



Mortality Determinants in the Handling of Maternal Emergencies

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The Maternal Mortality Rate (MMR) in Indonesia is still relatively high, and does not achieve the Millennium Development Goals (MDGs). However, antenatal care and births attended by health workers in Indonesia are quite high, including efforts by the PONEK program and PONEK. This study aims to ascertain the determinant of maternal mortality in North Lampung and the handling of maternal emergencies. Quantitative research methods were used to discern the determinants of maternal mortality; data retrieval was in the form of secondary data, and continued with qualitative methods in order to explore maternal emergency care. The sample size was 17 and participants were chosen using the Snowball method, a method of data collection utilising in-depth interviews, and focus group discussions (FGD). The number of maternal deaths in North Lampung shows fluctuations from year to year. The contextual determinants of maternal mortality in North Lampung showed that most of the mothers who died had a secondary education (72.8%), were homemakers (77.2%), had husbands who work (43.2%), and 68.1% of them were from isolated communities. The determinant of maternal deaths in North Lampung showed that the majority (70.5%) of mothers who died were multipara. 13.6% of mothers did ANC, 86.4% were given referrals to health services, 13.7% were aided by non-health workers (shamans), and 36.4% of pregnant women were aged between 21 and 35 years of age. The proximal determinants of maternal deaths in Lampung were due to complications with bleeding (45.6%) with 20.5% resulting from infections, and 20.5% from eclampsia. The results of the qualitative analysis showed that some problems related to the management of the emergency, with maternal deaths occurring mostly in hospitals, outside office hours, and when giving birth. The procedure for blood donors, and PONEK facilities were considered to be inadequate.

Key words: *determinants, maternal emergencies, the Millennium Development Goals*



Introduction

Indonesia has implemented emergency handling management, in the form Handling Basic Emergency Obstetric Neonatal (PONED) at the health centre level, and Services Comprehensive Emergency Obstetrics Neonatal (PONEK). The results of the evaluation in several regions in Indonesia found that implementation conforms to BEmOC standards. However, there is still the need to be more equipped, mainly in standard facilities. The results of the evaluation of infant deaths since the implementation of BEONC and PONEK show that there has not been a significant reduction in mortality.

Data relating to deliveries in health facilities in 2013 showed that in Lampung province (which included provincial maternity coverage) they were still under the national target of 89% ; figures were 88.6% for North Lampung district. Efforts to reduce AKI is associated with an increase in maternity coverage by health personnel. During 2009-2013, maternal deaths in government health care facilities tended to fluctuate, i.e., from 125 cases in 2009, increasing to 143 in 2010, to 152 cases in 2011, to 178 cases in 2012 and then slightly decreasing in 2013 to 158 deaths. These figures do not depict the actual deaths in the community, given that these deaths are handled by health personnel. Based on the causes of maternal mortality recorded in 2013, the most significant cause was due to bleeding at 31% of deaths; 29% of deaths were due to eclampsia, prolonged labor 0.63%, 6% infection, abortion 1%, and other causes 33% (Lampung, 2016)

The incidence of a persistently high Maternal Mortality Rate (MMR) in Indonesia, despite various attempts to alleviate it, has been suppressed in Lampung province. Health services in the Lampung region, including maternity coverage, are below standard, and require individual study and further research. Comprehensive models of effective treatments are required in order to reduce the death rate, since the direct causes of maternal mortality are complications in pregnancy coupled with poor access to health services. Recommendations of the study by the Evidence Summit are that the referral system requires revamping, according to the characteristics of the region. It is necessary to search further afield to get a design-related data handling model for referral of maternal emergencies.

This research was conducted to explore the data for consideration in the design of the system for the handling of emergency maternal referrals from the ground level (PONED) to the referral level 1 (PONEK).

Methodology

The aim of this research is to ascertain the the determinant of maternal mortality and the handling of maternal emergencies in North Lampung. This study was conducted using a sequential transformative strategy. Using this strategy, researchers applied a theoretical



perspective in order to establish specific procedures for the study. It was based on the conceptual framework of McCarthy and Maine who used a model approach and quantitative data to ascertain the determinants of maternal mortality. Further research was continued using qualitative methods such as in-depth interviews and focus group discussions (FGD), in order to study the documentation of the participants and obtain an idea of the handling of emergency maternal issues connected to maternal deaths.

The second phase included the families of mothers who had died, health officials directly involved in the treatment of patients (midwives, nurses, doctors, head of institution), and institutions (PKM, Hospitals, Public Health Service). The officer who chose the participants was involved in the management of patients in 2018-2019. . Sampling was done using the snowball method and included 17 deaths.

Research Phase 1: To identify the determinants of maternal mortality by way by documentation searches in the North Lampung Health Office. If the data did not exist an interview was conducted; the instrument used for data collection was a questionnaire.

Research Phase 2: Data collection was carried out by way of in-depth interviews with a data collection instrument called Free Interview and Focus Group Discussions (FGD). In FGD, the experience of handling cases by health workers and maternal mortality was discussed. In the early stages, data was obtained from the documentation of maternal mortality by the Health Office of North Lampung. It was then supplemented with in-depth interviews with the mother's family and included observations from the MCH handbook. . Data was then collected from birth attendants (midwives), health centre staff and village officials, where necessary. Further data collection was done at the referring hospital (PONED), namely HM Ryacudu Mayjend Hospital. by way of interviews and group discussions about the handling of maternal emergencies at the hospital. The explanation is based on the RS, and the researchers found it necessary to interview the officer at the Department of Health and the Indonesian Red Cross (PMI), which was the last interview conducted with the PMI.

Quantitative data analysis was used in this research in the form of frequency distribution analysis of the determinant factors of maternal mortality. Qualitative analysis of the data was obtained through the study of documentation, interviews, and focus group discussions. The analysis of the data relating to the handling of maternal emergencies was conducted from the base rate up to the reference level. Ethical clearance was obtained before the study began, with an ethical review of research protocols. The Ethics Committee for polytechnic study is Tanjung Karang.

Results and Discussion

The number of maternal deaths in North Lampung shows fluctuations from year to year, with

the lowest number recorded in 2018 (3 deaths), and the highest recorded in 2014 (11 deaths), as shown in figure 1.

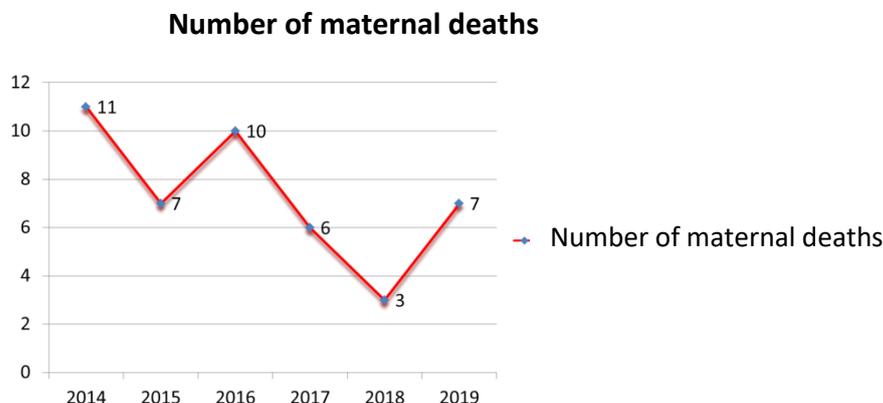


Figure 1. The number of maternal deaths in 2014 s / d in 2019

Table 1. Frequency Distribution of Contextual Factors in Determinants of Maternal Mortality in North Lampung 2014 s / d in 2019

Variables	Categories	Σ	%
Maternal education	SD	12	27.2
	SMP	15	34.1
	High School	17	38.7
Mother works	IRT	34	77.2
	trader	6	13.7
	farmer	4	9.1
Husband's work	Private	19	43.2
	trader	18	40.9
	farmer	7	15.9
Social status	Isolated	30	68.1
	urban	14	31.9

Table 1 shows the characteristics of the mothers who died: secondary education (72.8%), 'housewives' (77.2%), those with working husbands (43.2%), and 68.1% were from a remote community. From Table 2, it can be seen that the majority (70.5%) of mothers who experienced death were multipara. 13.6% of mothers did ANC, 86.4% had referrals to health services, 13.7 % were aided by non-health workers (shamans) and 36.4% of pregnant women were aged between 21 and 35 years of age. Table 3 shows that most mothers died from complications with bleeding (45.6%), 20.5% from infections and 20.5% from eclampsia.

Table 2. Frequency Distribution of Determinant Factors in Maternal Mortality in North Lampung 2014 s / d 2019

variables	Categorie	Σ	%
Parity	Primi	11	25
	Multi	31	70.5
	Grande Multi	2	4.4
ANC	To do	38	86.4
	Do not do	6	13.6
Access	Far	30	68.1
	Close	14	31.9
Helper	health workers	38	86.3
	Non-health workers (shaman)	6	13.7
Age	21-35 years	29	65.9
	<21> 35	15	34.1

Table 3. Frequency Distribution of Factors considered Proximal Determinants of Maternal Mortality in North Lampung 2014 s / d in 2019

Variables	Categories	f	%
Complication	Bleeding	20	45.6
	infection	9	20.5
	eclampsia	9	20.5
	heart	2	4.5
	henti_jantung	2	4.5
	hyperglycemia	1	2.2
	anemia	1	2.2

Qualitative analysis

Qualitative analysis was performed on the data obtained from in-depth interviews and Focus Group Discussions (FGD), and showed the following results:

1. Meeting to discuss the ten maternal deaths, based on interviews with the participants and midwives. On examination of the incidence of fatalities, it was found that 7 of the deaths occurred at night.
2. In interviews with participants (family and Midwives), it was found that eight of the maternal deaths occurred due to bleeding that took place within 24 hours after delivery.
3. Three out of ten respondents revealed that the wait for blood supplies was long and convoluted.

- There was less synergy between different departments: Midwives, BEONC PONEK and PMI. Interviews with several Midwives, FGD on PONEK officers, and focus group discussions with the Health Department revealed that every aspect of the handling of emergency maternal states was carried out at the maximum level (Midwives, PONEK, Red Cross, Department of Health), but that various parties did not support one another.

Maternal Mortality

The number of deaths in Indonesia is still the highest in Asia, with 2018-2019 data showing that the maternal mortality rate stands at 305 per 1,000 live births. In North Lampung there was fluctuations in the number of maternal deaths between 2014-2019, with the highest number of deaths occurring in 2014, and the lowest in 2018.

In comparison, the Maternal Mortality Rate (MMR) in other districts in Indonesia (Laian in Pati District) fluctuates with the highest number of deaths recorded in 2011 at 126 per 100,000 live births (Aeni, 2013). In Kapuas Hulu there were 14 maternal deaths in 2015 (Kapuas Hulu, 2019). The development of the maternal mortality rate in Indonesia, based on the Indonesian Demographic and Health Survey (IDHS) Maternal Mortality, showed a significant jump in 2012 to 359 per 100,000 live births. In 2007, the maternal mortality rate in Indonesia reached 228 per 100,000 live births (Nurrizka & Saputra, 2013).

Figure 2 shows the development of AKI from 1997 to 2012; the lowest mortality rate was achieved in 2007, but increased dramatically in 2012. much of the MDG target in 2015 and currently is the goal to be completed by 2013 that AKI SDGs 70.

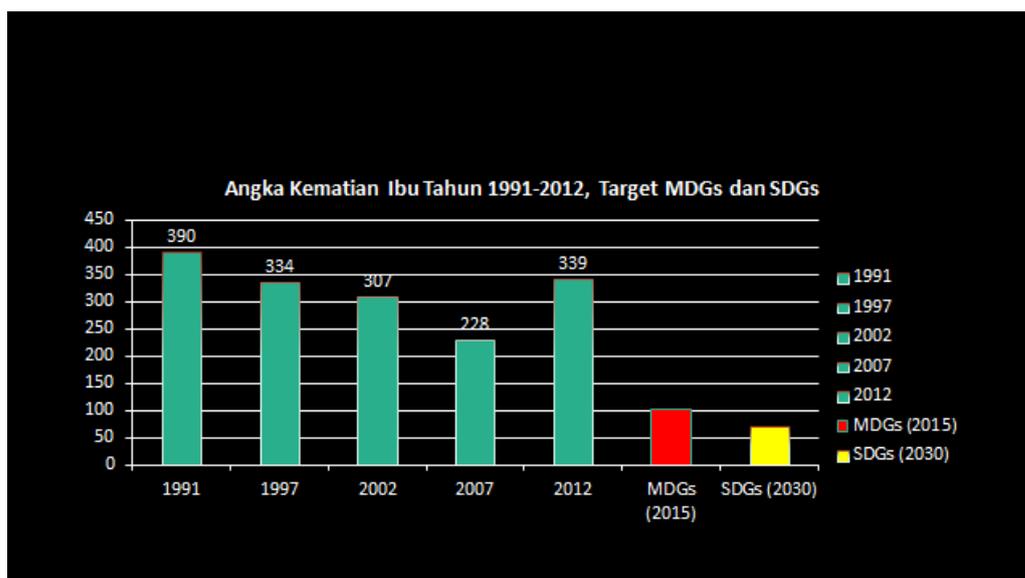


Figure 2. The development of AKI between 1997-2012
source: (Media Centre, 2014)



Since 2000, the maternal mortality rate (MMR) in Indonesia showed a downward trend. According to World Bank data, AKI in Indonesia was at a ratio of 177 deaths per 100,000 live births in 2017. This figure is down 35% compared to 2000, which recorded 272 deaths per 100 thousand births. Despite the decline, Indonesia has not yet reached the Millennium Development Goals (MDGs) identified in 2015 which amounted to 110 deaths per 100 thousand births (Widodo, Amanah, Pandjaitan, and Susanto, 2017).

Based on the definition of the World Health Organisation (WHO), maternal deaths occur during pregnancy or within 42 days after the end of the pregnancy. Some of the risk factors that are most often the cause of maternal mortality are hypertension and bleeding, among others. Infection, abortion, and long labours also pose risk factors for maternal death (Volkov, Granatovitch, and Guseva, 2017).

According to the Census Figures Survey (IPS) conducted in 2015, maternal mortality rates range from 305 deaths per 100,000 births. Of a total of 14,640 maternal deaths, only 4,999 were reported, which means that there were 9,641 deaths that were not published at the centre. According to this data, there were 83,447 maternal deaths in the villages, 9,825 maternal deaths in health centres, and 2,868 maternal deaths in hospitals (Francisco, 2013).

The WHO data shows that the maternal mortality rate is high. In 2017, in Sub-Saharan Africa, approximately 295,000 women died during and after pregnancy, or during childbirth., South Asia accounted for around 86% (254,000) of the estimated global maternal deaths in 2017. Sub-Saharan Africa alone accounts for about two-thirds (196,000) of maternal deaths, while South Asia accounts for nearly one-fifth (58,000). At the same time, between 2000 and 2017, South Asia achieved a reduction of the Maternal Mortality Rate (MMR) which was the highest overall: a reduction of almost 60% (from 384 to 157 AKI), despite its very high MMR in 2017. Overall, the maternal mortality ratio (MMR) in developing countries declined to just under 50%.

In 2017, according to the Fragile States Index, 15 countries were considered to be "extremely vigilant" or on "high alert" as a fragile state (South Sudan, Somalia, the Central African Republic, Yemen, Syria, Sudan, the Democratic Republic of Congo, Chad, Afghanistan, Iraq, Haiti, Guinea, Zimbabwe, Nigeria, and Ethiopia). Fifteen of these countries had MMR in 2017 ranging from 31 (Syria) to 1150 (South Sudan) (Althabe et al., 2015)(Ganchimeg et al., 2014).



Determinant Factors in Maternal Mortality

Determinants of maternal mortality consist of contextual determinants, the determinant between the proximal and the determinant factors. The third explanation for the determinant factor can be seen in the following statement:

a. Contextual Determinant Factors

Results of the study of contextual determinants of maternal mortality in North Lampung shows that most women who died had a secondary education, were 'housewives', and people who lived in remote areas. Culture determines knowledge factors in society, according to Green in Notoadmodjo in Irwan (2017), and knowledge and education influences health behaviours (Dr. Irwan S.KM, 2017).

Several studies have demonstrated that education is a determinant factor. Research by Rohmatin stated that 52.29% of AKI occurred in Surabaya which is the capital of the educated middle (Rohmatin, 2019). Research by Gurendro Putro, et al., concluded that 100% of women who died in the Hospital Dr. Rahem Abdoe Situbondo between January and July, 2013 were educated at the lower middle level (SLTA-non graduate) (Gurendro & Maisya, 2018).

An observational study using the Indonesian population census shows the results of maternal mortality was negatively related to the education levels of the head of the family; a woman that is a middle-educated head of the family is 63% less likely to experience the death of a mother than a woman of households headed by those who are uneducated (Cameron, Suarez, & Cornwell, 2019).

The results of a study of maternal mortality in Iran showed that gravidity, type of delivery, period of death, socio-economic status of the mother, place of birth and the utilisation of delivery care was related to maternal mortality: 32% of women in Iran are illiterate, 86% do not work and 90% experience a poor economic status (Zalvand, Tajvar, Pourreza, & Asheghi, 2019).

A stronger correlation was observed between the levels of social progress - such as education, attainment levels of fertility, and the empowerment of women - and the reduction of maternal mortality (El Arifeen et al., 2014).

b. Other determinant factors of maternal mortality

Identification of determinants are: the vast majority (70.5%) of mothers who died were classified as multipara, 13.6% of mothers did ANC, 86.4% were too far from referred health services, 13.7% were aided by non-health workers (shamans) and 36.4% were



attended to by herbalists.

Access to health services dramatically reduces the risk of maternal death. Each additional 10 km a woman was located from a hospital was associated with a 3.9% increase in the likelihood of maternal mortality. Although the distance to the health centre is not directly related to maternal mortality, each additional doctor at the health centre reduces the probability of maternal mortality by 3.2%.

Additional midwives working in the health centre is not associated with a decreased risk of maternal death, but the number of midwives working in the health centre in the village was found to be a protective factor, reducing the possibility of maternal mortality to 4.8%. The number of doctors in the town is the determinant that is highly statistically significant, although the effect is small (Lisa Cameron, K, 2015).

Increased access to and utilisation of health facilities was considered a critical contributor to improvement of the situation. Socio-economic factors have also been identified and found to be important, and contribute to a reduction in high-risk births, such as an increase in women's education, growth in income and a subsequent lessening of poverty, and advances in infrastructure (roads, bridges and communications) (El Arifeen et al., 2014), (Poudel, Upadhaya, Khatri, & Ghimire, 2018).

Birth attendant factors also play an essential role in contributing to maternal mortality, and are related to auxiliary health personnel, both to midwives with different levels of education and even by herbalists, well trained or not trained (Kamidah, 2018; Nirmala, Nurparidah, & Nopiantini, 2017). Studies by Banten (in Achadi et al., 2008) found that 79% of birth attendants in Banten pass D1 Midwifery. Even with education, the Midwife Diploma does not meet the standard requirements of a trained shaman (Media Centre, 2014) in Lisa Cameron. K, 2015). The proportion of births assisted by trained herbalists (83%) in Indonesia is better compared to other Southeast Asian countries despite the shortcomings in the quality of and access to services (Lisa Cameron, K, 2015).

c. Proximal determinant factor

Results of the study indicate a proximal determinant factor that most mothers who died experienced complications with bleeding (45.6%), 20.5% with infections, 20.5% with eclampsia.

Several studies have shown that bleeding is a direct and significant factor in maternal mortality (Thomas., 2017) (Kasap, 2015) (Volkov et al., 2017) (Malik, Begum, and Noor, 2019).



The WHO (2013) states that the global cause of maternal mortality in Southeast Asia was a direct cause of obstetric complications (83%), while 17% of deaths were due to indirect reasons (Say et al., 2014). 36% were due to obstetric bleeding, while 17% were a result of eclampsia (Say et al., 2014).

An observational retrospective study, at a hospital that provided secondary treatment of mothers, analysed data based on hospital records for two years from January 1, 1993 to December 31, 1994, and for two years from 1 January, 2008 to 31 December, 2009. The study found that the leading cause of death in secondary services was hemorrhage, eclampsia, and sepsis, obstructed labour, uterine rupture and anemia. Pre-eclampsia and eclampsia are severe and represent the most common cause of death (51.98% of all maternal deaths in January 1993 to December 1994), while bleeding (40%) was identified as the most common cause of maternal death (WHO, UNICEF, UNFPA, 2019).

Several studies in Indonesia regarding the origins of maternal mortality, including research in Pati regency, have concluded that the causes of maternal death are due to heart disease, preeclampsia/eclampsia, and bleeding (Aeni, 2013). Research by Astari et al. concluded that more than half of mothers die in childbirth due to hypertension in pregnancy (HDK) and identified this as a leading cause of maternal death. Other determinant factors were that more than half of all mothers who died had a junior high school education, most did not work and had an average family income. Among the determining factors were that most mothers do not experience KEK and anemia, and the maternal age at the time of death was between 20-35 years of age. More than half occurred in primiparous coverage of health services where it took 1-2 hours to arrive at the health service or to reach a qualified healthcare professional. Other determinant factors that influence maternal mortality are complications in pregnancy, childbirth, and post-partum. Other barriers and referral issues experienced by women who died were due to the mother's family, late referral to health facilities, long distances from health facilities, access to BPJS, long wait times and transportation problems. The speed and accuracy of health workers (both midwives and doctors) in making decisions, referrals, effective management of emergency situations and stabilisation of the patient's condition are essential factors in saving the lives of mothers. This is because maternal deaths often occur as a result of delays in the diagnosis of complications, late decisions, late referrals, long distances from health facilities, access to BPJS, and transportation problems (Lauria, Sandela, & Elvira, 2018; Riyanti & Legawati, 2018).

A search of emergency cases that resulted in maternal deaths in hospitals in Purworejo, and Central Java, shows that the results of maternal mortality was due to both medical and non-medical factors. A significant factor is that senior members of the family and the husband do not always recognise the danger signs during pregnancy and the delays involved in accessing a medical facility. The trust factor and traditional aspects of culture,



in addition to socio-economic factors, often contribute to the occurrence of fatal situations for mothers. Non-medical factors may also influence the medical decision-making process in medical emergencies that result in fatalities in some cases (Hasnah & Triratnawati, 2010) (Respati et al., 2019; Zahtamal et al., 2011).

Conclusion

The number of maternal deaths in North Lampung has shown year to year fluctuations; the lowest number of deaths was reported in 2018 (3), and the highest was in 2014 (11). The contextual determinants of maternal mortality in North Lampung showed that most mothers who died had a secondary education (72.8%), were homemakers (77.2%), had working husbands (43.2%) and 68.1% lived in a remote community. The determinant of maternal deaths in North Lampung showed that the majority (70.5%) of mothers who died were multipara. 13.6% of mothers did ANC, 86.4% were referred to health services. 13.7% were aided by non-health workers (shamans). 36.4% of pregnant women were aged between 21 and 35 years. Proximal determinants of maternal deaths in Lampung showed that most mothers died due to complications with bleeding (45.6%), 20.5% from infections, and 20.5% from eclampsia. The results of the qualitative analysis showed that some problems related to the management of the emergency, maternal deaths occurred mostly in hospitals, and outside office hours. Of those who died postpartum (after giving birth), the procedure for blood donors, and PONEK facilities were inadequate.



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