

Laporan Hasil Penelitian

MATERNAL MORTALITY DETERMINANTS IN REFERRAL HOSPITAL: THREE YEARS RETROSPECTIVE STUDY**Morel Sembiring¹, Yusuf R. Surbakti², Iman H. Effendi³**

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*Submitted : March 2017 | Accepted : June 2017 | Published : July 2017***ABSTRACT**

Maternal mortality rate is an indicator to assess women health status. Based on WHO data, the pregnancy and postpartum related complications mostly cause maternal mortality and predominantly occur in developing countries. The purpose of this research is to determine the causes of maternal deaths at H. Adam Malik General Hospital Medan based on maternal mortality risk factors including remote, intermediate, and outcome determinants. A retrospective study using medical records of women who underwent delivery at H. Adam Malik General Hospital, Medan from January 1st, 2010 until December 31st, 2012. Data were analyzed using bivariate and multivariate logistic regression. We analyzed complete medical records and found 37 maternal deaths during 3 years. Pre- eclampsia/eclampsia is the most common cause of death (20% and 37, 54.1%, respectively). Maternal education degree, referral system, facilities for delivery, history of systemic diseases, pregnancy and postpartum related complications were significantly correlated to the outcome of labor with OR =1.97, OR = 10.11, OR = 41.36, OR = 5.82, OR = 3.49 and OR = 685.7, respectively, $p < 0.05$. Based on the multiple logistic regression test, maternal history of systemic diseases, pregnancy and postpartum related complications were the three factors that most significantly correlated to maternal mortality. Delivery outcomes were significantly associated with the following factors: formal education, referral status, facilities for delivery, history of systemic diseases, mode of delivery, pregnancy and postpartum related complications. Maternal history of systemic diseases, pregnancy and postpartum related complications were the three factors that most significantly correlated to maternal mortality.

Keywords : maternal mortality, remote determinant, intermediate determinant, outcome determinant

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ABSTRAK

Angka kematian ibu merupakan indikator untuk menilai status kesehatan perempuan. Berdasarkan data WHO, komplikasi kehamilan dan pascapartum sebagian besar menyebabkan kematian ibu dan terutama terjadi di negara berkembang. Tujuan dari penelitian ini adalah untuk mengetahui penyebab kematian ibu di Rumah Sakit Umum H. Adam Malik Medan berdasarkan faktor risiko kematian ibu termasuk Determinan jarak jauh, menengah, dan hasil. Sebuah studi retrospektif dengan menggunakan rekam medis wanita yang menjalani persalinan di Rumah Sakit Umum H. Adam Malik, Medan mulai 1 Januari 2010 sampai 31 Desember 2012. Data dianalisis dengan menggunakan regresi logistik bivariat dan multivariat. Kami menganalisis rekam medis lengkap dan menemukan 37 kematian ibu selama 3 tahun.

Preeklampsia / eklampsia adalah penyebab kematian yang paling umum (masing-masing 20% dan 37, 54,1%). Tingkat pendidikan ibu hamil, sistem rujukan, fasilitas persalinan, riwayat penyakit sistemik, kehamilan dan komplikasi terkait pascapersalinan berkorelasi signifikan dengan hasil persalinan dengan OR = 1,97, OR = 10,11, OR = 41,36, OR = 5,82, OR = 3,49 dan OR = 685,7, masing-masing, $p < 0,05$. Berdasarkan uji regresi logistik berganda, riwayat maternal penyakit sistemik, komplikasi kehamilan dan komplikasi terkait pascapartum adalah tiga faktor yang paling signifikan berkorelasi dengan kematian ibu. Hasil pengiriman secara signifikan terkait dengan faktor-faktor berikut: pendidikan formal, status rujukan, fasilitas untuk melahirkan, riwayat penyakit sistemik, cara melahirkan, kehamilan dan komplikasi terkait pascapersalinan. Riwayat maternal penyakit sistemik, kehamilan dan komplikasi terkait pascapersalinan adalah tiga faktor yang paling signifikan berkorelasi dengan kematian ibu.

Kata kunci : angka kematian ibu, determinan jarak jauh, determinan intermediate, Determinan hasil

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BACKGROUND

Maternal mortality rate (MMR) is an indicator to assess overall women health status. It is associated with one of the targets enlisted in the millennium development goals for enhancing overall health status and reducing 3/4 maternal deaths by 2015.

According to WHO, 99% of MMRs are due to pregnancy and postpartum related complications. These cases are predominant in developing countries with incidence rates 450 maternal deaths per 100,000 live births compared to the ratio of maternal deaths in nine developed countries and 51 commonwealth countries (WHO, 2003).

According to Survei Demografi dan Kesehatan Indonesia (SDKI) in 2012, MMR in Indonesia is 359 per 100,000 live births, much higher than the MMR in 2007. This number is still below the MDG's target of 102 per 100,000 live births in 2015. Although the MMR based on local data in Sumatera Utara is only 116 per 100,000 live births (Profil Kesehatan Kabupaten/Kota Sumatera Utara), the

data may did not describe the actual MMR in the population. In fact, we found that MMR was recorded by 268 per 100,000 live births in 2010. Within 5 years period (2003-2008), we reported 23 and 53 maternal deaths of 1774 and 4120 live births, respectively in H. Adam Malik and Dr. Pirngadi General Hospital, Medan with MMR was 12.86 per 1,000 live births.

The main causes of maternal death in H. Adam Malik General Hospital, Medan were as follow: gestosis, hemorrhage, and infection as much as 8 cases (34.78%), 4 cases (17.39%), and 3 cases (13.04%), respectively. While in the Dr. Pirngadi Medan Hospital is 28 gestosis (52.84%), 7 bleeding cases (13.21%) and 7 infection cases (13.21%). (Hanum NS, 2008). Whilst, the common cause of death in RSUP H.Adam Malik General Hospital, Medan was preeclampsia/eclampsia by 16 cases (59.25%) (Effendi IH, 2012).

According to McCarthy and Maine in a study titled "A framework for analyzing the determinants of maternal mortality" proposed the following risk factors for maternal mortality: (1) remote factors including maternal education and

spouse occupation, (2) intermediate factors including maternal age, parity, residence, referral status, the number of antenatal care (ANC), inter pregnancy intervals, assistant during the first labor, place of delivery and history of maternal illness, (3) outcome factors including types of delivery, pregnancy, childbirth, and puerperium related complications (McCarty J, 1992).

In this study, we conducted to determine the causes of maternal deaths at H. Adam Malik General Hospital, Medan based on the following factors: remote, the intermediate and outcome determinants as a risk factor of maternal deaths.

METHODS

A retrospective study was conducted at the Department of Obstetrics and Gynecology H. Adam Malik General Hospital, Medan from November, 2013. The subjects included mothers which delivered at H. Adam Malik General Hospital, Medan and puerperium patients referred to H. Adam Malik General Hospital, Medan. We obtained data from the medical records at H. Adam Malik General Hospital, Medan from January 2010 until December 2012. Data were then processed by descriptive and inferential statistical analysis. Univariate, bivariate, and multivariate logistic regression analysis were used.

Table 1. Causes of Maternal Death

Causes of Maternal Death		N	%
•	Preeclampsia/eclampsia	20	54,1
•	Infection	7	18,9
•	Cardiovascular Disease	6	16,2
•	Hemorrhage	2	5,4
•	Another Cause	2	5,4
Total		37	100

Table 2. Association of Remote Determinants to Maternity Condition

Remote Determinants	Maternity Condition			Exp.
	Death	Alive	Total	
Education				
• formal ≤ 9 years	17 (45.9%)	194 (30.1%)	211(30.9%)	p=0.04*
• formal > 9 years	20 (54.1%)	450 (69.9%)	470 (69.1%)	OR=1.97
Total	37 (100%)	644 (100%)	681 (100%)	
Spouse Occupation				
• Permanent	4 (10.8%)	74 (11.5%)	78 (11.4%)	p=1*
• Non permanent	33 (89.2%)	570 (88.5%)	603 (88.6%)	OR=1.07
Total	37 (100%)	644 (100%)	681 (100%)	

*chi square test

RESULTS AND DISCUSSION

Six hundred and eighty-one complete medical records in 3 years (2010-2012) of mother who underwent delivery in H. Adam Malik General Hospital, Medan and puerperium patients referred to H. Adam Malik General Hospital, Medan. The number of maternal death was 37 cases.

The most common cause of death was preeclampsia / eclampsia by 20 cases (54.1%), followed by 7 cases of infections (18.9%), 6 cases of cardiovascular disease (16.2%), 2 cases of hemorrhage (5.4%) and 2 other cases (5.4%) (Table 1). It is consistent with a previous study that the main cause of maternal mortality is preeclampsia/ eclampsia (Effendi IH, 2012;

Hanum NS, 2008). Another study reported 109 maternal deaths (2005-2009), with the highest cause of death was preeclampsia/eclampsia (50%), and hemorrhage (28%) (Bazar A, 2012). Based on remote determinant, maternal education was significantly associated with the outcome of labor ($p < 0.05$) with probability 1.97 times higher in women with less formal education (Table 2). Based on spouse occupation, the percentage of maternal mortality in the non-permanent group was higher than the permanent group, however insignificantly associated with the outcome of labor ($p > 0.05$) (Table 2).

These results were in line with the statement of Ministry of Health Republic Indonesia that maternal mortality often occurs in poor, uneducated, living in remote areas and those who do not have the ability to fight for his own life (Ministry of Health RI, 2004). Based on the intermediate determinants (Table 3), MMR was lesser at age < 20 and > 35 years old than age between 20-35 years, but there was no significant correlation with the outcome of labor ($p > 0.05$). It is different with the studies in the United States that maternal mortality will increase four-times greater in women who are pregnant at the age of 35-39 years old than age of 20-24 years old. Age under 20 years old and above 35 years old have risk of pregnancy and labor (Ministry of Health RI, 1994). Women who gave birth at the age of 14 is at risk of childbirth death about 5 to 7 times and between 15 to 19 years by 2- times greater. The high mortality rate is caused by preeclampsia, postpartum hemorrhage, sepsis, HIV infection, and malaria (Royston E, 2000; Depkes RI 2004; De Cheney AH, 2007).

Women with parity 1 and > 3 were higher than parity 2-3 but did not show a significant correlation with the outcome of labor ($p > 0.05$). Parity 1 (no delivered/the first childbirth) and parity > 4 has a higher

maternal mortality rate (Saifuddin, 1994). An increased of risk in parity 1 and a young age may be associated with readiness of the mother, while the parity in age more than four and the elderly may be associated with a decreasing of physic due to previous pregnancy (WHO, 1998; Depkes RI 2004; De Cheney AH, 2007)

Based on pregnancy interval to MMR are higher in the women with pregnancy interval < 24 months but did not show any significant correlation with outcome of labor ($p > 0.05$). Interval pregnancy less than 2 years increase the risk of maternal death (Ministry of Health RI, 2004). Labor with pregnancy intervals less than 24 months are at high risk for postpartum bleeding, pain, and maternal mortality (Ministry of Health RI, 2004). The factor of total ANC to MMR are slightly lower in women with a total of ANC < 4 times but did not show any significant correlation with outcome of labor ($p > 0.05$).

Based on maternal residency factors, the rural area percentage is slightly higher than in women who lived in the cities, but did not show any significant correlation with outcome of labor ($p > 0.05$). The percentage of the referred mothers showed higher number of death than unreferred and showed a significant correlation with the outcome of labor ($p < 0.05$). MMR probability from referral status is 10-11 times greater compared to mother who did not come from referrals number of ANC, residential status. It is a determinant factor of maternal health where the convenient access to health services, such as the location where mother can obtain contraceptive counseling, antenatal care, primary health care or referral health services. available in the community (WHO, 1998; Depkes RI 2004).

Table 3. Association of Intermediate Determinants to Maternal Condition

Intermediate Determinants	Maternal Condition			Exp.
	Death	Alive	Total	
Maternal Age				
• <20 y.o& >35 y.o	14 (37.8%)	169 (26.2%)	183 (26.8%)	p=0.122*
• 20-35 y.o	23 (62.2%)	475 (63.8%)	498 (63.2%)	OR= 1.7
Total	37 (100%)	644 (100%)	681 (100%)	
Parity				
• 1 & >3	24 (64.8%)	354 (54.9%)	378 (55.5%)	p=0.239*
• 2 – 3	13 (35.2%)	290 (45.1%)	303 (44.5%)	OR=1.51
Total	37 (100%)	644 (100%)	681 (100%)	
Pregnancy Interval				
• <24 months	25 (67.5%)	374 (58.1%)	399 (58.6%)	p=0.254*
• >24 months	12 (32.5%)	270 (41.9%)	282 (41.4%)	OR=1.5
Total	37 (100%)	644 (100%)	681 (100%)	
Total ANC				
• <4 times	17 (45.9%)	234 (36.3%)	251 (36.8%)	p= 0.255*
• ≥4 times	20 (54.1%)	410 (63.7%)	430 (63.2%)	OR= 1.47
Total	37 (100%)	644 (100%)	681 (100%)	
Residential				
• Urban	15 (40.5%)	290 (45.0%)	305 (44.8%)	p=0.593*
• Rural	22 (59.5%)	354 (55.0%)	376 (55.2%)	OR=0.832
Total	37 (100%)	644 (100%)	681 (100%)	
Referral Status				
• Referred	21 (56.7%)	74 (11.5%)	95 (13.9%)	p = 0.001*
• Not referred	16 (43.3%)	570 (88.5%)	586 (86.1%)	OR=10.11
Total	37 (100%)	644 (100%)	681 (100%)	
Location				
• Adam Malik Hospital	31 (83.8%)	641 (99.5%)	672 (98.6%)	p = 0.001*
• Other hospitals	6 (16.2%)	3 (0.5%)	9 (1.4%)	OR = 41.35
Total	37 (100%)	644 (100%)	681 (100%)	
First Labor Assisted by				
• Midwife	1 (2.7%)	3 (0.5%)	4 (0.6%)	p = 0.083*
• Doctor	36 (97.3%)	641 (99.5%)	677 (99.4%)	OR= 5.935
Total	37 (100%)	644 (100%)	681 (100%)	
History of Maternal Systemic Illness				
• Yes	14 (37.8%)	61 (9.5%)	75 (11%)	p = 0.001*
• No	23 (62.2%)	583 (90.5%)	606 (89%)	OR = 5.818
Total	37 (100%)	644 (100%)	681 (100%)	

*chi square test

Based on location of labor, the percentage of mother's death delivered outside H. Adam Malik General Hospital was lesser compared with mothers who give birth at H. Adam Malik General Hospital and showed a significant correlation with the outcome of labor ($p < 0.05$). Probability maternal mortality from referral is 41.36 times higher compared to labor from the outside H. Adam Malik General Hospital.

Based on a history of maternal systemic illness factors, the percentage of death rate in mothers with a history of systemic illness was lesser than mothers with no history of systemic illness and showed a significant correlation with the results of labor ($p < 0.05$) as well as the history of maternal systemic illness was 5.818 times greater compared with no history of systemic illness. This is consistent with

the fact that the condition of mothers influenced by incidence of maternal mortality include nutritional status, anemia, maternal illness, and a history of complications in pregnancy and previous labor (Setyowati T, 2000).

Based on the outcome determinants (Table 4), the percentage of the group of mothers who died in labor with intervention is greater than the percentage of mothers in the group spontaneous parturition, and showed a significant correlation with the results of labor ($p < 0.05$). Probability maternal deaths by spontaneous parturition is 0.327 times greater compared to the type of intervention labor. Table 4 shows that the percentage of women who died in the group with pregnancy complications is greater than the percentage of mothers in the group with no complications of pregnancy, and showed a significant correlation with the outcome of labor ($p < 0.05$). Probability maternal mortality with pregnancy complications is 3.49 times

greater compared with no pregnancy complications. It is consistent with several studies that pregnancy complications are the direct cause of maternal deaths. Pregnancy complications that often occur is hemorrhage, preeclampsia/ eclampsia and infection.

Viewed from a labor complications factor, the percentage of mothers who died in the group with no complications of labor is relatively greater than that mother with pregnancy complications, but statistically Chi-square indicate that labor complications factors show no significant correlation with the outcome of labor ($p > 0.05$). Differ by puerperium complications factor, the percentage of women who died was greater in the group with the puerperium complications and showed a significant correlation with the outcome of labor ($p < 0.05$). Probability of maternal death in the presence of puerperium complication is 685.71 times greater compared with no puerperium complications.

Table 4. Association of Outcome Determinants to Maternal Conditions

Outcome Determinants	Maternal Conditions			Exp
	Death	Alive	Total	
Type of Labor				
• Spontaneous	7 (18.9%)	268 (41.6%)	275 (40.4%)	p=0,006* OR=0,327
• Interventions	30 (81.1%)	376 (58.4%)	406 (59.6%)	
Total	37 (100%)	644 (100%)	681 (100%)	
Pregnancy Complications				
• Yes	29 (78.4%)	328 (50.9%)	357 (52.4%)	p = 0.001* OR = 3,49
• No	8 (21.6%)	316 (49.1%)	324 (47.6%)	
Total	37 (100%)	644 (100%)	681 (100%)	
Labor Complications				
• Yes	8 (21.6%)	141 (21.9%)	149 (21.9%)	p = 0,969* OR=0,984
• No	29 (78.4%)	503 (78.1%)	532 (78.1%)	
Total	37 (100%)	644 (100%)	681 (100%)	
Puerperium Complications				
• Yes	30 (81.1%)	4 (0.6%)	34 (5%)	p = 0,0001* OR = 685,71
• No	7 (18.9%)	640 (99.4%)	647 (95%)	
Total	37 (100%)	644 (100%)	681 (100%)	

*chi square test

This is appropriate that complications of labor and puerperium complications is a direct cause of

maternal deaths. Complications that occur before labor and shortly after childbirth are hemorrhage, obstructed or prolonged labor and infections due to trauma in labor.

Based on bivariate analysis is known of the ten factors based remote determinant, between determinant, and the outcome determinant is maternal education, parity, maternal age, status referral, location of delivery, the first assisting deliveries, maternal history of systemic illness, type of delivery, complications of pregnancy, and puerperium complications have $p < 0.25$, so it was added to the multiple logistic regression. The result was obtained by multiple logistic regression test and it concluded that maternal history of systemic illness, pregnancy complications, and a puerperium complication are the most influence on the incidence of maternal mortality with $p < 0.05$.

Pregnant women with no pregnancy complications have 0.134 times as likely to die compared to pregnant women with no pregnancy complications. Pregnant women with no puerperium complications have 0,001 times as likely to die compared to pregnant women with no puerperium complications.

Pregnant women with systemic illness have risk of death 23.28 times greater compared to pregnant women with no systemic illness. Based on Nagelkerke R Square's coefficient, the pregnancy complications, puerperium complications, and systemic illness have 75.9% correlation on the incidence of maternal mortality and the remaining 24.1% is influenced by other factors.

CONCLUSION

Remote determinants, intermediate determinants, and outcome determinants showing a significant correlation with the outcome of labor are formal education, referral status, location of delivery, a history of systemic illness, type of delivery, pregnancy complications, and puerperium complications.

Based on the multiple logistic regression test on maternal systemic

illness factors, pregnancy complication factors and puerperium complications are the most significant on the incidence of maternal mortality.

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