ORIGINAL RESEARCH

Maternal, socioeconomic and healthcare factors associated with postpartum maternal mortality in Papua Province, Indonesia, based on secondary data analysis of IDHS 2020

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ABSTRACT

Objective: We conducted research based on the Indonesia Demographic Health Survey (IDHS) 2020 to investigate the association between postpartum maternal mortality and several parameters, including Maternal, socioeconomic and healthcare factor in Papua Province.

Materials and Methods: This study employed a cross-sectional design and quantitative analytical approach, using secondary data from IDHS 2020. A total of 14,802 female respondents between the ages of 15 and 49 were sampled. The data was analyzed using a simple logistic regression test for bivariate analysis with a 95% confidence level (α = 0.05). Subsequently, a multivariate multiple logistic regression analysis was performed on variables having a p-value less than 0.25.

Results: The results indicated that all factors (parity p<0.001 AOR=0.533 95% CI 0.375-0.758; living place p=0.001 AOR=2.526 95% CI 1.438-4.436; Indonesian language ability p<0.001 AOR=0.039 95% CI 0.031-0.050; delivery attendant and place of delivery p<0.001 AOR=0.118 95% CI 0.142-0.249, not associated with status/wealth index p=0.972 AOR=1.010 95% CI 0.565- 1.806). They had a significant negative association with postpartum maternal mortality (p-value <0.05) except for the status/wealth index. The highest association, with an odds ratio (OR) of 0.039, was observed in Indonesian language ability, which showed a 25.64-fold increase.

Conclusion: The research findings provide a strong foundation for future policies and interventions to reduce postpartum maternal mortality in Papua Province. Indonesian language ability was identified as the most dominant factor associated with maternal mortality, offering hope for targeted interventions and improved healthcare.

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Highlights:

1. Postpartum maternal mortality is associated with factors such as number of previous parity, living place, Indonesian language ability, status/wealth index, delivery attendant, and place of delivery.
2. Indonesian language ability is the most influential factor, likely reflecting disparities in access to healthcare, health literacy, and geographic or social marginalization.

INTRODUCTION

Strategic actions to improve health are integral to the 2030 development plan's Sustainable Development Goals (SDGs).[1] To lower the global maternal mortality ratio (MMR), the World Health Organization (WHO) advises stepping up efforts to enhance health. Maternal mortality is defined as death that occurs during pregnancy or within 42 days after the end of pregnancy and is not due to an accident or injury but rather to pregnancy or its care. According to data from the Indonesia Demographic Health Survey (IDHS), the maternal death rate in 2020 was 189 per 100,000 live births. By 2030, the SDGs aim for 70 per 100,000 live births. In the province of Papua, the MMR was 289 per 100,000 live births in 2017 and increased to 565 per 100,000 live births in 2020, maternal mortality has risen dramatically in three years.[2]

There are two categories of maternal mortality: direct and indirect maternal mortality. Pregnancy, birth, and postpartum problems are the primary causes of direct maternal death. Nearly 75% of maternal deaths are the consequence of issues such as hemorrhage, infection, pregnancy-related hypertension, difficult births, and botched abortions. Indirect maternal mortality is brought on by illnesses that afflict a pregnant woman or pre-existing medical difficulties that increase during pregnancy.[3] In Indonesia, the number of instances of Four High and Three Delays is the primary cause of indirect maternal mortality. Maternal deaths, known as Four High instances, can result in various consequences if they are not carefully evaluated for and managed. Risk variables that may affect these situations include age and parity.[3] Three Delays instances are sluggish to decide which medical facilities to refer to, discover pregnancy warning symptoms, and receive the appropriate care in medical facilities. The family's decision-making stage is often when the issue of a delayed decision to refer to health facilities occurs, so it is necessary to increase various aspects that influence medical decision-making and discover puerperal danger signs. Enhance the transportation network to eliminate delays in reaching the referral location and to facilitate quicker and simpler access to health service centers. The length of administrative arrangements, the lack of referral facilities, the shortage of medical personnel at the referral site, the absence of pre-facilities, and the scarcity of blood supply all contribute to delays in proper handling at health facilities, making it necessary for the Regional Government to make improvements to support the province of Papua Province's MMR reduction.[4]

Maternal parity factors, defined as the total number of children a mother has borne, whether living or deceased, are associated with maternal mortality during the postpartum period. Parity is an indirect metric for assessing maternal health during pregnancy and the fetus's well-being till birth.[3] Social determinants associated with residential environments, especially in rural and urban contexts, can indicate the prevalence of illness in a particular area. Differences in population density and age distribution, lifestyle, employment practices, perceptions of health and illness, living circumstances, and sanitation may lead to variations in disease prevalence and death rates between rural and urban regions.[5] Another social component is proficiency in the Indonesian language. Those who lack this capacity often experience social isolation due to residing in remote areas that lack access to education and technology, such as rural regions in Papua.

Many individuals in Indonesia are bilingual, utilizing native languages as their mother tongue and Indonesian as their second language.[6] Economic factors, such as the status/wealth index, influence the household's financial condition and can affect healthcare expenses. Households of lower socioeconomic status exert more effort to obtain healthcare than those of higher status.[5] Healthcare considerations encompass delivery attendants who commit their lives to the health industry. They possess expertise and competencies acquired via study in the field and necessitate a license, an essential regulatory requirement, to conduct health initiatives.[7] Another healthcare factor is the delivery location, encompassing healthcare and non-healthcare services. Non-healthcare facilities encompass the mother's residence, the homes of non-healthcare professionals, and sites without access to health infrastructure.[8]

MATERIALS AND METHODS

This research was quantitative analytical, using secondary data from SDKI 2020. This research was conducted in Surabaya with data from October 2023 to March 2024. The study consisted of 20,482 women aged 15 to 49. There were originally 439,562 data for this study, but only 14,802 data remained after cleaning. This study was a total sample with inclusion criteria using data on postpartum maternal deaths that occurred within two years. Exclusion criteria in this study included incomplete data and different RUTA IDs. SPSS software version 26 for Windows was used to classify and organize the study findings. This study received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine Universitas Airlangga Surabaya, numbered 41/EC/KEPK/FKUA/2024. This ethics declaration applies from February 6, 2024 until February 6, 2025. Variables independent in this study are parity, living place,

Indonesian language ability, status/wealth index, delivery attendant, and place of delivery. Variable Independent in this study is postpartum maternal mortality.

RESULTS AND DISCUSSION

The 2020 SDKI data categorizes the dependent variable into four distinct types of maternal mortality: pregnancy, abortion, delivery process and postpartum period. The Central Bureau of Statistics result show that maternal mortality in Papua Province is significantly higher than in other provinces. Table 1 shows the distribution of maternal mortality in Papua Province 2020.

The study examined several independent variables, including parity, living place, Indonesian language ability, status/wealth index, delivery attendant, place of delivery. Table 2 displays the distribution of parity, living place, Indonesian language ability, status/wealth index, delivery attendant, place of delivery.

A logistic regression test examined the association between parity and maternal mortality in Papua Province in 2020. The logistic regression test results yielded a p-value of less than 0.05, indicating a statistically significant link between parity and maternal mortality at a significance level of 0.05. The link between parity and postpartum maternal mortality has a negative Odds Ratio value. Mothers who have > 3 children are more at risk of maternal death than mothers who have ≤ 3 children.[9] A logistic regression analysis examined the association between Papua Province's living place and maternal mortality in 2020. The logistic regression test yielded a p-value of less than 0.05, indicating a significant link between living place and maternal mortality at a significance level of 0.05.

The odds ratio score indicates a negative association between living place and postpartum maternal mortality. Mothers who live in urban areas are more at risk of maternal death than mothers who live in rural areas.[9] A logistic regression test examined the correlation between Indonesian language ability and maternal mortality in Papua Province in 2020. The logistic regression test yielded a p-value of less than 0.05, indicating a meaningful link between Indonesian language ability and maternal mortality. This relationship is significant at a significance level of 0.05. The Odds Ratio value indicates the negative association between Indonesian language ability and postpartum maternal mortality. Mothers who can speak Indonesian are more at risk of maternal death than mothers who cannot speak Indonesian.[9]

Table 1. Distribution of maternal mortality in Papua Province 2020

Maternal mortality	Death n (%)	Life n (%)
Pregnancy	121 (26.30)	
Abortion	66 (14.35)	
Delivery process	204 (44.35)	
Postpartum period	69 (15)	
Total	460 (3.10)	14.342 (96.90)

Table 2. Distribution of parity, living place, Indonesian language ability, status/wealth index, delivery attendant, place of delivery

Factors	Categories	n (%)
Parity	> 3 children	2421 (16.36)
	≤ 3 children	12.381 (83.64)
Living place	Urban	4.136 (27.94)
	Rural	10.666 (72.06)
Indonesian language ability	Able	14.316 (96.72)
	Not capable	486 (3.28)
Status/wealth index	Middle to upper	3.693 (24.95)
	Middle to lower	11.109 (75.05)
Delivery attendant	Healthcare professional	10.562 (71.36)
	Non-healthcare professional	4.240 (28.64)
Place of delivery	Healthcare facility	10.562 (71.36)
	Non-healthcare facility	4.240 (28.64)

Table 3. Results from simple logistic regression parity, living place, Indonesian language ability, status/wealth index, delivery attendant, place of delivery with postpartum maternal mortality

Postpartum maternal mortality factors	Categories	p-values	Odds Ratio (95%CI)
Parity	> 3 children ≤ 3 children	0.000	0.478 (0.345-0.664)
Living place	Urban Rural	0.000	0.542 (0.425-0.691)
Indonesian language ability	Able Not capable	0.000	0.026 (0.021-0.033)
Status/wealth index	Middle to upper Middle to lower	0.000	0.513 (0.395-0.665)
Delivery attendant	Healthcare professional Non-healthcare professional	0.000	0.159 (0.130-0.195)
Place of delivery	Healthcare facility Non-healthcare facility	0.000	0.159 (0.130-0.195)

A logistic regression test examined the correlation between the status/wealth index and maternal mortality in Papua Province in 2020. The logistic regression test yielded a p-value of less than 0.05, indicating a significant association between the status/wealth index and maternal mortality. This link is statistically significant at a significance level of 0.05. The Odds Ratio score indicating the association between the status/wealth index and maternal mortality in the postpartum period is negative. Middle-to-upper mothers are more at risk of maternal death than middle-to-lower mothers.[9]

Logistic regression examined the correlation between delivery attendants and maternal mortality in Papua Province in 2020. The logistic regression test yielded a p-value of less than 0.05, indicating a statistically significant link between the delivery attendant and maternal mortality at a significance level of 0.05. The Odds Ratio value indicated the negative association between the delivery attendant and postpartum maternal mortality. Mothers whose delivery attendants by healthcare professionals were more at risk of maternal death than mothers whose delivery attendants by non-healthcare professionals.[9] Logistic regression was employed to examine the association between the place of delivery and maternal mortality in Papua Province throughout 2020. The logistic regression test yielded a p-value of less than 0.05, indicating a significant association between the place of delivery and maternal mortality at a significant level of 0.05. The Odds Ratio value indicating the association between place of delivery and postpartum maternal mortality was negative. Mothers who delivered in a healthcare facility were more at risk of maternal death than those who delivered in a non-healthcare facility.[9] Referral delays were found to result in fatalities at health facilities. The referral delay in Papua is due to the challenging accessibility, resulting in prolonged processing times. Table 3 displays the test results.

Research by Hazairin et al. (2021) stated that the weakened and declining function of reproductive organs can increase the risk of complications, low childbirth weight, and other health problems that can endanger the safety of the mother. In addition, high parity is generally also associated with older maternal age and short birth spacing, increasing the risk to the mother. From the results of this study, it is hoped that the government will further improve the family planning program for the community so that they are more aware of the risks during pregnancy, childbirth, and postpartum that can occur if they have high or non-ideal parity> 3 children.[3] Rosales et al. (2019) state that cases of postpartum bleeding are considered a dangerous sign, and the process of deciding to seek help must be as soon as possible. In the Papuan community, the husband mostly dominates the decision-making process.

Care of pregnant women until postpartum is still carried out at home by non-healthcare professionals if immediate action is needed. Most of them seek care outside the house but not at health facilities because mothers and families cannot easily recognize the danger signs of pregnancy until postpartum. The decision to seek urgent care at a health facility is only made when non-healthcare professionals cannot handle the case. Maternal mortality is associated with delays in seeking help due to limitations in identifying danger signs and is related to delays in receiving appropriate care at the health facility level.[10]

Specifically, no references were found regarding mothers who can speak Indonesian being more at risk of maternal death, but only references from Fiharsono's research (2021), which states that the diversity of Papua

is described in the socio-cultural levels of urban, rural, and remote areas. This research found that people who can speak Indonesian live more in rural areas.[11] Khayati et al. (2018) found that families with middle to upper status/wealth index had a relationship with working mothers. The study also found a relationship between maternal employment and stress levels in pregnant women and the incidence of preeclampsia. If stress is allowed to be prolonged, the body remains in a psychologically active state with excessive adrenaline and cortisol stress hormones that can paralyze the immune system of pregnant women. Pregnant women become vulnerable to various diseases and disorders, one of which is preeclampsia. Complications in pregnant women due to preeclampsia still accompany the mother during labor and the postpartum period.[12]

Research by Afrida et al. (2022) stated that a healthcare professional crisis in Indonesia will affect the success of health development. Papua Province is one of the areas experiencing problems regarding the uneven distribution of healthcare professionals, which can result in maternal mortality because of the quality of health services. Maternal deaths often occur due to delays in referral and treatment when the mother is already at the healthcare professional.[13] Research by Munro et al. (2022), it was found that Papuans value vaginal delivery or avoiding cesarean section. When giving birth, they often have to respond, manage, or reject the priorities of doctors who want to perform cesarean sections. Some people avoid hospitals, avoid cesarean section, refuse to give consent for cesarean section, negotiate with doctors, and demand to see evidence that cesarean section is necessary. This is also a contributing factor to maternal mortality due to delays in decision-making at the healthcare facility and treatment at the healthcare facility.[14]

According to the research hypothesis, parity is the most dominant factor associated with maternal mortality in Papua Province in 2020. However, after conducting multiple logistic regression tests, it was discovered that the Indonesian language ability factor had the most dominant relationship with postpartum maternal mortality with negative test results. The Indonesian language ability component has a correlation coefficient of 0.039, indicating a 25.64-fold increase in postpartum maternal mortality. Mothers who can speak Indonesian are more at risk of maternal death than mothers who cannot speak Indonesian.[15] Table 4 displays the test results. This is because people who can speak Indonesian live more in villages (OR=0.063), so there is a greater risk of delay when they need a referral. It is hoped that in addition to conducting health promotion, it is essential during pregnancy until postpartum to live closer to health facilities. The government can build more health facilities in villages, especially with complex and limited access to the nearest health facility.[16]

The presence of healthcare facilities in rural villages is fundamental to reducing maternal mortality by ensuring the availability of critical services such as antenatal care, skilled attendance at birth, and emergency obstetric interventions. These centers also contribute significantly to increasing community awareness regarding safe maternal health practices and potential pregnancy-related risks.[17] Access to trained healthcare personnel, including midwives and physicians, during labor and delivery enables early identification and management of life-threatening conditions such as postpartum hemorrhage and obstructed labor.[18] Routine antenatal visits at these facilities facilitate timely detection of complications during pregnancy and support adequate postnatal care, thereby lowering the likelihood of maternal and neonatal morbidity and mortality.[19] In emergencies, village-based health centers function as initial stabilization points, delivering prompt care and coordinating referrals to higher-level facilities—an essential function in settings with constrained transportation infrastructure. Moreover, these facilities serve as essential hubs for health promotion, providing expectant mothers and their families with vital education on childbirth preparedness, recognition of danger signs, and the utilization of available health services.[20]

Table 4. Results from multiple logistic regression factor with postpartum maternal mortality

Maternal mortality	Factors	p-values	Odds Ratio (95% CI)
Postpartum maternal mortality	Parity	0.000	0.533
	Living place	0.001	2.526
	Indonesian language ability	0.000	0.039
	Status/wealth index	0.972	1.010
	Delivery attendant	0.000	0.188
	Place of delivery	0.000	0.188

Table 5. Relationship between Indonesian language ability and living place

Factors	p-values	Odds Ratio (95% CI)
Indonesian language ability	0.000	0.063
Living place	0.000	0.063

The strong association between the ability to speak Indonesian and postpartum maternal mortality, as revealed in this study, may initially appear unexpected—especially given that language proficiency is generally assumed to facilitate access to healthcare (Table 5). However, in the sociocultural and geographic context of Papua, this finding can be meaningfully interpreted through a broader understanding of structural health determinants. In this case, Indonesian language ability appears not as a protective factor but rather as a proxy for other underlying risks. The study found that women who speak Indonesian are more likely to reside in rural areas of Papua with limited access to health facilities, skilled birth attendants, and emergency obstetric care.

Thus, contrary to typical assumptions, proficiency in the national language does not necessarily translate to better health outcomes in this setting. Instead, it may reflect exposure to circumstances that increase vulnerability—such as poor infrastructure, social exclusion, or the absence of culturally appropriate services. The limited availability of quality maternal healthcare in these rural communities likely contributes more significantly to maternal mortality than language proficiency alone. Furthermore, the extraordinarily high adjusted odds ratio (AOR = 0.039) suggests a complex interplay of risk factors. Indonesian language ability, in this context, may signal a subset of the population that, despite linguistic fluency, remains marginalized in terms of access to timely and adequate maternal care.

In summary, Indonesian language ability in Papua should not be interpreted as a straightforward advantage in maternal health. Instead, it reflects deeper systemic vulnerabilities—geographic isolation, healthcare inequity, and limited service reach—which must be addressed through inclusive, community-based, and regionally tailored health interventions.

Strength and limitation

The advantage of secondary data lies in the rapid and straightforward data collection method. The Secondary Data Analysis of IDHS offers a range of intriguing data that yield comprehensive insights into Indonesian society's demographic and health aspects. The constraints of secondary data research arise from the outcomes of interviews. Completing questionnaires necessitates that respondents depend solely on recollection, potentially leading to recall bias and insufficient clarity of the essential information. The data employed is solely from the datasheet, limiting the factors analyzed. Secondary data necessitates a process of elimination to obtain the requisite information for researchers, along with a coding procedure due to inconsistencies in specific codes relative to the research.

CONCLUSION

The results indicated that all factors—parity, living place, Indonesian language ability, delivery attendant, and place of delivery—were significantly associated with postpartum maternal mortality, except for the status/wealth index. The strongest association was observed in Indonesian language ability. This finding likely reflects broader disparities in healthcare access, health literacy, and geographic or social marginalization. The research provides a strong foundation for future policies and interventions to reduce postpartum maternal mortality in Papua Province, with Indonesian language ability emerging as the most dominant factor, highlighting the need for targeted, inclusive, and linguistically accessible healthcare strategies.

DISCLOSURES

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Conflict of interest

This study does not pose dangerous physical or psychological risks because it uses secondary data from IDHS 2020. The author has no conflict of interest in this research.

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Author contribution

All authors have contributed to all processes in this research, including preparation, data gathering and analysis, drafting, and approval for publication of this manuscript.

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