International Journal of Medical and Health Research
www.medicalsciencejournal.com
ISSN: 2454-9142
Received: 11-01-2023, Accepted: 27-01-2024, Published: 13-02-2024
Volume 10, Issue 1, 2024, Page No. 43-51

Analysis of determinants of disparity in maternal mortality rates between provinces in indonesia

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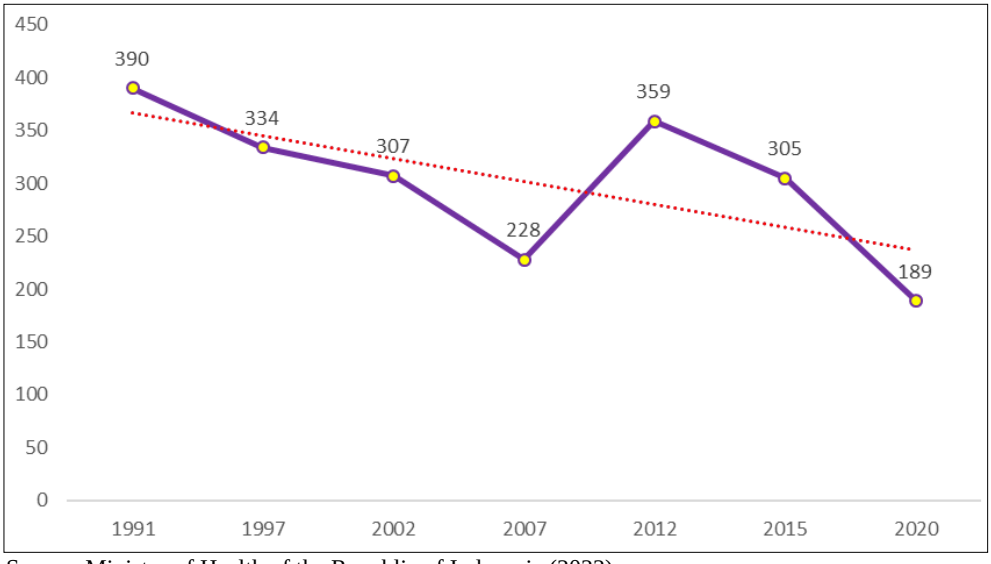
Abstract
There have been numerous attempts to reduce the maternal mortality in Indonesia especially to reach target Suistanable Development Goals (SDGs) (70/100,000 live birth) in 2030. However, maternal mortality in Indonesia is still far from the target and high enough than any other Southeast Asian Country. There's even a disparity between provinces. This reflects the gap of several factors relating to health and especially pregnant women and childbirth. However, it is Not many have done studies on the disparities (differences) between provinces in Indonesia especially those who use Indonesian health profile data. This study is analytical descriptive, using cross-sectional design with quantitative approach. Research locations in 34 provinces across Indonesia, using Indonesian Health Profile Data from 2014 to 2021.The secondary data is analyzed through the univariate analysis, bivariate (Simple linear regression), and multivariate (Multiple linear regression). The results of univariate analysis have been found that the average maternal mortality of 34 provinces in Indonesia in the past 8 years has not reached target SDGs of 129 per 100,000 per live birth especially in eastern Indoensia. Research results also showed that the most influential variables on the variation of maternal mortality between provinces in Indonesia are population density P Value= 0.005 and percentage coverage antenatal care (K4) P Value= 0.028 with R2= 0.16.

Keywords: Maternal mortality ratio, determinant, Indonesian health profile, reggression test, disparity, variations between provinces

Introduction

Maternal mortality is still a problem in many countries, especially in low- and middle-income countries.[1] Until 2017, there were still around 810 maternal deaths per 100,000 Live Births (KH) and these deaths 94% occurred in low- and middle-income countries although in the same period there has been a decrease of 38% [2]. In the Asian region, Asia-Pacific is the second highest contributor to Maternal Mortality Rate (MMR) (69/100,000 live births) after South Asia (163/100,000 live births) [3].

As a country in the Asia-Pacific region with middle income, Indonesia has a fairly high MMR (177/100,000 KH) even 6 times greater than Malaysia (29/100,000 KH) and 5 times greater than Thailand (37/100,000 KH).[3] The general picture of MMR in Indonesia from 1991 to 2020 continues to decline (Graph 1.1), this is contained in the 2021 Indonesian Health Profile [4]. The death rate in 1991 was 390/100,000, then in 2020 it was able to be reduced to 189/100,000 KH [5].

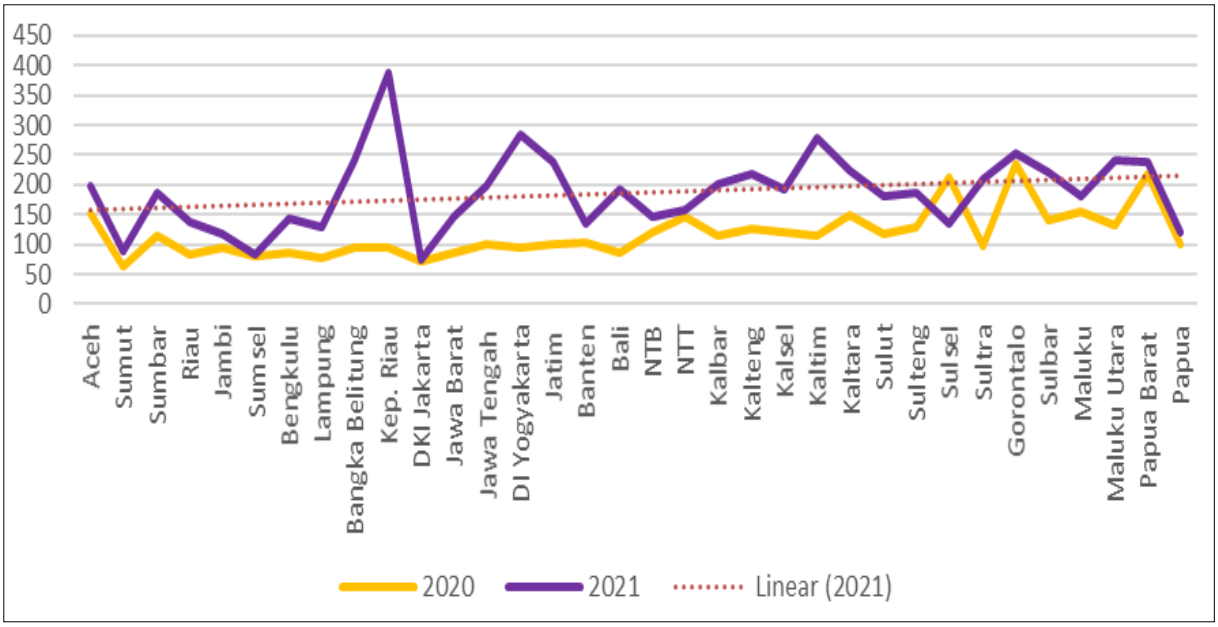


Source: Ministry of Health of the Republic of Indonesia (2022)

Graph 1.1: Maternal Mortality Rate Graph in Indonesia Per 100,000 Live Births

From the chart above, it shows that the MMR trend from 1991 to 2020 continues to decline. The results of the Inter-Census Population Survey (SUPAS) data in 2015 show that there are disparities (differences) in MMRs on each island in Indonesia. The island of Java-Bali, which is the center of government and metropolitan area, has the lowest MMR of

247/100,000 live births. While the islands of NTT, Papua, and Maluku which are far from the center of government have the highest maternal mortality of 489/100,000 live births [6].



Source: Ministry of Health of the Republic of Indonesia (2022)

Graph 1.2: Graph of Maternal Mortality Rate Between Provinces in Indonesia Per 100,000

Live Births 2020-2021

Data from Indonesia's Health Profile in 2021 shows that MMRs reported in Indonesia vary greatly, it can be seen that there are differences between one province and another (Graph 1.2).[4] The highest MMR (2021) occurred in Riau Islands Province (387/100,000 KH) and the lowest in DKI Jakarta Province (75/100,000 KH). Only South Sulawesi province experienced a significant decrease in MMR from 213/100,000 KH in 2020 to 135/100,000 KH in 2021. The trend line shows that the more to the Eastern Indonesia region, the higher the MMR.

There is still a disparity in MMR between provinces even though the government has made various efforts to reduce MMR, including by ensuring that maternal delivery is assisted by trained health workers in health care facilities, monitoring pregnant women by immediately referring if complications occur, ensuring mothers carry out ANC and family planning (KB) services [4]. Special programs that directly target pregnant women include classes for pregnant women and the Childbirth Planning and Complications Prevention Program (P4K), Antenatal Care (ANC) where at least once service in pregnancy and check once during the first trimester, and childbirth must be carried out at health care facilities, Tetanus Diphtheria Immunization services for WUS, giving blood added tablets, family planning services and HIV examination and Hepatitis B [4].

Based on previous research conducted by Girum & Wasie on factors that correlate with differences in maternal mortality rates in developing countries (82 countries) with variables observed including socio-economic, health care systems, and disease burden.[7] It was found that there was a correlation between the coverage of antenatal services, trained midwives, the ratio of doctors, the ratio of midwives and nurses, access to better water sources and sanitation, adult literacy rates, early marriage, GNI per capita, incidence of disease, unmet need, and several other variables with maternal mortality ratios. In the research of Alvarez.[8] it is known that various factors related to the occurrence of MMR differences between countries in Sub-Saharan Africa include health service systems & Family Planning (KB) (ANC coverage, assisted childbirth for health workers, access to adequate water sources, access to proper sanitation), education (adult literacy rate, contraceptive prevalence, ratio of women to men rates, primary school enrollment rate, education index), and economy (national gross income per capita, out of pocket for health, health financing by the government).

Previously, had conducted research on maternal mortality disparities between districts in Indonesia, but only examined 1 year of data and took variables including K1 & K4 visit coverage, childbirth coverage assisted by health workers, postpartum (KF) visit coverage, average number of children, average length of WUS schooling, poverty rate and population density [9]. So that researchers are interested in analyzing the determinants of MMR disparity between provinces in Indonesia using data from the Indonesian Health Profile for 2014-2019 by adding variables to the percentage of literate adult population, puskesmas carrying out classes for pregnant women, puskesmas implementing childbirth planning and complication prevention (P4K) programs, percentage of puskesmas with sufficient midwives, percentage of pregnant women getting TTD, number of blood transfusion units and contraceptive coverage.

The reason researchers use health profile data is because other data such as the Indonesian Health Demographic Survey (IDHS 2018) are not available, MMR data between provinces can only see maternal mortality outcomes (dead or alive mothers), in the Inter-Census Population Survey (SUPAS) the variables available are limited, and in Basic Health Research (Riskesdas) there is no MMR data available. The addition of the variables studied is useful for analyzing more deeply the factors associated with the occurrence of MMR disparities between provinces in

Indonesia in accordance with various health programs that have been implemented. Data for 8 years was used to see MMR trends in 34 provinces in Indonesia.

Various efforts have been made to reduce Maternal Mortality Rate (MMR) in Indonesia, especially to achieve the target of Sustainable Development Goals (SDGs) (70/100,000 KH) by 2030. However, MMR in Indonesia is still far from the target and quite high compared to other Southeast Asian countries, even there is a disparity in MMR between provinces. This reflects the gap in various factors related to maternal health, especially pregnant women and childbirth. However, not many have conducted studies on MMR disparities between provinces in Indonesia, especially those using Indonesian Health Profile data. Then, what factors cause the disparity (difference) in maternal mortality rates between provinces in Indonesia? Is it due to socio-demographic, economic, or health & family planning factors? This study will analyze the influence of these three factors.

Research Method

This study is Descriptive Analytic using Cross-Sectional Design, where independent variables (Independent) and dependent variables (Dependent) are studied at the same time and aim to determine the determinants of disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia using secondary data of the Indonesian Health Profile. The data used is secondary data in the form of a survey so that the most suitable design to use is Cross Sectional.

All data obtained are secondary data. The data analyzed are secondary data on maternal mortality from the Indonesian Health Profile report for the last 8 years, Basic Puskesmas data, and the KKBPK-BKKBN Program Work Indicator Survey. Other data in the form of literature reviews both from books and journal articles online and offline.

Results and Discussions

Socio-Demographic Variables

The Relationship between Population Density and Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution of population density, on average for the last 8 years 732 people in Indonesia live in 1 km2 of land area. However, some provinces such as West Papua and North Kalimantan have a population of only 9 people per km2 per area. Based on the results of bivariate tests, it is known that population density can be used to predict MMR variations between provinces with P Value = < 0.0001 and R2 = 0.073. This means that a population density of 7.3% determines MMR variations between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-0.006), meaning that the denser the population in a province, the lower the MMR, and vice versa, the lower the population density of a province, the higher the MMR that occurs. Based on the results of multivariate tests, population density is one of the determinants of MMR variation between provinces in Indonesia in addition to K4 service coverage with P Value = 0.005.

The results of this study are in line with previous research conducted [9] even though the samples used are different, namely districts / cities in Indonesia and only use 1 year of data. The study showed a significant association between low population density and high maternal mortality (P Value = 0.000 and OR= 4.5) [10]. research also showed similar results that population size in an area was associated with the incidence of maternal mortality with P Value = 0.04 with a negative relationship direction. This means that the higher the population size, the lower the maternal mortality rate.

Researchers assume that many other factors relate to and determine MMR variations between provinces in addition to population density variables. The researchers' initial assumption was considered correct because it examined many factors to predict MMR variations between provinces, not only population density factors. Then the small population in Eastern Indonesia shows the distance between one village and another so it is assumed that first-level health facilities such as puskesmas are also difficult to reach. The lack of infrastructure to access health services such as roads, public transportation and many isolated areas are also assumed to be the cause of the high MMR.

The Relationship Between the Average Length of WUS Schooling and the Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution, the average length of schooling for women of childbearing age in Indonesia is only up to the Junior High School (SMP) level. However, Papua Province has an average length of schooling for 6 years (graduating from elementary school). Based on the results of bivariate test analysis, it is known that the average length of schooling for women of childbearing age cannot be used to predict MMR variation between provinces with P Value = 0.543 and R2 = 0.0014. This means that there is no relationship between the average length of schooling of women of childbearing age and MMR disparities between provinces in Indonesia. This study is in line with research conducted that there is no relationship between the education of mothers who graduated from the first intermediate school with MMR in the United States in 2004-2015 (P Value = 0.135) [11].

The results of this study are not in line with previous research conducted [9] and that there is a significant relationship between the average length of WUS schooling and the proportion of maternal deaths [12]. (P Value 0.0 and <0.001). Similar [13], it was found that there is a relationship between women's education level (graduating from elementary school) and MMR differences between northern and southern Nigeria (P Value = <0.0001). obtained the same research results that the number of years of schooling is associated with high MMR in Iran (P Value = 0.028) [14]. The results of research using the sis method found that women's education and husband's education are consistently related to the use of maternal health in India [15].

The researchers' assumption is that the difference in analysis results is due to different types of data and analysis methods. A high level of education keeps mothers and husbands busy at work so that it can make a woman not pay attention to health during her reproductive years.

The Relationship between the Percentage of Literate Adult Women and the Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution of the percentage of literate adult women in Indonesia, the percentage of literate adult women over the last 8 years has

continued to increase, although not significantly (94% in 2014 to 96.4% in 2021). However, there is still a province, namely Papua with an average percentage of 72.97%. Based on the results of bivariate test analysis, it is known that the percentage of literate adult women cannot be used to predict MMR variation between provinces with P Value = 0.714 and R2 = 0.0005. This means that there is no relationship between the percentage of adult women literate and the MMR disparity between provinces in Indonesia.

The results of this study are not in line with previous research conducted by Girum & Wasie [7] and Alvarez (2009) it is known that there is a relationship between the average adult literacy and the incidence of maternal mortality in developing countries, [8] both have a P Value = <0.001. Berhan [16] also found the results of research on the relationship between the average adult literacy and MMR (P Value = <0.007). The research of Sharma [17] also showed significant results on the importance of increasing literacy as an effort to reduce maternal mortality (P Value = <0.001) using the singing method so that it showed the results that previously the most illiterate increased their knowledge on post-intervention tests and the majority of participants (63.9%) could provide the information learned to neighbors and friends.

The difference in the results of this study the author assumes due to differences in analysis and measurement of variables. In the health profile, Indonesia measures adult female literacy only by looking at the ability to read and write simple sentences in the form of Latin, Arabic, and other letters (such as Javanese, kanji, etc.). This cannot describe their level of literacy or understanding of information, especially health information.

Economic Variables-The Relationship between the Percentage of Poor People and the Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of variable distribution, the percentage of poor people in Indonesia over the last 8 years has decreased by 11.6% in 2014 to 10.4% in 2021. Although there are still provinces with a percentage of >20%, including West Papua and Papua. Based on the results of bivariate test analysis, it is known that the percentage of poor people can be used to predict MMR variation between provinces with P Value = <0.0001 and R2 = 0.061. This means that the percentage of poor people of 6.1% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a positive value (3.14), meaning that the lower the percentage of poor people in a province, the lower the MMR, and vice versa, the higher the percentage of poor people in a province, the higher the MMR that occurs.

The results of this study are in line with previous research conducted by Meh [13] that regions with a middle wealth index are associated with high MMR in Southern Nigeria compared to Northern Nigeria (P Value = <0.0001). Another study conducted using WHO, World Bank, UNDP and UNICEF data on 82 developing countries in the world found that the economic level measured using GNI per Capital showed a significant relationship with MMR differences between these countries (P Value = <0.001).[7] Research conducted by Hamal[15] also shows that economic status which is often measured based on living standards, household income, etc. has an impact on maternal health in India.

The results of research by Cameron on health workers in Iran show different results that there is no relationship between the level of wealth and MMR (P Value = 0.104). According to the researchers' assumptions, this difference can occur due to differences in data sources and the type of analysis used [14].

Health Service Variables

The Relationship between K1 Service Coverage and Maternal Mortality Rate (MMR) Disparity between Provinces in Indonesia

From the results of the variable distribution, K1 coverage over the last 8 years continues to fluctuate, but on average, this percentage is above the 2021 Strategic Plan target (80%). Although there are still provinces with a K1 coverage percentage of <80% such as Papua and Maluku. Based on the results of bivariate test analysis, it is known that K1 coverage can be used to predict MMR variation between provinces with P Value = < 0.0001 and R2 = 0.018. This means that K1 coverage of 1.8% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-0.4), meaning that the lower the K1 coverage in a province, the higher the MMR, and vice versa, the higher the K1 coverage of a province, the lower the MMR that occurs.

The results of this study are in line with previous research conducted by Asrofin [18]. using Nganjuk Regency Health Profile data in 2016. It was found that K1 coverage was significantly related to MMR in the district with P Value = <0.019. Nurrizka & Wahyono also found that there is a significant relationship between K1 coverage and maternal mortality between districts in Indonesia (P Value = 0.0 (1,993 (1,388-2,862 CI)) [9].

According to the researchers' assumptions, this can happen because the first visit of pregnancy (K1) is very important in detecting pregnancy risk. The sooner the risk of pregnancy is known, the faster the handling will be carried out by health workers, mothers get blood-added tablets, get education related to pregnancy, and are ready to become a mother.

The Relationship between K4 Service Coverage and Maternal Mortality Disparity (MMR) between Provinces in Indonesia

From the results of the variable distribution, K4 coverage in Indonesia is still fluctuating. Although nationally it has reached the strategic plan target for each year, there are still provinces that do not reach the target even the coverage value is still below 50% by looking at the range value (Papua and West Papua). Based on the results of bivariate test analysis, it is known that K4 coverage can be used to predict MMR variation between provinces with P Value = <0.0001 and R2 = 0.182. This means that K4 coverage of 18.2% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-1.44), meaning that the lower the K4 coverage in a province, the higher the MMR, and vice versa, the higher the K4 coverage of a province, the lower the MMR.

The results of this study are in line with previous research conducted by Asrofin [18] found that complete antenatal visits are related to MMR in Nganjuk Regency (P Value = 0.026). Similarly, Girum & Wasie [7] research that ANC coverage is related to MMR differences in 82 developing

countries in the world with P Value = <0.001. The results of Nurrizka & Wahyono's study also show that there is a significant relationship between the coverage of K4 pregnancy visits and the proportion of neonatal deaths between districts in Indonesia (P Value = 0.0) [9].

According to the researchers' assumptions, this can happen because if K4 coverage is high, it indicates that during pregnancy the mother is always monitored by health workers. The risk of pregnancy, nutrition of pregnant women, birth plans, prevention of complications and the role of family have all been carried out well so maternal death will not occur.

The Relationship between Assisted Childbirth Coverage by Health Workers in Health Care Facilities with Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution, the coverage of childbirth assisted by health workers in health care facilities continues to fluctuate even every year has not reached the strategic plan target (85%). Based on the results of bivariate test analysis, it is known that the coverage of childbirth assisted by health workers in health care facilities can be used to predict MMR variations between provinces with P Value = < 0.0001 and R2 = 0.136. This means that the coverage of childbirth coverage assisted by health workers in health care facilities 13.6% determines the disparity in MMR between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-1.2), meaning that the lower the coverage of childbirth assisted by health workers in health care facilities in a province, the higher the MMR, and vice versa, the higher the coverage of childbirth assisted by health workers in health care facilities in a province, the lower the MMR.

This study is in line with research conducted by Nurrizka & Wahyono [9] that low coverage of childbirth by health workers is also proven to be significantly associated with high maternal mortality between districts in Indonesia (P Value = 0.0 and OR = 2,890 (1,981-42.17 CI)). Similar to Girum & Wasie's [7] research, it is known that the coverage of childbirth by skilled workers is related to differences in MMR between developing countries in the world with P Value = <0.001. The results of this study are not in line with previous research conducted by Asrofin where it was known that there was no relationship between childbirth assisted by health workers and MMR in Nganjuk Regency (P Value = <0.308).[18]

According to the researchers' assumptions, this can happen because the more deliveries assisted by health workers in health care facilities in a province, the delivery can proceed safely. Complications can be detected early, good hygiene and sanitation, the ability of qualified health workers, the presence of drugs and blood transfusion units can prevent maternal death.

The Relationship between Postpartum Visit Coverage (KF3) and Maternal Mortality Disparity (MMR) between Provinces in Indonesia

From the results of the variable distribution, the coverage of postpartum visits (KF3) in Indonesia continues to fluctuate, but in 2021 KF3 coverage has reached the strategic plan target (80%) of 83.1%. Judging from the minimum value, there are still provinces with a coverage of 1.1% (Central Java). Based on the results of bivariate test analysis, it is known that the coverage of postpartum visits (KF3) can be used to predict MMR variations between provinces with P Value = <0.0001 and R2 = 0.133. This means that the coverage of postpartum visits (KF3) of 13.3% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-1.19), meaning that the lower the coverage of postpartum visits (KF3) in a province, the higher the MMR, and vice versa, the higher the coverage of postpartum visits (KF3) of a province, the lower the MMR.

This study is in line with research conducted by Nurrizka & Wahyono, [9] low postpartum visit coverage is significantly proven to be associated with high maternal mortality between districts in Indonesia with P Value = 0.0 and OR = 2,570 (1,771-3,729 CI). However, research conducted by Pratama shows that postpartum services are not associated with maternal mortality during the puerperium (P Value = 0.632) [19].

There are differences in research results according to the assumptions of researchers, this can occur due to differences in samples and data used. While KF3 coverage can affect MMR disparities between provinces according to the researchers' assumptions because the more mothers who get postpartum services in a province, postpartum depression, family planning services and others that can prevent maternal death can be handled.

The Relationship between Puskesmas Coverage Implementing Pregnant Women Class with Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution, the coverage of puskesmas carrying out classes for pregnant women in Indonesia has reached the strategic plan target (90%) in 2019 of 92% and decreased in 2021 to 83.36%. There are still provinces with coverage below the strategic plan by looking at the range values including Central Kalimantan, Central Sulawesi, West Papua and Papua. Based on the results of bivariate test analysis, it is known that the coverage of puskesmas carrying out classes for pregnant women can be used to predict MMR variations between provinces with P Value = < 0.0001 and R2 = 0.065. This means that the coverage of postpartum visits (KF3) of 6.5% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-0.72), meaning that the lower the coverage of puskesmas carrying out classes for pregnant women in a province, the higher the MMR, and vice versa, the higher the coverage of puskesmas carrying out classes for pregnant women in a province, the lower the MMR.

Previously, there was no study that directly analyzed the relationship between the coverage of puskesmas carrying out classes for pregnant women and MMR. However, the assumption of pregnant women class researchers can affect the MMR disparity between provinces because this program was created by the Ministry of Health to reduce MMR, the pregnant women class can be a gathering place for mothers and health workers so that they can learn together about pregnancy and childbirth, maternal pregnancy is controlled by health workers and usually pregnant women will get additional food.

The results of Fibriana & Azinar research in the village area of Singorojo District, Kendal Regency found that after the pregnant women class, the knowledge of pregnant women

increased, the attitude of pregnant women participants became good, the practice of preventing risks and complications of pregnancy for pregnant women became better, and ANC visits became more intensive every month. [20].

Relationship between Puskesmas Coverage Implementing Childbirth Planning and Complications Prevention (P4K) Program with Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution, puskemas coverage carried out the Childbirth Planning and Prevention of Complications (P4K) Program in 2021 by 86.4%, an increase compared to the previous year (60.5%). Even in 2021, there are still provinces with a coverage of 16.4%, namely Papua Province.

Based on the results of bivariate test analysis, it is known that the coverage of puskemas implementing the P4K program can be used to predict MMR variations between provinces with P Value = 0.015 and R2 = 0.029. This means that the coverage of puskemas implementing the P4K program of 2.9% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-0.35), meaning that the lower the coverage of puskesmas implementing the P4K program in a province, the higher the MMR, and vice versa, the higher the coverage of puskesmas implementing the P4K program in a province, the lower the MMR.

Previously, there was no research that directly analyzed the relationship between the coverage of puskesmas implementing the P4K program and MMR. However, the assumption of P4K program researchers can affect MMR disparity between provinces because this program was created by the Ministry of Health specifically to reduce MMR, the P4K program can increase the participation of families and husbands in childbirth planning such as blood donors, vehicles, helpers, places and times of delivery so as to prevent complications during pregnancy and childbirth that can cause maternal death.

Based on research conducted by Werdiyanthi [21] it is known that pregnant women who participated in the P4K implementation program did not experience pregnancy complications (77.8%) compared to those who did not implement the P4K program (25%) with P Value = 0.004. In line with this research, Nursiyam also proved that the existence of the P4K stikerization program made pregnant women treated when experiencing complications (87.6%) greater than mothers who did not stikerize (42.1%) [22].

The Relationship between the Percentage of Puskesmas and the Adequacy of Midwives with the Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution of the percentage of puskesmas with sufficient midwives, puskesmas in Indonesia for the last 8 years still lack midwives, even in 2021 there are still provinces with a shortage of midwives reaching 69.7% and 88% in 2015. Based on the results of bivariate test analysis, it is known that the percentage of puskesmas with sufficient midwives cannot be used to predict MMR variation between provinces with P Value = 0.315 and R2 = 0.287.

This study is not in line with research conducted by Girum & Wasie [7] that the ratio of nurses and midwives to 1000 population is related to differences in MMR in 82 developing countries in the world (P Value = <0.001). The results of research by Cameron [14] using data from the 2010 Indonesian Population Census also show that the number of midwives working in puskesmas is related to differences in MMR between regions in Indonesia with P Value = <0.001 and 1.58% of this variable determines the variation between high MMR and low MMR provinces.

According to the researchers' assumptions, this difference can occur because the Maternal Mortality Rate is very influential with other variables. Although there have been many midwives and the percentage of adequacy of midwives in puskesmas has been fulfilled, the ability and competence of existing midwives are not able to help or provide good services for pregnant women. Researchers also assume that the willingness of mothers to check pregnancy to the puskesmas is very low.

The Relationship between the Percentage of Pregnant Women Getting Blood Added Tablets with the Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of variable distribution, the percentage of pregnant women getting blood-added tablets on average for the last 8 years more than half of pregnant women in Indonesia have received ≥90 blood-added tablets. However, the existing coverage from 2015 to 2021 has not reached the 80% figure that is usually the target of the Renstra.

Based on the results of bivariate test analysis, it is known that the percentage of pregnant women getting blood-added tablets can be used to predict MMR variations between provinces with P Value = 0.005 and R2 = 0.029. This means that the percentage of pregnant women getting blood-added tablets of 2.9% determines the disparity in MMR between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-0.43), meaning that the lower the percentage of pregnant women getting blood-added tablets in a province, the higher the MMR, and vice versa, the higher the percentage of pregnant women getting blood-added tablets in a province, the lower the MMR.

This study is not in line with research conducted by Haider & Bhutta, [23] it was found that there was no significant difference between pregnant women who were given micronutrients (folic acid and iron) and maternal mortality compared to pregnant women who were not given micronutrients (placebo) (mean RR 0.97 (95% CI, 0.63-1.48). There are differences in research results according to the assumptions of researchers this can occur due to differences in samples, data, and analysis used. This variable can be related, researchers assume that the higher the percentage of pregnant women getting blood-added tablets in a province, the less anemic pregnant women are, so as not to cause further complications such as bleeding during childbirth that can cause death in the mother.

Relationship between Number of Blood Transfusion Units and Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution of the number of Blood Transfusion Units (UTD) in each province in Indonesia as many as 12 to 13 units. However, in 2021 the average number of registered blood transfusion units decreased to 8 units. Even for Papua and West Papua Provinces do not have UTD registered. Based on the results

of bivariate test analysis, it is known that the number of blood transfusion units can be used to predict MMR variation between provinces with P Value = <0.00501 and R2 = 0.092. This means that the number of blood transfusion units of 9.2% determines the disparity of MMR between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-2.03), meaning that the fewer the number of blood transfusion units in a province, the higher the MMR, and vice versa, the more the number of blood transfusion units in a province, the lower the MMR.

Previously there was no study that directly analyzed the relationship between the number of blood transfusion units and AKI. However, research by Smith [24] explains that 5.1 per 1000 pregnant women still need intrapartum-pospartum blood transfusion even though they do not have anemia, higher than the needs of anemic mothers with OR= 2.45 (95% CI 1.74-3.45). So the assumption of researchers should be that the more the number of blood transfusion units in the province, the lower the MMR, but this must be balanced with a continuous blood stock.

The Relationship between Contraceptive Coverage and Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of variable distribution, contraceptive coverage in Indonesia over the last 8 years has decreased. In 2014 contraceptive coverage of 74.5% dropped to 52.99% in 2021. Based on the results of bivariate test analysis, it is known that contraceptive coverage can be used to predict MMR variation between provinces with P Value = 0.003 and R2 = 0.003. This means that there is a relationship between contraceptive coverage and MMR disparities between provinces in Indonesia. Contraceptive coverage of 0.3% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (-0.75), meaning that the less c in a province, the higher the coverage of contraception in a province, the higher the MMR, and vice versa, the more the number of blood transfusion units in a province, the lower the MMR.

This study is in line with research conducted by Girum & Wasie [7] showing the results that contraceptive prevalence is one of the factors associated with the occurrence of MMR disparity between developing countries (P Value = <0.001), MMR is higher in countries with low contraceptive prevalence. Meh also provided the same research results where there was a relationship between contraceptive type use and maternal mortality in North and South Nigeria (P Value = <0.0001) [13].

The Relationship between the Number of PONED and the Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of variable distribution, the average number of PONED puskesmas in Indonesia in 2015 was 77 puskesmas per province. There are still provinces with 9 PONED health centers (North Kalimantan Province). Based on the results of bivariate test analysis, it is known that the number of PONED health centers cannot be used to predict MMR variations between provinces with P Value = 0.08 and R2 = 0.093. This means that there is no relationship between the number of PONED health centers and the MMR disparity between provinces in Indonesia.

This study is not in line with research conducted by Cameron [14] that maternity places that have inpatient facilities are associated with MMR disparities between provinces in Indonesia (P Value = 0.00), this study uses data from the 2010 Indonesian Population Census. From the results of the study, Chavane also explained that delays in women who experience pregnancy complications to reach health facilities are proven to be more common in maternal death, both direct and indirect causes of death (>60% of deaths) than delays in receiving appropriate care (P Value = 0.0001) [25].

According to the author's assumption, the difference in the results of this study occurred because the available data was only one year (34 samples) so it was less able to predict the relationship between independent and dependent variables. Even though the author's initial assumption is that this variable will have a significant effect because the existence of PONED puskesmas is able to describe health facilities, health workers, and other infrastructure in supporting pregnancy and childbirth of mothers running well.

The Relationship of Total Fertility Rate with Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution of Total Fertility Rate (TFR), the average woman in Indonesia has 2 to 3 children during her reproductive years. Based on the results of bivariate test analysis, it is known that TFR can be used to predict MMR variation between provinces with P Value = 0.021 and R2 = 0.026. This means that a TFR of 2.6% determines the MMR disparity between provinces in Indonesia. Judging from the value of the coefficient, it shows a negative value (26.6), meaning that the more children owned by women in a province, the higher the MMR, and vice versa, the less number of children owned by women in a province, the lower the MMR.

This study is in line with research conducted by Girum & Wasie [7] also found a significant relationship between the total fertility rate per a woman with the difference in MMR between developing countries with P Value = <0.001. Similarly, research conducted by Lan & Tavrow found that TFR is significantly related to maternal mortality ratios in African and Non-African countries (low-income countries) (P Value = <0.01) [26].

The results of Berhan & Berhan's (2014) study also showed that TFR was significantly related to maternal mortality rates P Value = <0.001 and R2 = 0.36. This means that a TFR of 36% affects the high MMR in African countries. According to the author's assumption, the difference in the results of this study occurred due to differences in the data used.

The Relationship of Unwanted Pregnancy with Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia

From the results of the variable distribution of unwanted pregnancy (KTD) as much as 17.1% and 19.1% in 2019 and 2018 did not want their pregnancy. Based on the results of bivariate test analysis, it is known that KTD cannot be used to predict MMR variation between provinces with P Value = 0.412 and R2 = 0.01. This means that there is no relationship between KTD and MMR disparity between provinces in Indonesia.

This study is not in line with research conducted by Moaddab [11] using CDC WONDER data with retrospective research, it is known that there is a significant relationship between KTD and MMR in the United States in 2005-2014 (P Value = <0.001). This is also in line with research conducted by Mohamed [27] that untimely and unwanted pregnancies are associated with late ANC treatment (P Value = <0.0001) and more pregnancy complications (P Value = <0.001).

According to the author's assumption, the difference in the results of this study occurred due to differences in the data used. MMR data uses the Indonesian Health Profile while KTD uses Secondary data from the KKBPK – BKKBN Program Work Indicator Survey Report. This difference in data may not represent the state of each province (bias), making the research results unrelated. Even though the author's initial assumption of this variable will have a significant effect because mothers who do not want their pregnancy tend to be aceh towards their pregnancy even to the point of having an abortion.

Conclusion

Research that has been conducted entitled Analysis of Determinants of Disparity in Maternal Mortality Rate (MMR) between Provinces in Indonesia found that one socio-demographic variable, namely population density, is related to MMR disparity between provinces with P Value = <0.0001 and R2 = 0.073. Economic variables measured using the percentage of poor people showed significant results with MMR disparity between provisions with P Value = <0.0001 and R2 = 0.061. Health service & family planning variables get the results that the percentage of K1 coverage (P Value = <0.0001 and R2 = 0.018), K4 coverage (P Value = <0.0001 and R2 = 0.182), childbirth coverage assisted by health workers in health care facilities (P Value = <0.0001 and R2 = 0.136), postpartum visit coverage (KF3) (P Value = <0.0001 and R2 = 0.133), Puskesmas coverage carrying out classes for pregnant women (P Value = <0.0001 and R2 = 0.065), coverage of Puskesmas Implementing the Childbirth Planning and Complications Prevention Program (P4K) (P Value = 0.015 and R2 = 0.287), the percentage of pregnant women getting blood added tablets (P Value = 0.005 and R2 = 0.004), the number of blood transfusion units (P Value = <0.0001 and R2 = 0.092), contraceptive coverage (P Value = 0.003 and R2 = 0.032) and Total Fertility Rate (TFR) (P Value = 0.021 and R2 = 0.026) were significantly associated with the occurrence of MMR disparity between provisions in Indonesia.

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