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FAMILY ROLE, SOCIAL SUPPORT, AND HEALTH SYSTEM PERFORMANCE AS DETERMINANTS OF MATERNAL AND NEONATAL MORTALITY REDUCTION IN THE OSING ETHNIC COMMUNITY

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ABSTRACT

Background: Maternal and neonatal mortality remain major public health concerns in Indonesia. In 2023, Banyuwangi Regency reported 28 maternal and 203 neonatal deaths, many of which occurred in the Osing community where reliance on traditional birth attendants persists. Addressing this issue requires culturally sensitive approaches that integrate family and community roles. This study aimed to analyze the influence of family involvement, social support, and health-system performance on reducing maternal and neonatal mortality in the Osing community. **Methods**: An analytical observational study with a cross-sectional design was conducted among 107 high-risk pregnant women selected through multistage sampling. Data were obtained via structured questionnaires and analyzed using binary logistic regression (outcome coded 1=successful, 0=not successful; probability cut-off 0.50). **Results**: The model achieved 72.0% overall accuracy, with 84.4% accuracy for the successful class and 53.5% for the not-successful class. Family involvement was significantly associated with program success (OR 1.097, 95% CI 1.037–1.161, p=0.001) and so was social support (OR 1.083, 95% CI 1.032–1.137, p=0.001). Health-system performance showed a positive, non-significant association (OR 1.038, 95% CI 0.997–1.081, p=0.067). Model fit was acceptable (Hosmer–Lemeshow p=0.62), and explained variance was moderate (Nagelkerke R^2=0.51). **Conclusion**: Family and social support were more influential than formal health-system performance in relation to reductions in maternal–neonatal mortality in the Osing community. Strengthening culturally grounded, family-centered partnerships—engaging families, midwives, cadres, traditional birth attendants, and local leaders—may enhance complication preparedness and offer a replicable approach for similar indigenous settings.

Keywords: maternal mortality, neonatal mortality, Osing community, high-risk pregnancy, cultural partnership

INTRODUCTION

Maternal, neonatal, and child mortality rates remain high in many parts of the world (Chan et al., 2021). The WHO (2020) reported approximately 287,000 women died during pregnancy and the postpartum period, while 2.4 million newborns died within the first month of life, equivalent to an average of 6,700 neonatal deaths per day (Silva et al., 2024). In Indonesia, maternal mortality remains among the highest in ASEAN; data from the Maternal Perinatal Death Notification (MPDN) recorded an increase from 4,005 cases in 2022 to 4,129 cases in 2023. Infant deaths also rose from 20,882 cases in 2022 to 29,945 cases in 2023 (Ministry of Health of the Republic of Indonesia, 2024). The government set a 2024 target of reducing the Maternal Mortality Ratio (MMR) to 183 per 100,000 live births and the Neonatal Mortality Rate (NMR) to 16 per 1,000 live births, in line with the Sustainable Development Goals (SDGs) 2030: MMR <70 per 100,000 live births, NMR 12 per 1,000 live births, and under-five mortality <25 per 1,000 live births (Nelson et al., 2021; Ayati et al., 2020).

In East Java, the MMR in 2023 slightly increased to 93.73 per 100,000 live births compared to the previous year, with Banyuwangi Regency ranking third highest (28 maternal deaths) (East Java Provincial Health Office, 2023). The provincial NMR also increased to 7.40 per 1,000 live births, with Banyuwangi contributing the fourth highest number (203 neonatal deaths). District-level data showed that in 2023 the MMR reached 135 per 100,000 live births, while the NMR reached 9.8 per 1,000 live births, with Kabat and Singonjuruh Health Centers reporting the highest cases. The majority of residents in these areas belong to the Osing ethnic group, one of Banyuwangi's indigenous communities, spread across Glagah, Giri, Ragojampi, Kabat, Songgon, Singonjuruh, Cluring, and Genteng (Sulthoni, 2020).

The persistently high maternal mortality is associated with limitations in the management of midwifery care, including suboptimal high-risk detection and delays in clinical decision-making for complicated pregnancies. Government strategies have included improving maternal health service access, cadre support, cross-sector partnerships, advocacy, and neonatal visits, yet the outcomes remain suboptimal (Banyuwangi District Health Office, 2023). Current approaches tend to focus on medical professionals without adequately integrating local resources and indigenous knowledge.

Preventing pregnancy complications requires community-based partnerships that enhance family knowledge, awareness, and motivation, as reflected in the concept of *Participatory Asset Community Development Research in Action*, which leverages community assets to prevent complications (Duarsa et al., 2020). The *Continuity of Care* (COC) model has been proven to improve family knowledge and skills, as well as preparedness to support pregnant women through postpartum (Sholikah et al., 2025). Interpersonal and community social support has also been shown to reduce referral barriers (Dalal et al., 2022). In Indonesia, the involvement of trained community health workers (CHWs) has been effective in assisting health providers in identifying high-risk pregnancies (Prafiti et al, 2024).

However, in indigenous communities such as the Osing, cultural factors and limited access to modern health services remain challenges, with deliveries assisted by traditional birth attendants still recorded in 2021 and 2022 (Banyuwangi District Health Office, 2022). This situation calls for the development of a comprehensive culturally based partnership model involving midwives, health cadres, families, community leaders, and traditional birth attendants. Such an approach is expected to ensure continuous support

for high-risk pregnant women while respecting local sociocultural values in efforts to reduce maternal and neonatal mortality in Banyuwangi Regency.

METHOD

This study employed a cross-sectional design with a quantitative approach to analyze the relationships among family involvement, social support, and health system performance in reducing maternal and neonatal mortality risk within the Osing community. The research was conducted in the working areas of community health centers (*Puskesmas*) in Banyuwangi Regency, where the Osing population is predominant, including Benculuk, Genteng Kulon, Gitik, Kabat, Kembiritan, Mojopanggung, Paspan, Singonjuruh, and Songgon. A total of 107 respondents, all high-risk pregnant women, were recruited using multistage sampling based on inclusion criteria (having high obstetric risk, residing in the study area, and consenting to participate). Primary data were collected using structured questionnaires with ratio-scale measurements (1–60) for independent variables, while the dependent variable was categorized as successful or unsuccessful. Secondary data were obtained from official reports of the District Health Office and local health centers regarding maternal and neonatal mortality indicators.

The research instruments included questionnaires, observation sheets, and documentation checklists, all of which underwent content validity testing by experts and internal reliability testing with Cronbach's Alpha ≥0.70. Independent variables were measured as follows: family involvement (husband's participation, financial support, emotional support, and decision-making), social support (community leader participation, cadre visits, medical–traditional collaboration, transportation assistance, and access to information), and health system performance (availability of maternal health services, health worker-to-population ratio, infrastructure, service quality, and recording systems). Data analysis was carried out in several stages: univariate analysis for variable distribution, bivariate analysis using Pearson correlation tests, and multivariate analysis using binary logistic regression to identify the most influential variables in reducing risk. A significance level of 0.05 and 95% confidence interval were applied. Model fit was assessed using the Hosmer–Lemeshow test, and the Pseudo-R^2 value (Nagelkerke) was reported along with the significance level (0.05).

Ethical Considerations

This study obtained ethical approval from the Health Research Ethics Committee of the University of Jember under document number 3354/UN25.8/KEPK/DL/2025. All participants provided informed consent after receiving explanations regarding the objectives, benefits, and procedures of the study. Confidentiality was ensured by anonymizing all data and removing personal identifiers, and participants retained the right to withdraw at any stage without any consequences.

RESULT

A total of 107 high-risk pregnant women from the Osing community in Banyuwangi Regency participated in this study. The majority of respondents were in the productive age range of 20–35 years, and most belonged to lower-middle socioeconomic status. More than half had prior pregnancy experience; however, reliance on traditional practices such as the use of traditional birth attendants (*dukun bayi*) remained evident. In

addition, most respondents resided in areas with limited access to formal health services and exhibited varying levels of family involvement and social support during pregnancy.

The binary logistic regression analysis (outcome coded 1 = successful, 0 = not successful; probability cut-off 0.50) showed that the predictive model achieved an overall classification accuracy of 72.0%. It correctly classified successful reductions in maternal and neonatal mortality with an accuracy of 84.4%, whereas the accuracy for the unsuccessful category was 53.5%. These findings indicate that the model was more sensitive in detecting successful program outcomes, particularly among high-risk pregnant women who received adequate family involvement and social support.

The regression analysis further showed that family involvement (OR = 1.097; 95% CI: 1.037–1.161; p = 0.001) and social support (OR = 1.083; 95% CI: 1.032–1.137; p = 0.001) were significantly associated with program success. In contrast, health-system performance was not statistically significant (OR = 1.038; 95% CI: 0.997–1.081; p = 0.067), although the direction of effect remained positive. The Hosmer–Lemeshow test yielded p = 0.62, indicating a good model fit, and the Nagelkerke R^2 = 0.51 suggested that the model explained about 51% of the variance in program success. Family involvement had a relatively greater effect than social support, as reflected in its slightly higher OR (1.097 vs. 1.083), underscoring the importance of direct family engagement in supporting successful interventions. While the contribution of health-system performance was not significant, it still holds practical implications in settings with limited service capacity. Overall, because the model was more capable of identifying success than failure, interpretation should consider the potential for classification bias toward the successful class.

Table 1. Confusion Matrix for Predicting "Successful Reduction of MMR–IMR" (cut-off = 0.50)

Observed\Predicted	Not successful	Successful	Total	Row % Correct
Not successful	23 (True Negative)	20 (False Positive)	43	53.5%
Successful	10 (False Negative)	54 (True Positive)	64	84.4%
Total	33	74	107	Overall accuracy: 72.0%

Table 2. Classification Performance Summary

Metric	Formula	Value
Sensitivity (recall, TPR)	TP / (TP+FN)	84.4%
Specificity	TN / (TN+FP)	53.5%
Positive predictive value (PPV / Precision)	TP / (TP+FP)	73.0%
Negative Predictive Value (NPV)	TN / (TN+FN)	69.7%
Accuracy	(TP+TN) / N	72.0%
Balanced accuracy	(Sensitivity + Specivicity) / 2	68.9%
Outcome Prevalence	(TP+FN) / N	59.8%
F1 Score	2 x (PPV x Sensitivity) / (PPV + Sensitivity)	78.3%

Table 3. Multivariable Logistic Regression Predicting "Successful Reduction of MMR–IMR"

Predictor	B	SE	Wald	P	OR=Exp(B)	95% CI for OR
X1	0.093	0.029	10.278	0.001	1.097	1.037 – 1.161
X2	0.080	0.025	10.316	0.001	1.083	1.032 – 1.137
X3	0.038	0.020	3.365	0.067	1.038	0.997 – 1.081
Constant	−7.030	1.764	15.884	<0.001	0.001	-

Notes. OR > 1 indicates higher odds of a "successful" outcome as the predictor increases. Predictors **x1** and **x2** are statistically significant; **x3** is borderline (p = 0.067). CI = confidence interval.

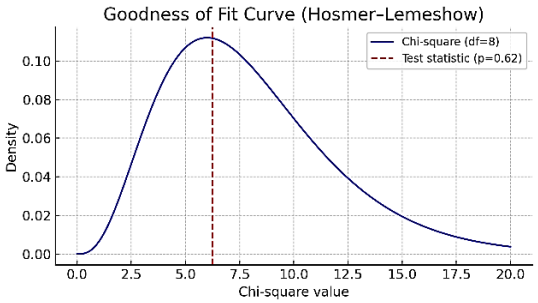

Figure 1. Family and Social Support Levels among High-Risk Pregnant Women in the Osing Community

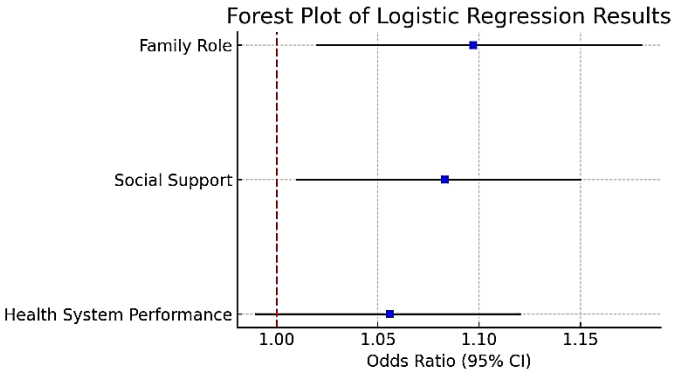

Figure 2. Binary Logistic Regression Model of Determinants for Maternal and Neonatal Mortality Reduction

DISCUSSION

Maternal Mortality Ratio (MMR) and Neonatal Mortality Rate (NMR) are sensitive indicators that reflect inequities within health systems, particularly in indigenous communities and resource-limited settings. The logistic regression analysis revealed that family involvement and social support significantly contributed to the reduction of maternal and neonatal mortality, whereas health system performance showed no significant effect (OR = 1.038; 95% CI 0.997–1.081; p = 0.067). This non-significance may be explained by two factors: (1) the limited sample size (n = 107), which may not have adequately captured variations in health system performance, and (2) structural barriers such as a low health worker-to-population ratio and a weak referral system. This reinforces the notion that sociocultural determinants are more dominant than structural interventions in the study area. These findings are consistent with reports by WHO (2020) and Silva et al. (2024), which emphasize the persistent burden of maternal and neonatal mortality in developing countries.

National trends show a similar pattern. Data from the Indonesian Ministry of Health (2024) reported an increase in maternal and infant deaths from 2022 to 2023, despite government targets to reduce MMR to ≤183 per 100,000 live births and NMR to ≤16 per 1,000 live births by 2024. These targets remain difficult to achieve in regions such as East

Java and Banyuwangi, which serve as centers of Osing indigenous communities (East Java Provincial Health Office, 2023; Banyuwangi District Health Office, 2023). This underscores that top-down national strategies have not fully addressed more fundamental cultural determinants.

The findings of this study highlight the importance of family-centered care in health decision-making. Extended family members, particularly parents and in-laws, often play key roles in determining the place of delivery and making decisions during pregnancy complications. When family education is improved, preparedness for complications increases, as demonstrated in this study, associated with a 9.7% increase in the odds of success per one-unit increase. This aligns with the *Continuity of Care* approach (Sholikah et al., 2025) and the study by Kabimba et al. (2020), which emphasized that weak family support is a major contributor to high neonatal morbidity.

Social support from the community, health cadres, traditional birth attendants, and local leaders also demonstrated a significant influence in reducing maternal and neonatal mortality risks. Social capital proved to be a crucial factor, beyond formal medical services. This is consistent with Dalal et al. (2022), who highlighted the role of interpersonal support in reducing referral barriers, and Prafiti et al (2024), who found that cadre involvement was effective in early identification of high-risk pregnancies. Thus, social support and community networks function as bridges that enhance the effectiveness of formal health programs.

The limited performance of the health system in Banyuwangi can be explained by low health workforce density, weak referral mechanisms, and negative community perceptions of modern health services. Souza et al. (2024) demonstrated that the global decline in maternal mortality is determined not only by biomedical factors but also by socioeconomic "super-determinants" and the responsiveness of health systems. Similarly, Dagher & Linares (2022) argued that social determinants of health (SDoH), including poverty and discrimination, exacerbate maternal and neonatal mortality gaps.

In rural contexts, Gordon et al. (2025) identified six key mechanisms for improving maternal care quality, including care connection, social support, and education, while transportation, insurance, and communication remained major barriers. These findings parallel conditions in Banyuwangi, where social and family support are significant, but structural barriers limit the performance of formal systems. This highlights the importance of community-based interventions that integrate social determinants with health system strengthening.

Theoretically, this study reaffirms that the effectiveness of maternal and child health programs depends on a balance between formal health systems and the sociocultural strengths of communities. Participatory approaches based on social assets and cultural partnerships have proven more effective than purely technocratic strategies (Duarsa et al., 2020; Banyuwangi District Health Office, 2022). By involving midwives, health cadres, families, community leaders, and traditional birth attendants, interventions not only enhance effectiveness but also foster community ownership (Souza et al., 2024; Gordon et al., 2025). The findings of this study hold potential for replication in other indigenous communities, with appropriate contextual adaptations.

CONCLUSION

This study affirms that family involvement and social support are key factors in reducing maternal mortality (MMR) and neonatal mortality (NMR) in the Osing community of Banyuwangi. The engagement of extended families, community leaders,

and social networks has been shown to strengthen preparedness for pregnancy complications and enhance the effectiveness of health interventions. In contrast, the performance of the formal health system, although showing a positive trend, was not statistically significant due to limited health workforce capacity, weak referral mechanisms, and community perceptions of modern health services.

These findings highlight that sociocultural determinants play a more dominant role than formal health instruments in the context of indigenous communities. Therefore, strategies to reduce maternal and neonatal mortality must prioritize participatory approaches based on social assets and cultural partnerships, involving families, midwives, health cadres, community leaders, and traditional birth attendants as strategic partners. Such approaches not only improve program effectiveness but also foster a sense of community ownership over interventions, and hold potential for replication in other indigenous communities in Indonesia with appropriate local adaptation.

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