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Analysis of *Continuity of Care* in Pregnant Women on Newborn Weight, Immunization, and Postpartum Contraceptive Use in Jember District

[1]Restiningsih*, [2]Nyoman Anita Damayanti, [3]Armunanto
[1] School of Midwifery, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia*; email: restiningsih@fk.unair.ac.id
[2] Department of Health Administration and Policy, Faculty of Public Health, Universitas Airalngga, Surabaya, Indonesia; email: nyoman.ad@fkm.unair.ac.id
[3] Health Specialist, UNICEF, Surabaya, Indonesia; email: aarmunanto@unicef.org
*Correspondence

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Abstract
Introduction: *Reducing the Maternal Mortality Rate (MMR) to <70 per 100,000 live births is a global SDG target. Despite a decline in maternal deaths, infant mortality in East Java remains high. The Geliat Airlangga–UNICEF program applies a Penta Helix approach through continuity of care to improve maternal and child health outcomes.* ***Objective:*** *To analyze the effect of continuity of care for pregnant women on newborn birth weight, immunization, and postpartum contraceptive use in Jember District.* ***Method:*** *This observational analytic study involved 100 pregnant women supported by volunteers from December 2024 to June 2025 in three health centers. Data were collected from logbooks and analyzed using the Spearman correlationtest.* ***Result and Discussion:*** *Most respondents (90%) were aged 20–35 years, 70% were primigravida, and 86% had MUAC >23.5 cm. A weak positive correlation was found between support frequency and newborn birth weight ($r=0.185$; $p<0.05$). No significant correlation was found with immunization status ($r=0.163$; $p>0.05$), while a weak negative correlation existed with postpartum contraception ($r=-0.227$; $p<0.05$). Continuous support improved maternal awareness and early detection but had varied effects on postpartum practices.* ***Conclusions:*** *Continuity of care positively influences pregnancy readiness and newbo rn outcomes. Strengthening community-based, volunteer-supported maternal care can contribute to reducing maternal and infant mortality in Jember District.*

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Introduction

The target of reducing the Maternal Mortality Rate (MMR) to less than 70 per 100,000 is one of the global priority targets in the Sustainable Development Goals (SDGs) (Mugo et al., 2018). Indonesia has the second highest MMR among ASEAN countries, at 205 per 100,000 live births (LB), according to a 2017 report from the Millennium Development Goals (MDGs). This poses a challenge for Indonesia to achieve the Sustainable Development Goals (SDGs) by 2030 (Sachs et al., 2023). In East Java, maternal mortality has fluctuated significantly in the last five years. In 2020, there were 565 cases of maternal deaths, which rose dramatically in 2021 to 1,279 cases. This surge was a result of the COVID-19 pandemic. From 2022 to 2024, maternal deaths can be reduced to 484 cases. In contrast to maternal deaths, infant deaths have increased from 3,172 in 2021 to 3,754 in 2024 (East Java Health Office, 2024).

The declining Maternal Mortality Rate (MMR) does not align with the dynamics observed in the field. Not all reductions in MMR correspond with decreases in the Infant Mortality Rate (IMR). Success in reducing MMR in certain regions has been optimized through various efforts, including obstetric emergency care, increased postpartum family planning coverage, and maternal support. Continuity of Care support for mothers since pregnancy is expected to reduce the Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) in an integrated manner (Zelka et al., 2023). The phenomenon occurring in the field is that Continuity of Care support for mothers since pregnancy has not been fully effective in reducing the Infant Mortality Rate (IMR).

The increase in infant mortality rates (IMR) in several regions is influenced by various factors, namely delayed care, low birth weight (LBW), low immunization coverage, and limited quality of postpartum and neonatal services (Indonesian Ministry of Health, 2023). This situation reinforces the need to evaluate strategies that empower communities and various sectors.

Geliat Airlangga, together with UNICEF, is promoting innovation in East Java through an integrated and sustainable Penta Helix approach (academics, community, government, industry, and media) based on continuity of care in an effort to reduce maternal and infant mortality. In 2024-2025, GELIAT will provide six months of assistance to mothers and babies in 9 districts/cities in East Java, namely Banyuwangi, Jember, Magetan, Ponorogo, Pacitan, Nganjuk, Bangkalan, Sampang, and Malang City. The selection of districts/cities is based on the determination of locations by BAPPENAS. Jember District is one of the districts with the highest maternal mortality rate in 2024. Maternal support is provided continuously with the involvement of three universities in Jember Regency. This study aims to monitor and evaluate the role of maternal and child support by volunteers (students) through Pentahelix on birth weight, postpartum contraceptive use, and immunization as efforts to reduce maternal and infant mortality rates.

Method

The research method used in this study was an observational analytical design. Data were collected using support records (*logbooks*). The study was conducted on all pregnant women who were supported by volunteers from December 2024 to June 2025. A total of 200 pregnant women were accompanied until the postpartum period, and samples were taken using *consecutive sampling* techniques. The sample size was determined using Slovin's formula, resulting in 100 samples. The research results were tested for normality to determine the next statistical test.

The inclusion criteria for this study were all pregnant women in their second and third trimesters who were willing to be accompanied until the postpartum period. Conversely, the exclusion criteria were pregnant women who were unwilling to be accompanied, had incomplete data, and had not yet completed the postpartum period. This study was conducted at three Community Health Centers in Jember Regency, namely Puseksmas Panti, Sukorambi, and Sumbersari.

Research and Discussions

1. Result

This mother and child assistance program is a collaboration with UNICEF in the HEALTH cluster, which aims to monitor and educate pregnant women so that complications can be detected early and further treatment can be administered in a timely manner. Additionally, it seeks to improve maternal compliance with Ante Natal Care (ANC). Support for pregnant women begins in the second and third trimesters and continues through the postpartum period, conducted offline through home visits and accompaniment during ANC, as well as online via WhatsApp and video calls.

Characteristics of Pregnant Women

Frequency Distribution of Pregnant Women's Characteristics Based on Pregnancy Eligibility (Age, Parity, LILA, BMI, and Interpregnancy Interval)

Table 1

Frequency Distribution of Pregnancy Eligibility (Age, Parity, LILA, BMI, and Interpregnancy Interval) in Jember District from December 2024 to June 2025.

	Frequency Distribution	
Pregnancy Eligibility	**Frequency (n)**	**Percentage (%)**
Age (years)		
< 20	5	5
20-35	90	90
>35	5	5
Total	100	
Parity		
P1	70	70
P2-P5	30	30
Total	100	
LILA (cm)		
< 23.5	14	14
≥23.5	86	86
Total	100	
BMI (kg/m²)		
< 18.5	9	9
18.5-25.0	32	32
>25	59	59
Total	100	
Pregnancy Interval (years)		
< 2	7	7
≥ 2	90	90
≥ 10	3	
Total	100	

Table 1 shows that 90% of respondents based on pregnancy eligibility were within the eligible age range of 25-35 years. Parity , 70% of respondents were primigravida. The pregnancy eligibility characteristics of respondents based on nutritional status are as follows: 86% have a LILA > 23.5 cm, 59% have a BMI > 25, and 32% have a BMI of 18.5-25. The pregnancy eligibility of respondents based on pregnancy interval is 90% within the ideal interval of ≥ 2 years.

Table 2
Analysis of the Effect of Pregnancy Support During Pregnancy and Postpartum on Birth Weight

Correlation		Frequency of Support	Newborn Weight
Frequency of Support	Correlation Coefficient	1.000	.185
	Sig, (2-tailed)		.065
	N		
		100	100
Birth Weight of Newborns	Correlation Coefficient	.185	
	Sig, (2-tailed)	.065	
	N		
		10	

Based on Table 2, the statistical test used is Spearman's correlation because, based on the normality test, the data is not normally distributed. Table 2 shows the results of the *Spearman* correlation test *of* 0.185 (unidirectional), which means that there is a correlation, albeit weak, and statistically significant 0.065 ($p<0.05$) between the frequency of maternal assistance and the weight of newborns.

Table 3
Analysis of the Effect of Maternal Support During Pregnancy and Postpartum on the Immunization Status of Newborns

Correlation		Frequency of Support	Immunization Status
Frequency of Support	Correlation Coefficient	1.000	.163
	Sig, (2-tailed)		.105
	N		
		100	100
Immunization Status	Correlation Coefficient	.163	
	Sig, (2-tailed)	.105	
	N		
		100	

Based on Table 3, the statistical test used is Spearman's correlation because, based on the normality test, the data is not normally distributed. Table 3 shows the results of the *Spearman* correlation test of 0.163 (unidirectional), which means there is a weak positive correlation but statistically no significant correlation $\alpha=0.065$ ($p> 0.05$) between the frequency of maternal assistance and the immunization status of newborns.

Table 4
Analysis of the Effect of Maternal Support During Pregnancy and Postpartum on Postpartum Contraceptive Use

Correlation		Frequency of Support	Postpartum Contraception
Frequency of Support	Correlation Coefficient	1.000	-, 227
	Sig, (2-tailed)		0.023
	N		
		100	100
Postpartum Contraception	Correlation Coefficient	-. 227	
	Sig, (2-tailed)	.023	
	N		
		100	

Based on Table 4, the statistical test used is Spearman's correlation because, based on the normality test, the data is not normally distributed. Table 4 shows the results of the *Spearman* correlation test of -0.227, which means that the correlation is weak but statistically significant at α=0.065 (p> 0.05) between the frequency of maternal assistance and the use of postpartum contraception.

2. Discussion

The characteristics of pregnant women who received counseling based on pregnancy eligibility in Jember Regency showed varying results. Most of the pregnant women who received counseling were aged 20-35 years. The age of 20-35 years is considered appropriate for pregnancy, both physically and mentally (Ministry of Health of the Republic of Indonesia, 2021) . The risk of adverse pregnancy outcomes for both the mother and fetus increases significantly at ages >35 years compared to younger pregnant women, even in healthy pregnant women without comorbidities (Judette M. Louis, 2022) . The incidence of maternal morbidity increases significantly in women over 40 years of age, including conditions such as kidney failure, shock, acute heart disease, obstetric complications, and increased ICU care (Lisonkova et al., 2017) . The proportion of pregnant women with appropriate pregnancies can contribute to reducing maternal mortality in Jember District; however, this does not mean that pregnant women aged 20–35 years do not require optimal support. Therefore, continuous support must be provided comprehensively, and health promotion for delaying pregnancy at inappropriate ages must be continuously improved.

The parity and pregnancy spacing of pregnant women in Jember Regency are within the appropriate range, consistent with normal reproductive age. Maternal and infant health deteriorates with excessive pregnancy spacing. Generally, favorable pregnancy outcomes occur with an interval of 18–23 months (Starbird & Crawford, 2019) . Conversely, pregnancies that are too close together can impact the health of the mother and baby, so appropriate contraception is needed to regulate the spacing between pregnancies (Feyissa et al., 2025) . Anemia, postpartum bleeding, hypertension during pregnancy, gestational diabetes mellitus, and premature birth are more common in grand multiparas than in multiparas or nulliparas (Başkiran et al., 2023) . Pregnant women who received continuous antenatal care ( ) in Jember Regency already had good pregnancy planning. Through this care, it is hoped that pregnant women will obtain information about the ideal pregnancy spacing and appropriate contraceptive planning from the start of pregnancy.

Characteristics of pregnant women in Jember Regency, in addition to age, parity, and pregnancy spacing, which indicate suitability for pregnancy, show that from a nutritional status perspective, most have a Mid-Upper Arm Circumference (MUAC) > 23.5 cm, meaning that their nutritional status is good and their nutritional needs are met. A MUAC < 23.5 cm is associated with anemia, which can affect fetal development and lead to obstetric complications (Lisa et al., 2023) . Some pregnant women with a BMI > 25 show a tendency toward overweight, which is a condition requiring special attention. Although their nutritional status is good, being overweight before pregnancy can threaten the health and well-being of the pregnant woman and the baby and will certainly increase the cost of pregnancy management. Therefore, a risk-based approach is needed as a preventive measure (Langley-Evans et al., 2022) . The nutritional status of most of the pregnant women who received assistance was good and suitable for pregnancy, but there were still pregnant women with LILA < 23.5 cm before and during pregnancy and who were overweight before and during pregnancy. Therefore, through continuous volunteer assistance, education on balanced nutrition and weight gain targets for pregnant women in accordance with their BMI can be provided.

Continuous support for pregnant women correlates with the birth weight of newborns. The continuous support model (Continuity of Care) has been proven to result in birth weights appropriate for gestational age compared to other models (. Continuous support during pregnancy through physical, mental, and emotional support, as well as nutritional education during pregnancy, results in newborns weighing > 2500 grams (Nanda Pratama Putri et al., 2024) . Continuous support for pregnant women by volunteers, both *offline* and *online,* in Jember Regency provides leverage beyond increasing knowledge and changing mothers' behavior toward nutritional needs; it also impacts newborn birth weight. This can be a supporting factor in reducing the Infant Mortality Rate in Jember Regency.

Continuous support during pregnancy is an effort to prepare mothers in terms of knowledge, psychology, and awareness of pregnancy, childbirth, postpartum, and newborns (Midwifery Continuity of Care Model Toolkit, 2012). Volunteer support through Continuity of Care from pregnancy to the postpartum period makes it possible to provide support to infants, particularly regarding immunization compliance, by reminding them of schedules or educating them about the importance of infant immunization (Enlow et al., 2017). Volunteer assistance may not have an impact on immunization status because immunization is a government program that is greatly influenced by the expertise of health workers, vaccine availability, service system integration, supervision, and because immunization coverage in the region is already very high (Gilmore & McAuliffe, 2013). In Jember District, volunteer assistance has not been proven effective in increasing immunization coverage in newborns. This does not mean that assistance does not contribute to a decrease in infant mortality rates, but rather that immunization status in infants can be influenced by the location of Jember District, which consists of land, sea, and mountains, thus requiring access to immunization services. In addition, vaccine availability, training updates, cadre involvement, and regional policies can also influence immunization coverage.

The use of postpartum contraception has a weak negative correlation with the outcomes of both *online* and *offline* support. The use of postpartum contraception is influenced by demographic, economic, ethnic, educational, environmental, obstetric history, health service facility, and psychosocial-cultural factors (Robinet et al.., 2023) . Increasing maternal age, having more than one child, and good knowledge influence

contraceptive planning among mothers (Zulfa et al.., 2024) . These findings indicate the need for further evaluation regarding the quality of counseling and capacity building, as well as the need for strategic approaches and communication for postpartum contraceptive planning. A holistic approach is needed to increase postpartum contraceptive coverage as an effort to reduce maternal mortality and infant mortality.

Conclusion

Continuity of care by volunteers for pregnant women until postpartum has a positive leverage in Jember Regency. Pregnant women who are accompanied are mostly in a condition suitable for pregnancy, which means they have good pregnancy planning. Overall, *continuity of care* for pregnant women by volunteers in Jember Regency can be an innovation as a strategy to reduce maternal and infant mortality rates through *pentahelix* collaboration.

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