence ($p = 0.049$).

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Conclusions: The risk factors that contribute to maternal deaths include pregnancy complication, delivery complication, puerperal complication, maternal age, prior medical history, antenatal care, and area of residence.

Keywords: Complication, maternal deaths, risk factors

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Introduction

Maternal mortality rate (MMR) is an important component of the Human Development Index (HDI), a measure of a nation's development.¹ Indonesia is one of the Southeast Asian countries that have failed to reach the target of lowering MMR. In 2012, MMR in Indonesia was 359 per 100,000 live births, increasing from the rate in 2007 (228 deaths per 100,000 live births).² The definition of maternal death according to the Tenth Revision of The International Classification of Diseases (ICD-10) is "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration

and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes".³

According to McCarthy and Maine, there are 3 determinant factors affecting maternal death. These three factors are divided into close, intermediate, and distant determinants. Close determinants include the immediate processes after maternal death such as complications in pregnancy, childbirth, or postnatal periods. Intermediate determinants are those which influence close determinants such as maternal health, reproductive status, access to health care, health care behavior or utilization of health care, and other unknown or unexpected factors. Distant determinants are those which influence the intermediate determinants such as sociocultural and economic factors.⁴ This study aimed to discover factors affecting the occurrence of maternal deaths.

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Methods

This study was an analytic observational, case-control study conducted in Dr. Hasan Sadikin General Hospital Bandung. Data were collected from the medical records of women giving birth in Dr. Hasan Sadikin General Hospital during the period from 1 January 2009–31 December 2013. This study had been approved by Health Research Ethics Committee Dr. Hasan Sadikin General Hospital, Bandung. The minimum

sample size was calculated using the unpaired analytic comparative study formula which set 52 case subjects and 52 control subjects. The inclusion criterion in this study was medical records that include variables collected in this study. Medical records with incomplete or missing data were excluded.

Out of 104 maternal death cases identified, 52 fulfilled the inclusion criterion. Samples were selected using simple random sampling method and were assigned into the case group.

Table 1 Characteristics of Case and Control

Risk Factors	Result (n=52)		p Value
	Death (%)	Death (%)	
Pregnancy complication			
Yes	21 (40%)	5 (9%)	<0.001
No	31 (60%)	47 (90%)	
Delivery complications			
Yes	41 (79%)	22 (42%)	<0.001
No	11 (21%)	30 (58%)	
Puerpural complications			
Yes	11 (21%)	3 (6%)	0.022
No	41 (79%)	49 (94%)	
Maternal age			
<20 years or >35 years	20 (38%)	10 (19%)	0.030
20–35 years	32 (61%)	42 (81%)	
Parity			
<1 or >4	24 (46%)	20 (38%)	0.427
1–4	28 (53%)	32 (61%)	
Prior medical history			
Yes	23 (44%)	2 (4%)	<0.001
No	29 (56%)	50 (96%)	
Antenatal care			
<4 times	13 (25%)	3 (6%)	0.007
≥4 times	39 (75%)	49 (94%)	
Maternal education			
<9 years	37 (71%)	34 (65%)	0.527
≥9 years	15 (29%)	18 (34%)	
Area of residence			
Urban	28 (63%)	23 (44%)	0.049
Rural	24 (36%)	29 (56%)	

Data collection was done on the control group which also had 52 subjects (case-control ratio =1:1). After data collection, data tabulated using Microsoft Excel, and bivariate analysis was performed using chi-square test through the use of statistics software.

Complications in pregnancy, delivery, and the puerperal period were analyzed. Analysis was also performed on maternal age, parity, maternal medical history, antenatal care, maternal education, and area of residence.

Results

The number of maternal patients giving birth in Dr. Hasan Sadikin General Hospital from 2009 to 2013 was 13,453 people, with 104 (0.77%) death cases.

Both groups characteristics (case and control) presented in Table 1 show correlations were found between pregnancy complication ($p < 0.001$), delivery complication ($p < 0.001$), puerperal complication ($p < 0.022$), maternal age ($p < 0.001$), antenatal care ($p = 0.007$), and area of residence ($p = 0.049$) and the incidence of maternal deaths. Meanwhile, parity and education variables did not show significant correlations to maternal deaths ($p > 0.05$).

OR analysis with 95% confidence interval (CI) was performed to measure the effects of significant variables on the incidence of maternal deaths (Table 2).

Discussion

This was a case-control study involving 104 samples comprising of 52 cases and 52 controls. Maternal death risk factors were classified

into three determinants: close, intermediate, and distant.⁴ The study variables included as close determinants were complications during pregnancy, complications during birth, and also neonatal complications. All close determinants included in this study had a significant correlation with the incidence of maternal deaths (Table 1). Mothers with complications during pregnancy had a 6.368 times larger risk to suffer maternal death compared to those without them. Mothers with complications during birth were 5.083 times more vulnerable to maternal deaths compared to those without them. Mothers with neonatal complications had a maternal death risk that was 4.382 times larger than those without them. This findings supported previous studies which discover that obstetric complications, i.e. pregnancy complications, delivery complications, as well as puerperal complications, are risk factors for maternal deaths.^{4,5} Obstetric complications that directly result in maternal deaths contribute to 75% of all maternal deaths. Such deaths can actually be prevented through medical interventions.⁶

Age, prior medical history, and antenatal care, which are intermediate determinants, showed significant results (Table 1). Mother who were under 20 or over 35 had 2.625 times larger risk than mothers age 20–35. Age that is too young or too old had an effect on the condition of the uterus. Mothers that are too young are not physically ready yet to conceive and give birth.^{7,8} Comparing the two high-risk age groups, more maternal deaths came from the young age mothers.⁸ Mothers with a history of diseases had 19.828 times larger risk compared to those without any history. Prior medical history included diseases that had been suffered by the mothers before

Table 2 Maternal Death Risk Factors

Risk Factors	Results		
	p Value	OR	95% CI
Pregnancy complication	<0.001	6.368	2.172 – 18.668
Delivery complication	<0.001	5.083	2.143 – 12.053
Puerperal complication	0.022	4.382	1.145 – 4.382
Maternal age	0.030	2.625	1.081 – 6.377
Prior medical history	<0.001	19.828	4.356 – 90.258
Antenatal care	0.007	5.444	1.449 – 20.462
Area of residence	0.049	2.190	0.998 – 48.07

conceiving/giving birth and would give the pregnancy an effect or greater burden. Mothers with poor antenatal care were more prone to maternal deaths by 5.444 times than those without it. Antenatal care functions to screen mother for other diseases or disorders that the mother has. In India (2013), 7 out of 10 mothers passed away because they did not receive antenatal care. Government's intervention in the form of family planning is needed to address this issue.⁹

In this study, the factor that was included as distant determinants was mother's area of residence. Mothers that stayed far from health care facility had a 2.190 times larger risk compared to those who stayed close to one (urban). This finding supported a previous study in Gambia.⁶ As the referral hospital in West Java, the cases handled in Dr. Hasan Sadikin General Hospital were all referred cases. The distant location is one of the 3 "too late" causes of maternal deaths.¹⁰ This was because patients needed more time to reach Dr. Hasan Sadikin General Hospital, causing them to arrive late and receive late treatments.^{6,11} For this reason, maternal deaths are 11 times more likely to happen in referral hospitals if the patients do not arrive in two hours.⁵

The problem of maternal deaths demands serious attention because it affects not only the mothers, but also their families. When its occur, other family members will have a decrease in their productivity which will

eventually affect the family's economy and social status.^{12,13} Multi-sector governmental intervention is needed to solve this problem.¹¹ Policies need to be made according to the principle of decentralization so as to achieve effectiveness and efficiency in each region.²

One of the limitations of this study was that the unsuitability of the definition of maternal death with the conditions in Dr. Hasan Sadikin General Hospital. Maternal deaths include the deaths that occur during pregnancy up to 42 days after birth; however, the medical records only had information about pregnancy up to a few days of hospital care. There was no data of maternal condition up to the 42nd day after birth. Besides that, another limitation was the limited number of samples.

The number of missing medical records was not a little. Complete medical records and systematic, careful filing of medical records should be done. If possible, they can be done through a computerized system to prevent missing or incomplete data and expedite data searching. Further studies should apply different method so that other factors that affect maternal deaths can also be observed.

Hence, it is concluded that the risk factors that affect maternal deaths in Dr. Hasan Sadikin General Hospital from 2009 to 2013 comprise of pregnancy, delivery, and puerperal complications, maternal age, prior medical history, antenatal care, and area of residence.

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Maternal Mortality Risk Factors in Dr. Hasan Sadikin General Hospital, Bandung in 2009–2013

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