

**MATERNAL DEATH IN INDONESIA:
FOLLOW-UP STUDY OF THE 2010 INDONESIA POPULATION CENSUS**

Kematian Ibu di Indonesia: Studi Follow-up Sensus Penduduk Indonesia 2010

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Abstract

Background: Among ASEAN countries, Indonesia is the country with high maternal mortality ratio (MMR) and unable to reach target of reduction of MMR. In order to reduce the MMR target, the government of Indonesia needs evidence to evaluate and design the maternal health program.

Objective: The study aims to answers specific issues of who, when, where and why maternal death occurred in Indonesia in order to understand the effective policy and health program decisions.

Methods: The 2010 Indonesia Population Census identified pregnancy-related deaths occurring in the household from 1 January 2009 until the date of census (May 2010). The follow-up study revisited almost half of households reporting pregnancy-related deaths to be accounted as samples (4167 of 8464). Basic information related to cause of death were collected by trained data collector using verbal autopsy approach. The information was converted to cause of death defined by medical doctor using WHO ICD-10 rules. The underlying cause of death was later analysed.

Result: The highest risk of maternal death was adolescents who were pregnant under 15 years old. The maternal death mostly occurred at postpartum period (56%), 57 percent occurred at hospitals and 31.3 percent at home. Oedema, proteinuria and hypertensive disorder in pregnancy were at 27 percent, whereas complication during labour and delivery problems were accounted for 26 percent. The pattern of maternal causes of death varies between regions.

Conclusion: Maternal health program has not been considered as general plan of intervention. It is imperative to consider considered by pattern of characteristics and cause of maternal death and region for effective interventions.

Keywords: pregnancy-related death, maternal mortality, maternal health status

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INTRODUCTION

Maternal mortality remains major challenge to health systems worldwide. As the 2015 date for the Millennium Development Goals (MDGs) ends, reduction of maternal mortality is an unfinished agenda for Indonesia. It is one of national health development priority, which requires more attention on the improvement and sustainable commitment to high-functioning maternal health programs along the continuum of care. Over the past two decades, many ASEAN countries have succeeded in significant progress of maternal mortality reduction, but these achievements have been uneven. Indonesia, for example, still has high level of Maternal Mortality Rate (MMR) and rank the third highest followed to other ASEAN countries, such as Cambodia and Lao PRD.¹

While civil registration systems are the most appropriate vital statistics on maternal deaths, the system remains insufficient as data source in the majority of developing countries, including Indonesia. Civil registration system in Indonesia is still lacking and inadequate as source of maternal death. Maternal deaths are relied from alternative data source, mostly household based surveys with their limitation. Indonesia Demographic and Health Survey (IDHS) has been use as data source to obtain maternal death information by employing direct sisterhodd method (sibling technique). IDHS 1994 thru 2012 have been used to demonstrate level and trend of MMR (pregnancy related deaths) at national level. However many parties don't agree with the level and trend of MMR from IDHS due to limitation of approach (sibling technique) which give unreliable estimates. Inconsistency level and trend of MMR was demonstrated by the recent 2012 IDHS.² IDHS as data sources of MMR only provide limited information on health services and did not provide sufficient information on cause of death.

Given the shortcomings of civil registration and limitation of IDHS, it has been suggested to find a more appropriate data collection approach for producing acceptably precise, cost-effective estimates of maternal mortality. It has also been recommended by ICPD+5 action program to consider the use of the census for maternal mortality measurement.³

Through the 2010 Population Census, Statistics Indonesia (BPS) has initiated to include questions of pregnancy-related deaths in the census questionnaire. Every household was asked to report death events within the period from 1 January 2009 until 15 May 2010 (census date). Pregnancy related deaths were defined as female aged 10 years above who died during the period of pregnancy until 2 months after birth.⁴ To ensure the quality of pregnancy related death information from the 2010 Population Census, BPS Statistics conducted a follow-up verification on the completeness and classification of the pregnancy related death cases.

More than 8000 pregnancy related deaths were reported by the 2010 Population Census within the periode 1 Januari 2009-May 2010. The number of reported pregnancy-related deaths was huge as compared to 2007 IDHS which only reported 62 within the periode 5 years preceding the survey as the basis of MMR estimation.⁵ It line with the government policy to reduce number of maternal deaths through enhancing an effective policy and maternal health program. It is a great opportunity if the pregnancy related death reported by 2010 Population Census could be followed up by obtaining causes of death and related death information on the role of health infrastucture and maternal care⁶ The opportunity has been realized by A follow-up study in 20100 as a collaboration between The National Institute of Health Research and Development (NIHRD) and the Indonesia Statistics (BPS) . The study follow-up almost half of total pregnancy-related death reported by 2010 Populatiuon Census. An instrument employing verbal autopsy method was developed to determine maternal cause of death. This paper is an attempt to discussing the issues about who, where, when and why maternal death occurred about the magnitude of the problems and the pattern of maternal causes of death between regions in Indonesia.

METHODS

Follow-up study was collaboration between National Institute of Health Research and Development (NIHRD) and Indonesia Statistics (BPS). The study follow-up pregnancy related death reported by 2010

Population Census. The sampling frame of the study was a listing of validated pregnancy-related deaths obtained prior the study.

Table 1. Definition and source of variables analysed in the study

Variables	Definition	Data source	Numerator	Denominator
1. Age specific pregnancy related death rate	The women (10 yrs+) who died during pregnancy or 2 months after birth	Follow-up study and 10% data from 2010 Indonesia Population Census	Number of 10-59 years old women died from follow-up study	Number of 10-59 years old women who delivered 1 January 2009 until census from 10% 2010 Indonesia Population Census
2. Attainment of school	The educational background based on the graduation certificate.	Follow-up study and 10% data 2010 Indonesia Population Census	Mothers died according to attainment of school from follow-up study	Number of population 10-59 years old women who delivered 1 January 2009 within the same group
3. Working activities	Working activities; 1. Earning wages (working) 2. Housewife	Follow-up study and 10% data 2010 Indonesia Population Census	Mothers died according to working activities from follow-up study	Number of population 10-59 years old women who delivered 1 January 2009 within the same group
4. Type of residency	Type of residency; 1. Urban 2. Rural	Follow-up study and 10% data 2010 Indonesia Population Census	Maternal died according to type of residency (urban and rural) from follow-up study	Number of population 10-59 years old women who delivered 1 January 2009 within the same group
5. Region	Group of islands (region) where deceases lived.	Follow-up study and 10% data 2010 Indonesia Population Census	Maternal died according to region area from follow-up study	Number of population 10-59 years old women who delivered 1 January 2009 within the same group
6. Timing	Periode when death occurred; - Pregnancy - Abortive - Delivery - 0-42 days after birth - 43-60 days after birth	Follow-up study	Mothers died according to maternal periode (pregnancy, delivery, post partum period)	All pregnancy-related deaths
7. Place	The place where mothers died	Follow-up study	Mothers died according to the place	All pregnancy-related deaths
8. Underlying cause of death	The disease or condition that initiated any events leading to death or any circumstances of the accident or violence that produced a fatal injury. The single identified cause of death should be a specific as possible ⁷	Follow-up study	Single code or code group of underlying cause of death	All cases from follow-up study

A sample of 4167 cases of pregnancy related death was selected from 8464 cases in the population. Stratified Proportional Probability to Size (PPS) technique was employed. The sample was designed to representing 5 regions (Sumatera, Java-Bali, Kalimantan, Sulawesi and Eastern Indonesia) and included 134 districts within in 27 provinces.

Data collection was carried out in November-December 2011. Every trained enumerator

assigned to revisit household sample with pregnancy-related death. According to the classification of the 2010 Indonesia Population Census, eligible cases were any pregnancy-related deaths of women aged 10-59 years old who died during pregnancy until 2 months after birth at the reference period (1 January 2009 until time of interview in May 2010).⁸ Information about the etiology and cause of death based on the decease's history was asked to family members, which

were carefully selected to ensure the death information given would support the best final diagnosis of maternal death. The data quality control was undertaken by NIHRD researcher, BPS on district and province level.

In survey or sensus, maternal death is identified base on time-of-death question such as Pregnancy related death rather than true maternal. 2010 population census used time-of death approach until 2 months after birth. World Health Organisation defined a pregnancy-related death⁹ as follow:

“A pregnancy-related death is the death of a women while pregnant or within 42 days of termination of pregnancy, irrespective of cause”

Since the definition of maternal death⁹ as follow:

“A maternal death is the death of a women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of pregnancy from any cause related to aggravated by the pregnancy or its management but not from accidental causes’

Both definitions⁷ show that the cause of death is essential to identify the accurate maternal death compared to the pregnancy-related

death, which was only based on the timing of death related pregnancy.

The instruments used in the interviews were designed by NIHRD and BPS. The instrument designed for autopsy verbal approach included identification and characteristics of diseased women, and brief story leading to cause of maternal death. The interview was carried out by trained enumerators under supervision of NIHRD researchers.

Variables analysed in this paper included Age Related Pregnancy Specific Death Rate (ASPRDR), working activities, type of residency, region, timing and place of death, underlying causes of death as explained in Table 1 above.

Two steps of data management were arranged for the analysis. First, the completed autopsy verbal questionnaires were reviewed by collaboration field team between NIHRD and BPS. The questionnaire returned to Jakarta and all information should be entered at the BPS office. Second, the questionnaires without ID were sent to NIHRD to determined cause of death. Basic information on signs, symptoms and observations on autopsy verbal questionnaire were reviewed by qualified physicians to define cause of death was further converted to ICD 10 code to classify final underlying cause of death (FUCOD).

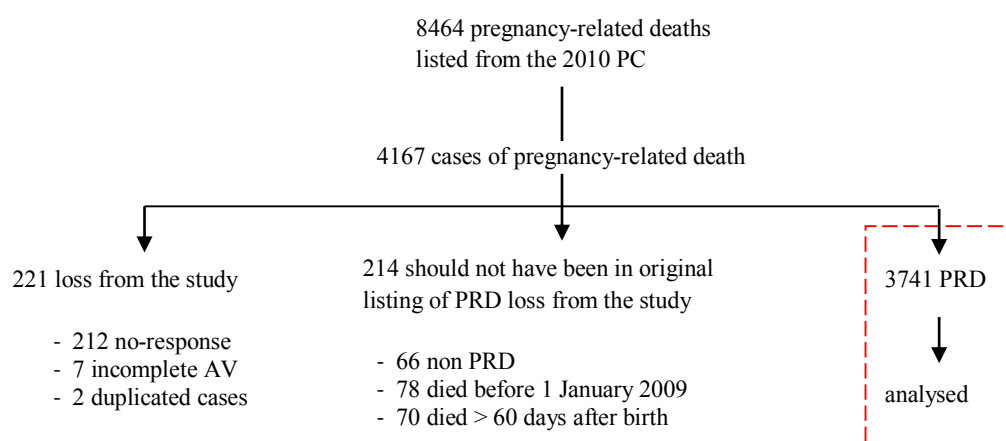


Figure 1. The flow diagram for the case selection of the study

The eligible records of pregnancy-related death were analysed to obtain the proportion of time, place and causes of death based on the

characteristic variables such as age, education, working activities, residency and region. Some analyses, which needed information outside

the follow-up study, were provided by existing 2010 population census data (see Table 1). The analysis also applied weighting procedur. Further, variables 1-5 spesifically used the formula for rate defined as:

$$Rate = \frac{Numerator}{Denominator} \times 100000$$

Nevertheless, the study has some limitations in regards to under reporting of death cases, recall interval period between dates of population census and follow-up study. Limitation may influence the determination and pattern of cause of maternal deaths.

This study was granted ethical approval by the National Commission on Ethics of Health Research dated 12 September 2011 Number: KE.01.09/EC/508/2011

RESULT

We analysed 3741 of 3796 death records, which were successfully entered. Figure 1 above shows the summary of data.

Age Spesific Pregnancy-related Death Rate (ASPDR)

Based on the analysis of weighted 3741 pregnancy-related death records, we identified those who were classified as maternal death in Indonesia. We found maternal mortality at the age of 13-59 years old. Figure 2 shows the age specific pregnancy-related death rate by urban-rural residence. The denominator of the rates was based on population of females delivering babies since 1 January 2009 reported by the 2010 census population (were closely represented the population at risk). Mothers aged 13-14 years were at extremely high-risk of maternal death. The ASPDR in rural was higher than urban at all agegroup.

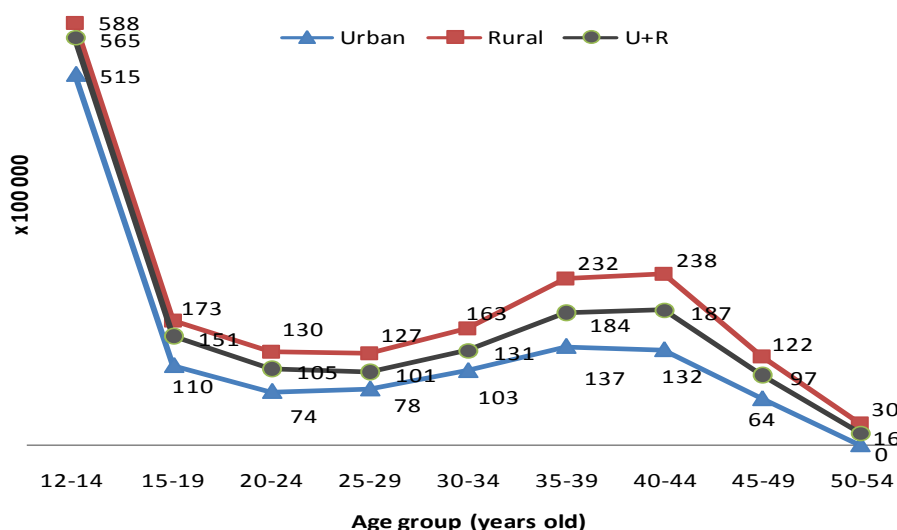


Figure 2. The Age Specific Pregnancy-related Death Rate in Indonesia based on the residency classification.

Characteristics of pregnancy-related death

Pregnancy-related death rate characteristics were presented on Figure 3. Mothers who were

less educated (elementary school), worked and lived in rural area had higher rates than others. Region of Sulawesi had the highest pregnancy-

related death rate than other regions, whereas the Java-Bali was the lowest.

Timing and places of maternal death

Information about timing and place of maternal deaths is important to understand the period of high-risk death and where the common maternal deaths occurred. The timing of pregnancy-related death was mostly occurred during postpartum period (57%) followed by pregnancy period (22,4%) and childbirt period (14,6%). While the common place of maternal death mostly at hospital (58%) and home (31,4%), see Figure 4. This place of maternal death was likely related to the access of health services when mothers had had a complication.

Causes of maternal death in Indonesia

The Statistics Indonesia (BPS) collected pregnancy-related death information in the 2010 Population Census. NIHRD then conducted a follow-up study to obtain the causes of death through diagnoses, resume and coding activities. This collaboration has supported information on how maternal death was occurred in Indonesia.

We analysed the cause of death based on ICD 10 as shown on Table 2 and 3. The Table 2 shows that there was 2.4 percent maternal death caused coincidental causes which were not maternal death. Maternal most died cause related direct obstetrics (74%) and the proportion of this category varied by region. Another category of maternal cause of death i.e. indirect obstetric showed high in in Region Java-Bali and Eastern of Indonesia.

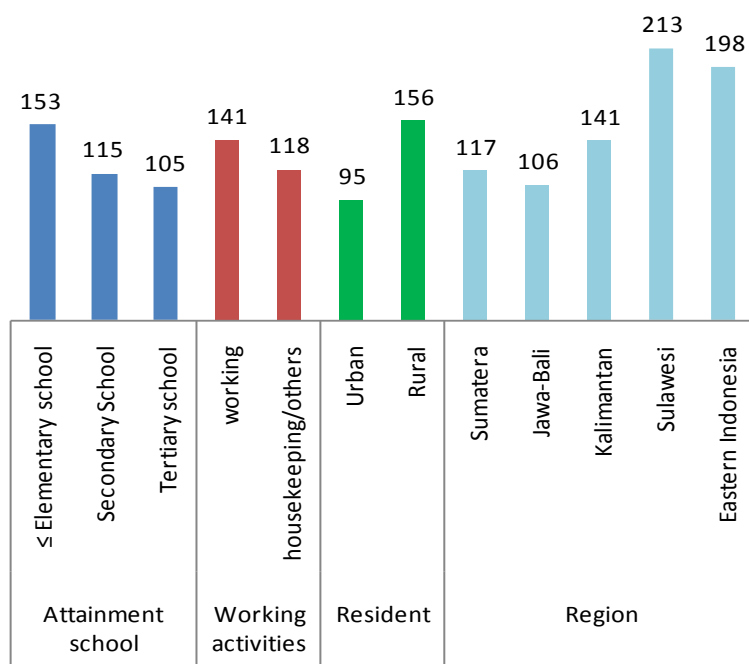


Figure 3. Level of pregnancy-related death rate by characteristics

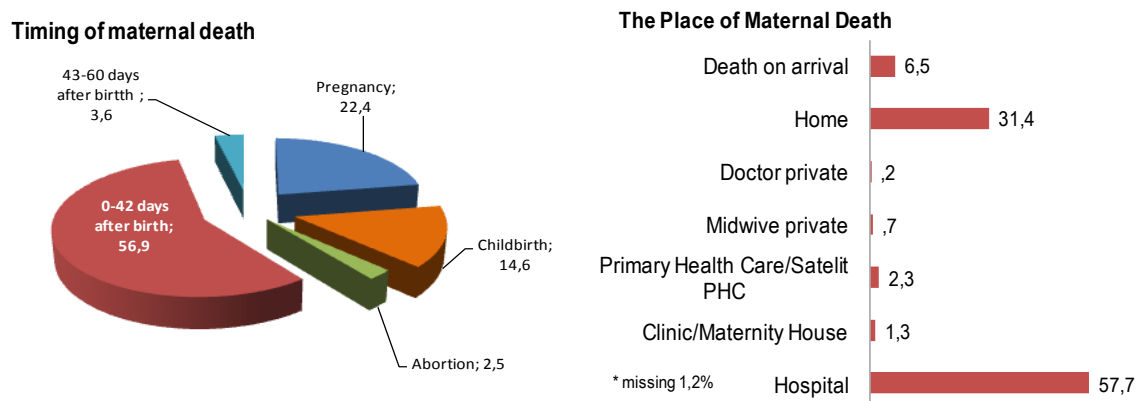


Figure 4. The timing and place of maternal deaths in Indonesia

Table 2 also shows that according to the definition of maternal death among pregnancy-related death, there was almost fourpercent of non-maternal death accrued by accident (ICD 10 code V and X). Table 3 describes the 25

leading single causes of death. The table shows that the primary cause of death was postpartum haemorrhage (20,21%). However, this pattern was different if we analysed the causes by group.

Table 2. Proportion of maternal death by direct and indirect causes of maternal death and region, 2011

Cause of death (ICD-10 Code)	Sample (Weighted)	Region					Indonesia
		Suma- tera	Jawa- Bali	Kali- mantan	Sula- wesi	Eastern Indonesia	
Coincidental (V01-X59)	177	2,8	2,0	3,2	2,8	1,9	2,4
Direct obstetric causes (O00-O97)	5583	77,5	70,8	77,4	76,7	73,9	73,9
Indirect obstetric causes (O98-O99)	1790	19,7	27,2	19,4	20,5	24,2	23,7
Total	7550	100,0	100,0	100,0	100,0	100,0	100,0

Refer to Table 3, although postpartum haemorrhage was the largest causes of maternal deaths in Indonesia, but if we compile into a group of oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium appropriate to the grouping of ICD-10 (see Table 4), the percentage of causes maternal mortality by this

group was 27 percent, larger than postpartum haemorrhage.

Based on this information, it can provide an overview to imply the program as an evaluation and intervention planning.

Table 3. The 25 largest proportion of pregnancy-related death by single causes of death, Indonesia, 2011

Rank	ICD-10 Code	Underlying cause of death	Sample (Weighted)	Percentage
1	O72	Postpartum haemorrhage	1526	20,21
2	O99	Other maternal diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium	1131	14,97
3	O15	Eclampsia	948	12,56
4	O98	Maternal infectious and parasitic diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium	659	8,73
5	O10	Pre-existing hypertension complicating pregnancy, childbirth and the puerperium	306	4,06
6	O14	Gestational [pregnancy-induced] hypertension with significant proteinuria	304	4,02
7	O13	Gestational [pregnancy-induced] hypertension without significant proteinuria	213	2,82
8	O86	Other puerperal infections	177	2,35
9	O16	Unspecified maternal hypertension	169	2,23
10	O46	Antepartum haemorrhage, not elsewhere classified	145	1,92
11	O90	Complications of the puerperium, not elsewhere classified	141	1,87
12	O96	Death from any obstetric cause occurring more than 42 days but less than one year after delivery	117	1,55
13	O75	Other complications of labour and delivery, not elsewhere classified	99	1,31
14	O88	Obstetric embolism	95	1,26
15	O03	Spontaneous abortion	89	1,18
16	O85	Puerperal sepsis	83	1,10
17	O00	Ectopic pregnancy	81	1,08
18	O12	Gestational [pregnancy-induced] oedema and proteinuria without hypertension	79	1,04
19	O26	Maternal care for other conditions predominantly related to pregnancy	69	0,91
20	O63	Long labour	68	0,90
21	O44	Placenta praevia	63	0,84
22	O21	Excessive vomiting in pregnancy	57	0,76
23	O67	Labour and delivery complicated by intrapartum haemorrhage, not elsewhere classified	55	0,73
24	O95	Obstetric death of unspecified cause	55	0,73
25	O73	Retained placenta and membranes, without haemorrhage	53	0,71
26		Others	766	10,15
			7550	100,00

Table 4. Percentage maternal death caused by oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium (O10-O16) of pregnancy related death, Follow-up Study of Population Census, 2011

ICD 10 Code	Underlying cause of death	Sample weighted	Percentage
O15	Eclampsia	948	12,56
O10	Pre-existing hypertension complicating pregnancy, childbirth and the puerperium	306	4,06
O14	Gestational [pregnancy-induced] hypertension with significant proteinuria	304	4,02
O13	Gestational [pregnancy-induced] hypertension without significant proteinuria	213	2,82
O16	Unspecified maternal hypertension	169	2,23
O12	Gestational [pregnancy-induced] oedema and proteinuria without hypertension	79	1,04
Hypertention of pregnancy disorder		2019	26,74

DISCUSSION

High commitment to enhance maternal and childhood health status as one of the health development targets, is still under priority of Ministry of Health Republic of Indonesia. National Medium-Term Development Plan (RPJMN) 2009-2015 has stated that "Health Access Achievement" aims to achieve life expectancy at birth, decrease of infant mortality rate and decrease maternal mortality ratio are among the six main targets of health development in 2019. The data shows that IDHS 2012 MMR in Indonesia (359 per 100,000 live births) was higher than IDHS 2007 (228 per 100,000 live births).^{2,5} IDHS provided estimation the MMR for five years period preceding survey. However IDHS has it limitation that the maternal health program requires further adequate information of MMR need needed by maternal health program. This implies that the maternal health program requires further information not only the level mortality but also information on cause of maternal deaths as evidence for generating better policy development.

In 2010, the Indonesia Statistics (BPS) collected pregnancy related death information in the 2010 Population Census instrument (part of Block V).⁸ Every household was asked if there was any household member died within time reference (1 January 2009 until 15 May 2010). The death cases identified can be classified by sex and age. In order to select pregnancy-related death, definition of timing

of deaths occurrence is preferred. A pregnancy-related death is defined as the death of a women while pregnancy or within 2 months of termination of pregnancy irrespective of cause.⁹ Hill mentions that by this definition, the result of pregnancy-related death is generally reported as maternal death.³ Pregnancy-related death is specific information to differ maternal death from non-maternal death with identification of timing of adult female death relative to pregnancy, abortion childbirth, or post partum period.

The 2010 Indonesia Population Census defined pregnancy-related death as deaths occurred until 2 months after birth. When we compared with the definition of maternal deaths according to WHO, the death in the period of 43 to 60 days after delivery is included in the category of late maternal death.¹⁰ Although the 2010 census covered the entire population, not all pregnancy related deaths could be identified. The general problem of identification pregnancy related deaths in the census is problem of missclassification and incompleteness of death reporting. The Indonesia 2010 Population Census was a big task involving huge enumerators. Compared with sample household survey, the census is lack in enumerator recruitment, training and supervision which may ended with less data quality. The pregnancy related data obtained by the 2010 Census Data were indicated by high percentages incompleteness and missclassification.

The follow-up study result was based on the successfully reported cases and many unknown pregnancy related deaths were excluded. The information generated from this follow-up study excluded unknown pregnancy related deaths. About 50 percent of pregnancy related deaths were not reported and unlikely the characteristics of reported and un-reported deaths are the same. Therefore information generated by the follow-up study; included level of pregnancy related rates, patterns of cause of maternal death and characteristics of pregnancy related deaths should be interpreted with caution.

Who maternal died in Indonesia?

Characteristic of maternal death by age group covered question on persons who had maternal death. We calculated maternal mortality rate by age group. We use population of women in the same group who reported having given birth for the period from January 1, 2009 from the 2010 population census as the denominator. The denominator was used to choose population at risk, women who were exposed pregnancies in the same age group.

Figure 2 indicated the high risk of death for adolescent pregnancy. WHO also reported that the highest risk of maternal mortality are adolescence girl under 15 years old. Complications in pregnancy and childbirth are the leading cause of death among adolescence girls in developing countries.¹¹ Adolescent pregnancies are also major health problems in Indonesia. Tin Afifah¹² stated that early marriage in Indonesia were mostly occurred among people with the poverty, living in rural area and unemployed.¹² Early marriage affects the risk of pregnancy at a very young age that associated with fetal development and pregnancy process. This increases the risk of maternal death. If the fetus survived, the baby will be faced with the problem of inadequate growth thus included in the cycle of growth failure. Figure 2 showed that childbearing age less than 15 years old was higher rate than other age groups.

Gender and culture are common issues in Indonesia, which influence early marriage. Education was related to health seeking behavior. The study shows that mothers with less education, working and live in rural had

the highest death rate. It is found that education is one of the ways to postpone the early marriage. The government's policy of 9 years compulsory education is an effort to improve basic education. By this policy it is expected that girls graduate from junior high school at 15 years old with an insight of better basic education. Based on the Marriage Law No. 1 of 1974, the requirement of a minimum marriage age for women is 16, which is inadequate from the aspect of reproductive health.¹³ At the childbearing age below 19 years old, the reproductive organs of girls is immature enough so that they are categorised as a pregnancy risk group. Delay in pregnancy as the aim of family planning program is an effort to reduce maternal mortality. When associated with education, scholarships will further help poor girls to continue to higher education and consequently delay marriage until the age of 18 years. In addition to that, State Ministry for Population/ National Family Planning Coordination Board (BKKBN) had *GenRe (Generasi Berencana)* program to give awareness of the youth to plan a marriage and pregnancy.¹⁴

When and where maternal died in Indonesia?

The information about the timing of maternal death is needed for maternal health services plan. Every mother should be provided with adequate access to health services. The continuum of care for maternal and newborn health should be started from antenatal care for every pregnant woman and provided by professional health care. At least four times pregnant women has access to health facilities and received "7T" services (recently known as 10T program) to detect the risks of pregnancy.¹⁵

The Figure 2 shows that the maternal deaths mostly occur at postpartum period. Mothers and neonates are the vulnerable group of people and have high risk in the first days after birth.¹⁶ Some risks identified after birth were bleeding/haemorrhage and eclampsia. This implies that the reduction of maternal deaths is associated with postpartum care. WHO recommends postpartum care packages¹⁷ as follow:

- *If birth in health facility, mothers and newborns should receive postnatal care in the facility for at least 24 hours after birth*
- *If birth at home, the first postnatal contact should be as early as possible within 24 hours of birth*
- *At least three additional postnatal contacts are recommended for all mother and newborn; on day 3 (48-72 hours), between days 7-14 after birth and six weeks after birth.*

One of the Ministry of Health's policy, which is related to postnatal contact, is that for every delivery woman must receive postpartum care three times until 42 days after childbirth.¹⁸ First postpartum care (1stPPC) was held during 6 hours until 3 days after delivery.¹⁸ This service aims to prevent mothers from postpartum haemorrhage, since this period is crucial for them to suffer from maternal complication. Second postpartum care is undertaken during 4 until 28 days after childbirth and the third postpartum care is at 29 until 42 after childbirth.¹⁸ The purposes postpartum care are to anticipate postpartum complication and to provide after-delivery contraception, respectively.¹⁹ If we compare the coverage of each care, the 2010 Basic Health Research (*Riskesdas*) presented that only 65.2 percent of women received first delivery postpartum care.²⁰ This means that almost half the women who did not get access to postpartum care.

This result of follow-up study strongly argued a recommendation to enhance the coverage of postpartum care provided by arising health facilities. It is imperative for Indonesia to scale up postpartum health care in order to reduce the number of maternal death.

Figure 2 also explained the most maternal deaths were happened at hospital than at home, meaning that maternal complication is often occurred unpredictable. Three non-clinical factors influencing maternal death is delay to recognise the emergency situation, delay to decide the appropriate health facility to deliver baby and delay to reach health services.²¹ The high proportion of death occurring at hospital may not the contribution of non-clinical

factors mostly due to delay to reach the hospital. The delay receiving the treatment by the hospital may also contribute to maternal deaths in the hospital.

Figure 3 revealed that Sulawesi had the highest maternal death rate among regions followed by Eastern Indonesia, Kalimantan, Sumatera and Jawa Bali. Priority to reduce maternal mortality is needed for Sulawesi and Eastern Indonesia. This information also prompted the government to encourage mother deliveries in health facilities so if any problems such as complications or maternal and newborn emergencies can get adequate treatment and maternal and neonatal deaths can be prevented.

The causes of maternal death

Information of death causes is important to understand the underlying causes of death. Table 2 and 3 indicate that Indonesian maternal deaths mostly due to direct obstetric causes. Maternal health services demand a great effort to provide comprehensive and continuity services. Based on Table 3, postpartum hemorrhage (20%) was the first leading cause of pregnancy-related death, but hypertension at pregnancy disorder was the highest at group level (Table 4). Both causes have same intervention strategy that an early risk detection at antenatal care is necessary to anticipate the risk of maternal death. Early detection of hypertension at pregnancy disorder can be done using simple urine test laboratory. Yet, a study indicated that only 53.3 percent of pregnant women who reported had urine test during the last pregnancy.²²

Maternal health program should there for ensure that every pregnant woman receives adequate antenatal care, not only for the minimum quantity of four times of care along pregnancy but also the quality of care, especially early detection of pregnant women from complication risks. To address this purpose the pregnant woman should be served by health professional that have good competency. Postpartum hemorrhage is the leading cause of death identified as emergency situation and needs quick response of health

treatment. Delay on finding the treatment for maternal health will consequently affect to the risk of death. Another problem is geographical aspect as some population live in very remote area. This causes a barrier for mothers to access the health facilities.

To avoid postpartum haemorrhage, it is essential to ensure pregnant women to deliver at health facility and received sufficient blood storage. Community awareness will empower every pregnant woman to have antenatal care during pregnancy and support to delivery at health facility. If both community and health facility are cooperated together to improve maternal health, Indonesia will be getting a step closer to reduce the maternal death in Indonesia.

CONCLUSION

The highest risk of maternal death was mostly appeared at adolescents under 15 years old. To reduce early marriage, adequate education should be addressed by providing fellowship to poor teenagers to stimulate them to continue their education and postpone the marriage. To reduce the number of maternal death, health program should ensure that more mothers should have adequate access to postpartum care, especially during the first postpartum period. Other aspect is to increase the access of mothers who have emergency obstetrics. From geographic perspective, increasing community awareness is the first step to improve access to health facility.

The result of the study should be interpreted with caution due to the limitation of the study. Samples were only included half of all deaths obtained from the population census. Therefore, the cause of death in the follow-up does not necessarily describe the cause of death.

RECOMMENDATION

Postpartum hemorrhage as the first leading single cause of death is the condition of obstetric emergency that requires timely response. Development of community awareness on referral system will ensure the access of adequate maternal health treatment.

In addition, early detection of pregnancy complication risk is one way to avoid the risk of hypertension disorder in pregnancy. Maternal health program should provide simple urine test to detect the risk of hypertension at pregnancy disorder. Another recommendation is that complete services package of continuum of care should ensure that every pregnant woman received health services continuously. Family planning especially the long-term contraceptive type should also be easily acknowledged and accepted by every married couple. Meanwhile, different pattern of maternal death should be considered as the evidence for decision makers to plan interventions.

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