ORIGINAL ARTICLE

Maternal and Infant Mortality Rates's Contributing Factors Description and Its Prevention in Kencong Healthcare Center, Jember Regency : A Descriptive Study

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ABSTRACT

Background: Maternal Mortality Rates (MMR) and Infant Mortality Rates (IMR) are two of the indicators on the success of health programs in Indonesia. Jember has become the district with the highest rate of maternal and infant deaths throughout 2020-2021.

Methods: This research assessed the contributing factors of MMR and IMR in Puskesmas Kencong, Jember Regency. This study uses a qualitative descriptive research design. Data in this study were taken by conducting interviews to fill out questionnaires to mothers who had given birth at least once and the Coordinating Midwife and Head Midwife of PONED (Basic Emergency Neonatal Obstetrics Services) at the Puskesmas Kencong. Then the data from the questionnaires and interviews will be processed and then explained in the narrative.

Results:. Based on data from questionnaires filled out by 37 respondents, as well as questions posed to the midwife, Puskesmas Kencong has fulfilled the requirements needed as a PONED Health Center according to PONED Guidelines.

Conclusion: The PONED Health Center at Kencong Health Center has a low prevalence of MMR and IMR.

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Introduction

Maternal Mortality Rates (MMR) is one of the indicators on the success of health programs in Indonesia. MMR can be defined as all deaths during pregnancy, childbirth, and puerperium. Maternal mortality rates in Indonesia tends to decrease every year, but the number is still insignificant and hasn't met the target of Sustainable Development Goals (SDGs). MMR, which was initially progressively decreasing throughout the year, had increased again in 2020 and reached its peak in 2021. MMR in 2021 was mainly caused by COVID-29 infection followed by post-partum bleeding and hypertension in pregnancy [1]. Infant Mortality Rate (IMR) is all infant deaths in the age of 0-59 months. This mortality rate along with MMR is also one of SDGs targets of 2021. The number of infant deaths in 2021 was 27.566, which had decreased from 2020, which was 28.158 deaths. Even though we can see the decrease in numbers, this decrease is still not significant and has not met the SDGs target of 25 deaths per 1.000 births [1].

The Maternal Mortality Rate in Jember Regency in 2021 had increased to 115 cases from 61 cases in 2020. This figure had brought Jember Regency to become the district with the highest Maternal Mortality Rate in East Java Province in 2021. This was due to the lack of complete pregnancy checks so that high risk pregnancies were left undetected. There were 9 cases of maternal mortality in Jember Regency in 2021 caused by bleeding, 15 cases of hypertension during pregnancy, 1 case of infection, and 90 other cases. Jember Regency also became the highest Infant Mortality Rate (IMR) in East Java Province with 300 cases in 2021. The most cases of infant mortality in Jember Regency were caused by low birth weight as many as 88 cases. [23]

Puskesmas Kencong is one of the health centers in the Jember Regency with a working area covering Kencong and Wonorejo Villages. Kencong District has an area of 5865.3 ha / 65.92 km2 with a total of 71,430 inhabitants. Kencong sub-district has 46 posyandu, two supporting health centers (*puskesmas pembantu*), and one village polyclinic (*poliklinik desa*) spread throughout the Kencong sub-district. The complications of pregnancy and childbirth that are most often encountered and referred to at the *Puskesmas Kencong* are premature rupture of membranes, severe preeclampsia, prolonged 1st stage of birth, premature parturition, and hepatitis B positive patients. Meanwhile, most neonatal referral cases are caused by giant babies, low birth weight babies, and severe asphyxia. In 2021, there were three cases of maternal death and one case of infant death at *Puskesmas Kencong* [23].

MMR can be caused by the 3T (*3 Terlambat*) or 3 Delays factors, namely Delay in Making Decisions, Delay in Referring, and Delay in Obtaining Services [4]. Delay in decision making is possible due to being late in realizing a complication or late in early detection of a complication, fear of the hospital, or lack of funds. Delays in reaching referral sites may be due to difficulties in transportation facilities, while delays in obtaining services may occur due to a lack of medical equipment facilities, limited operating rooms, and limited blood supplies. The delay in service in this case refers to services at referral hospitals, and this factor has the greatest impact on maternal mortality, because not all facilities provide emergency obstetric services, so that it becomes a separate problem for the health care system [5]. In addition, internal factors or 4T include too young in maternal age (< 20 years), too old in maternal age (> 35 years), too close in pregnancies

interval (< 2 years), and too many children (more than four) can affect MMR [67]. IMR is closely related to factors that affect MMR because the baby is directly related to the mother in terms of nutrition, immunity, and so on [8].

The high MMR and IMR are the main focus of this research. The risk factors that influence the occurrence of AKI and IMR, especially in Jember, which is the highest contributor to MMR and IMR in East Java, need to be studied and found out so that prevention and mitigation efforts can be made.

Methods

This study uses a qualitative descriptive research design and has been approved by the Ethical Committee of Medical Faculty of Jember University. Data to determine the late decision factor in this study were taken by conducting interviews to fill out questionnaires on November 2022 to mothers who had given birth at least once from 2020-2022. Data to find out the late referral factor was carried out by conducting interviews with the Coordinating Midwife and Head Midwife of *PONED* (Basic Emergency Neonatal Obstetrics Services) at the *Puskesmas Kencong*. Then the data from the questionnaires and interviews will be assessed according to PONED Guidelines and then explained in the narrative.

Results

The questionnaire given to the respondents was divided into several sections according to the question criteria. Respondent characteristics including place of residence, age, mother's educational background, ethnicity, and religion are shown in Table 1.

Table 1. Respondents Characteristics

	n	%
Address		
Cakru	1	2,7
Gumuk Mas	1	2,7
Gumuk Banji	12	32,4
Kencong	4	12,8
Krajan	11	29,7
Pondok Waluh	1	2,7
Ponjen	3	8,1
Wonorejo	4	10,8
Age		
<20 year old	1	2,7
20 - 35 year old	33	89,2
>35 year old	3	8,1
Mother's Educational Background		
Has not completed primary school	1	2,7
Primary School Graduate	4	10,8
Junior High School Graduate	10	27
Senior High School Graduate	15	40,5
College Graduate	7	18,9
Ethnic		
Javanesse	27	73
Javanesse - Maduranesse	5	13,5
Maduranesse	2	5,4
Others	3	8,1
Belief		
Islam	37	100

The characteristics of the respondents presented in Table 1 shows that the majority of respondents we met at the Kencong Health Center lived in Gumuk Banji (32.4%), followed by Krajan (29.7%) and Kencong (12.8%). Most of the respondents were mothers aged 20-35 years (89.2%), then more than 35 years (8.1%), and less than 20 years (2.7%). The majority of respondents were senior high school graduates (40.5%) followed by junior high school graduates (27%). The respondents we met were Javanese (73%), Maduranese (8.1%), and Javanese-Maduranese (5.4%), and all of them were Muslim.

We examined the characteristics of the respondents to determine the socio-cultural background of the

respondents and their influence on habits that could increase MMR and IMR.

Mother's basic information can be seen in Table 2, where we included it in the questionnaire to analyze the effect of basic information such as occupation, gravida, parity, etc. on the MMR and IMR figures.

Table 2. Mother's Basic Information

	n	%
Occupation		
Housewife	31	83,8
Farmer	1	2,7
Civil Worker	1	2,7
Nurse	2	5,4
Tailor	1	2,7
Midwife	1	2,7
Gravida		
First	10	27
Second	19	51,4
Third	5	13,5
Fourth	2	5,4
Fifth	1	2,7
Parity		
0	3	8,1
1	20	54,1
2	12	32,4
3	2	5,4
Mother's age at birth of first child		
Abortion	3	8,1
<20 year old	4	10.8
20 -35 year old	30	86,5
>35 year old	0	0
Mother's age at birth of last child		
Abortion	3	8,1
<20 year old	3	8,1
20 -35 year old	30	86,5
>35 year old	1	2,7
Pregnancies Interval		
First pregnancy	12	32,4
<2 years	1	2,7
2 - 10 years	18	48,6
>10 years	5	13,5
Maternal medical history before pregnancy		
None	34	91,9
With medical history		
Typhoid fever	1	2,7
Hypertension	1	2,7
Vulvar Tumor	1	2,7
History of complications during last pregnancy		
None	32	86,5
With complications		
Abortion	4	10,8
Late due date	1	2,7
History of complications during last delivery		
None	35	94,6
With complications		
Prolonged first phase	1	2,7
Post Date	1	2,7
History of complications during last delivery		
None	35	94,6
Referral if there are complications during the last delivery		
Not referred	1	14,3
Referred	7	85,7
Referral destination		
Puskesmas	1	12,5
Clinic	2	25
Regional Public Hospital	3	37,5
Private Hospital	2	25

Based on the questionnaire data in Table 2, the majority of respondents (83.8%) were housewives who did not work. Most of the respondents had been pregnant twice (51.4%), and following in second place were respondents with their first pregnancy (27%). Most of the respondents had given birth once (54.1%). The age of the mother at the time of giving birth to her last child was mostly in the age range of 20-35 years (86.5%) with the interval between pregnancies being the majority in the range of 2-10 years (48.6%). The majority of respondents did not experience any complications during pregnancy (91.9%), while one respondent had experienced hypertension during pregnancy, one respondent had experienced a vulvar tumor, and one respondent had had typhoid fever. 10.8% of respondents had experienced an abortion in a previous pregnancy. The majority of respondents did not experience complications during childbirth, but respondents were found with prolonged first phase (2.7%) and late due date (2.7%). Seven of the respondents who experienced complications were

referred (85.7%) with the most referral destinations being regional public hospitals (37.5%), clinics (25%), and private hospitals (25%).

Infant's basic information is presented in Table 3 as an overview of the baby's birth history as things that can affect IMR

Table 3. Infant's Basic Information

	n	%
Current age of last child		
<1 year old	7	18,9
1-3 year old	11	29,7
3-5 year old	6	16,2
>5 year old	10	27
Gender of last child		
Female	23	67,6
Male	11	32,4
Mother's gestational age at last delivery (weeks)		
Preterm (<37 weeks)	17	40.5
Aterm	12	32.4
Postterm	5	13.5

The majority of respondents' babies are currently in the range of 1-3 years (29.7%). The sex distribution of the respondent's babies was 67.6% female and 32.4% male. The majority of respondents gave birth at term (40.5%), but the percentage of preterm births was still large, namely 32.4%.

Antenatal visits are presented in Table 4 to describe the pregnancy examination status of the respondents.

Table 4. Antenatal Visits

	n	%
ANC visit		
Ever	37	100
Never	0	0
Gestational Age at first visit (K1)		
1 month	21	56,8
2 months	8	21,6
3 months	5	13,5
4 months	2	5,4
5 months	1	2,7

	n	%
Comprehensiveness of ANC		
Complete (standard 1:1:2)	32	86,5
Uncomplete	5	13,5
ANC Treatments and Care		
Maternal Weight Check		
Yes	37	100
No	0	0
Maternal Blood Pressure Check		
Yes	37	100
No	0	0
Uterine fundal height measurement		
Yes	35	94,6
No	2	5,4
Administration of TT Immunization		
Yes	26	70,3
No	11	29,7
Administration of Blood Supplement Tablets		
Yes	35	94,6
No	2	5,4
Urine test for STD detection		
Yes	24	64,9
No	13	35,1
Counseling		
Yes	35	94,6
No	2	5,4
Antenatal Care Examiner	**n**	**%**
Midwife	32	86,5
Obstetricians	4	10,8
Quack	1	2,7
Antenatal Care Place	**n**	**%**
Midwife's private practice	17	45,9
Posyandu	9	24,3
Puskesmas/ Pustu	6	16,2
Clinic	3	8,1
Polindes	1	2,7
Other people's resident	1	2,7
Source of recommendations for antenatal care/ANC		
Own desire	32	86,5
Health Cadre	2	5,4
Neighbour	2	5,4
Husband	1	2,7
Mother's assistance during antenatal care/ANC		
Alone	12	35,1

Husband	22	59,5
Parents	2	5,4
Parent in laws	1	2,7
Family members	1	2,7
Health workers who conducts the antenatal care / ANC		
Midwife	33	89,2
Obstetricians	4	10,8

All of the respondents had done antenatal care with most of the first visits being made at one month's gestation (56.8%). The completeness status of respondents' ANC visits according to the standard reached (86.5%). Most of the standard checks on ANC have been carried out except for urine tests and immunizations which are carried out according to the indications and immunization status of the respondents. ANC is mostly done by midwives (86.5%) and most is done in midwife's private practice (45.9%). The majority of respondents came for prenatal checks of their own free will (86.5%) and came accompanied by their husbands (59.5%). However, not a few also came to health facilities (35.1%) to do ANC. Basic childbirth information is presented in Table 5 as an overview of how childbirth in the area was done.

Table 5. Basic Childbirth Information

	n	%
Helper for the last birth		
Midwife	26	70,3
Obstetricians	10	27
Reasons for choosing the birth helper		
Think it's safer	13	35,1
Near mother's residency	7	18,9
The only health workers available are midwives	2	5,4
Close relationship with the healthworker	5	13,5
There were complications so they were referred to birth attendants	7	18,9
Others	3	8,1
Place of last delivery		

Puskesmas	9	24,3
Hospital	8	21,6
Midwife's private practice	7	18,9
Private clinic	5	13,5
Other people's residence	5	13,5
Maternity Hospital	2	5,4
The source of recommendations for choosing the place of delivery during the last delivery		
Own desire	27	73
Husband	5	13,5
Parents	2	5,4
Health cadre	3	8,1
Healthworker's referral	2	5,4
Doctor	1	2,7
Mother's companion during the last birth		
Alone	1	2,7
Husband	31	83,8
Parents	12	32,4
Parent in laws	6	16,2
Family members	2	5,4

The majority of respondents chose to have their birth assisted by a midwife (70.3%) unless they experienced complications that had to be referred, on the grounds that they felt it was safer to have it done by a midwife (35.1%). Respondents mostly chose the place of delivery at the Puskesmas (24.3%), hospital (21.6%), and midwife's private practice (18.9%). The decision on where to give birth was mostly due to the respondents' personal wishes (73%), and 83.8% of respondents gave birth accompanied by their husbands. Basic health information is presented in Table 6 to describe the health support facilities for respondents outside the availability of health workers.

Table 6. Basic Health Information

	n	%
Health Insurance Ownership		
None	18	48,6
Own a health insurance		
BPJS	13	35,1
KIS	4	10,8

Jamkesmas	1	2,7
Mediciline	1	2,7
Distance from Home to Health Facility		
<1 km	20	54
1-5 km	16	43,2
>5km	1	2,7
Total family income in one month		
< Rp. 1.000.000	5	13,5
Rp 1.000.000 - Rp 1.499.000	9	24,3
Rp 1.500.000 - Rp 1.999.000	9	24,3
≥ Rp 2.000.000	14	37,8

Most of the respondents did not own any health insurance (48,6%). BPJS was owned by most respondents (35,1%) who claimed to have health insurance. The average distance of health facilities from the respondents residency was less than 1 kilometer (54%), or in the range from 1 to 5 kilometres (43,2%).

We also conducted interviews with the Coordinating Midwife and Head Midwife of *PONED* to assess the fulfillment of the criteria for the *Puskesmas* Kencong as *PONED* (Basic Emergency Neonatal Obstetrics Services). The data from the questionnaire states that the *Puskesmas* Kencong has 4 ready-to-use ambulances with the availability of health workers consisting of 19 midwives, 2 general practitioners, 25 nurses, and a dentist who works on a 24-hour shift system. Drugs and equipment used in obstetrics emergencies and fetal distress are available and can function properly. The most obstetric referral cases from 2020 were premature rupture of membranes, and the most referred neonatal cases were giant babies. The main referral goals for the *Puskesmas* Kencong include dr. Soebandi Public Regional Hospital, Balung Public Regional Hospital, and dr. Haryoto Public Regional Hospital Lumajang.

Discussion

The Maternal Mortality Rate (MMR) is an indicator of the success of health programs in Indonesia. MMR can be defined as all deaths during pregnancy, childbirth and the puerperium. The maternal mortality rate tends to decrease every year but the decrease that occurs is insignificant and still does not meet the target of the Sustainable Development Goals (SDGs). AKI in Indonesia will increase again in 2020 and reach its peak in 2021. AKI in 2021 is mainly caused by COVID-19 infection followed by postpartum hemorrhage and hypertension in pregnancy [1].

The Maternal Mortality Rate in Jember Regency in 2021 has increased to 115 cases from 61 cases in 2020. This figure has brought Jember Regency to become the district with the highest Maternal Mortality Rate in East Java Province in 2021. This is due to restrictions on visits for pregnancy checks so that the screening of high-risk pregnant women becomes less than optimal. There are 9 cases of maternal death in Jember Regency in 2021 caused by bleeding, 15 cases of preeclampsia, 1 case of infection and 90 other cases. There will be no cases of maternal death in *Puskesmas* Kencong in 2021 [23].

The Infant Mortality Rate (IMR) is all infant deaths aged 0-59 months. This figure is also one of the SDGs targets. The number of infant deaths in 2021 was 27,566 which decreased from 2020, which was 28,158. This reduction, which is still not significant, still does not meet the SDGs target of 25 deaths per 1,000 births [1]. Jember Regency in 2021 has the highest Infant Mortality Rate (IMR) in East Java Province with 300 cases. The most cases of infant mortality in Jember Regency were caused by LBW as many as 88

cases. At *Puskesmas* Kencong there were 3 cases of infant death in 2021 [23].

This high maternal and infant mortality rate can be caused by the 3T factor, namely Delay in Making Decisions, Delay in Referring, and Delay in Obtaining Services [4]. In addition, internal factors or 4Ts, including Too Old, Too Young, Too Close Distance of Pregnancy, and Experiencing Too Many Pregnancies also affect MMR [6]. IMR is also closely related to factors that affect MMR because the baby is directly related to the mother in terms of nutrition, immunity, and so on [8]. Other factors that can influence are the mother's age, multigravida, parity status, ANC visits that are incomplete and not according to the 10T standard, family support, and decisions about where to give birth which are not determined by the pregnant women themselves [9].

Maternal age has a significant influence on maternal mortality because age is a factor that needs to be considered to maintain the stability of the mother's condition during pregnancy [1011]. At the age of <20 years and> 35 years will increase the risk of maternal death. This is because at the age of <20 years the mother's reproductive organs are still not mature enough and when the mother is >35 years old a degenerative process occurs [1213]. This study shows that 33 out of 37 respondents are in the age of 20-35 years old. At this age, it is said that the age is not at risk, so it does not increase cases of maternal and infant mortality.

Gravida is the total number of maternal pregnancies, including normal and abnormal intrauterine pregnancies, abortions, ectopic pregnancies and hydatidiform moles. Gravida has no significant effect on maternal mortality, but increases the risk factors for pregnancy complications. This is consistent with the theory that explains the relationship between gravida and

the incidence of complications of pregnancy and childbirth. Primigravida and gravida ≥ 4 are one of the factors causing problems in pregnancy and childbirth. Mothers with gestational primigravida are more susceptible to blood pressure problems, namely preeclampsia, bleeding, miscarriage, preterm (premature) labor, congenital disorders and abnormalities, impaired fetal growth in the womb [14]. In this study, it was found that 20 out of 37 respondents were primigravidas, 12 out of 37 respondents had been pregnant twice.

Parity is the number of babies born alive by the mother [15]. Parity is said to have no relationship to maternal mortality but the higher the parity can have a negative impact on the mother. Women with high parity can increase welfare and quality of life problems [16]. High parity will increase the mother's risk of developing cardiovascular disease and type 2 diabetes mellitus [17]. The results of this study found that 20 out of 37 respondents had given birth to a live birth once and 12 out of 37 respondents had given birth to a live birth twice. Pregnant women are required to make antenatal care (ANC) visits at least four times during pregnancy. This visit is carried out at least once in the first trimester (K1), at least once in the second trimester (K2), and at least twice in the third trimester (K3 and K4). Examinations that must be carried out during ANC visits are known as 10T [18]. Antenatal Care (ANC) must be carried out from the beginning of pregnancy so as to be able to detect early risk factors for pregnancy and childbirth so that proper prevention and management can be carried out [19]. Pregnant women are required to make ANC visits at least four times during their pregnancy because it can reduce maternal mortality through screening and early treatment [20].

In this study it was found that all respondents carried out ANC examinations with a

distribution of 34 respondents doing K1 in the first trimester, and 3 respondents doing K1 in the second trimester. There were 32 out of 37 respondents who had made standard ANC visits, namely at least once in the first trimester (K1), at least once in the second trimester (K2), and at least twice in the third trimester (K3 and K4). Meanwhile, 5 out of 37 respondents did not make ANC visits at the appointed time. Examinations carried out by all pregnant women at ANC are weighing and measuring blood pressure. There were 11 pregnant women who did not get TT immunization because these pregnant women already fulfilled the TT vaccination status. There were 2 mothers who did not get iron tablets, 13 respondents did not do urine tests, and 2 respondents did not do counseling with health workers.

One effective solution in reducing the Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) is by increasing delivery assistance provided by trained medical personnel provided by health care facilities. In addition, it requires the participation and awareness of mothers on the importance of prenatal check-ups at health care facilities by health workers. The Ministry of Health of the Republic of Indonesia requires pregnant women to carry out pregnancy checks by professional health workers and at health service facilities. This is intended so that pregnant women receive quality and comprehensive services [18]. The results of this study found that 32 out of 37 chose to have a pregnancy check-up at the Independent Practicing Midwife, 26 out of 37 respondents gave birth with the help of a midwife, 11 out of 37 respondents gave birth at a Gynecologist. Respondents have also conducted ANC pregnancy checks and deliveries at health care facilities.

Respondents said that carrying out examinations and deliveries at health facilities was safer so as to reduce maternal and infant mortality. In addition, the respondents made ANC visits and deliveries at health facilities as a result of good education by midwives in classes for pregnant women.

Forms of family support can be in the form of positive appreciation of individuals, encouragement, approval of individual opinions, as well as support and attention [21]. Family support that plays a very important role is support from the husband who is the closest person to pregnant women [22]. Family support plays an important role in influencing the motivation and psychology of mothers in carrying out health behaviors. From this research it can be seen that the respondents get support from the family. This can be seen from the assistance of respondents when carrying out ANC examinations and childbirth. During the ANC examination, 22 out of 37 respondents were accompanied by their husbands. During the delivery process, 36 out of 37 respondents were accompanied by their husbands and/or family. In addition, this family support can be seen from the majority of the husbands and/or families of the respondents who gave authority to the respondents to determine the place for ANC examinations and their own deliveries.

The number of maternal deaths in Indonesia in 2021 has increased compared to 2020. This shows the low quality of maternal health services. WHO states that one of the important aspects of maternal and child health services is the existence of a close relationship with the health services that are above it. This close relationship is reflected through an effective referral system [9]. An effective health service referral system is one of the efforts to improve the quality of health services

which can have an impact on reducing the Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) [23]. The results of this study indicate that the referral system at the *Puskesmas* Kencong has been running well so there is no delay in referring. This is proven by the available infrastructure according to the PONED Capable Health Center guidelines, midwives provide education before being referred, midwives contact destination hospitals to prepare for patient acceptance, transport using ambulances, midwives bring tools and medicines needed during the trip, and fill out referral letters online completely.

Conclusion

Based on data from questionnaires filled out by 37 respondents, as well as questions posed to the midwife, *Puskesmas Kencong* has fulfilled the requirements needed as a PONED Health Center according to PONED Guidelines. However, the promotion strategies to enrich mothers' knowledge about pregnancies and infants care should be enhanced.

Conflict of Interest

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