Jurnal Kebidanan dan Keperawatan Aisyiyah
Vol. 21, No. 2 (2025), pp. (129-138)
e-ISSN 2477-8184
p-ISSN 1858-0610
https://doi.org/10.31101/jkk.4094

Original Research Paper

Effect of modified early obstetric warning system (MEOWS) on mode of delivery and neonatal outcomes

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Submitted: May 16, 2025 Revised: December 19, 2025 Accepted: December 26, 2025

Abstract

Delayed management of obstetric complications increases maternal and neonatal mortality rates. The Modified Obstetric Early Warning System (MEOWS) facilitates early detection, determines safe delivery, and improves neonatal outcomes, especially when combined with obstetric factors. This study aims to analyze the effect of MEOWS implementation on the delivery mode and neonatal outcomes, both individually and in combination with obstetric factors. This study used an observational analytical method with a cross-sectional design. Data were collected from the medical records of 281 patients who gave birth at Bhayangkara Brimob Hospital in 2024. Sampling used probability sampling with proportional stratified random sampling. The independent variable was MEOWS, the dependent variables were delivery mode and neonatal outcomes, while obstetric factors were considered confounding variables. Bivariate analysis used chi-square and Fisher's exact tests. Multivariate analysis used binary logistic regression. Bivariate results: MEOWS was linked significantly to neonatal outcomes, but not with delivery mode. Multivariate analysis: MEOWS had no significant effect on delivery mode and neonatal outcomes ($p>0.05$). Delivery Mode was significantly associated with parity ($p = 0.012$; OR 2.073) and history of previous delivery ($p < 0.001$; OR = 4.858). Meanwhile, neonatal outcomes were significantly associated with gestational age and parity ($p<0.05$; OR 45.49 vs OR 0.171). The application of MEOWS combined with obstetric factors improves the prediction of complications, guides clinical decisions, reduces unnecessary interventions, and contributes to better outcomes. Further research is recommended to develop an integrated risk prediction model to improve the accuracy of assessment and enhance safety for both mothers and newborns.

Keywords: delivery; early detection; modified early obstetric warning system (MEOWS); neonatal outcomes; obstetric factors

1. Introduction

Maternal and child health remains a critical global health concern, with the maternal mortality ratio (MMR) and infant mortality rate serving as key indicators of healthcare system performance. In Indonesia, the MMR in 2020 was 189 per 100,000 live births, ranking as the second highest in the ASEAN region after Myanmar (Kemenkes RI, 2024). The leading causes of maternal mortality include non-obstetric complications (49%), hypertensive disorders of pregnancy (19%), and obstetric hemorrhage (18%) (Syairaji et al., 2024). Previous research by Sampurna et al. (2023) identified several maternal factors significantly associated with an increased risk of neonatal mortality, including inadequate postnatal care involvement (OR = 20.394) and childbirth-related complications (OR = 2.072). From the neonatal perspective, low birth weight was found to substantially increase the risk of neonatal mortality (OR = 12.489). Furthermore, Diana et al. (2020) emphasized that the

majority of maternal and neonatal deaths are preventable through early detection and timely clinical intervention.

The Modified Early Obstetric Warning System (MEOWS) is an early warning system developed in the United Kingdom to detect clinical deterioration in pregnant women. It has been widely adopted as a standard obstetric protocol and has been shown to improve timely responses to obstetric emergencies (Singhal et al., 2022). Evidence indicates that MEOWS is effective in reducing obstetric complications and improving both maternal and neonatal outcomes (Balik et al., 2025; Sulistianto et al., 2023; Tuyishime et al., 2020).

Although MEOWS has the potential to serve as a standard of obstetric care, its implementation in Indonesia remains limited due to various constraints. Previous studies have demonstrated a strong correlation between MEOWS scores and the severity of maternal conditions, including length of hospital stay, need for intensive care unit (ICU) admission, and its effectiveness in predicting maternal morbidity (Padmavati et al., 2024; Ratu & Hutagaol, 2023; Singhal et al., 2022; Yadav & Sinha, 2023). However, comprehensive studies integrating MEOWS scores with modes of delivery and neonatal outcomes remain scarce, particularly in hospitals where MEOWS has been routinely implemented. Bhayangkara Brimob Hospital, for instance, has adopted MEOWS since 2022, supported by structured SBAR communication and written read-back confirmation. Therefore, this study is warranted to address this gap and to support the development of more accurate risk assessment strategies aimed at improving maternal and neonatal safety. This study aims to analyze the impact of MEOWS implementation on delivery methods and neonatal outcomes, both independently and in combination with obstetric factors.

2. Research Methods

This study employed an analytical observational quantitative design with a cross-sectional approach, aiming to analyze the effects of the Modified Early Obstetric Warning System (MEOWS) and obstetric factors on modes of delivery and neonatal outcomes. Neonatal outcomes assessed included APGAR scores, birth weight, anthropometric measurements, vital signs, and overall physical condition at birth. The obstetric factors examined comprised maternal age, gestational age, parity, history of delivery, and maternal medical conditions. Data were obtained from the medical records of women who delivered at Bhayangkara Brimob Hospital in 2024. The inclusion criteria were women who underwent vaginal delivery or cesarean section, gestational age ≥ 37 weeks, premature (< 37 weeks), live-birth and stillbirth infants, and complete medical records. The exclusion criteria included incomplete data, multiple pregnancies, infants with major congenital anomalies, and abortion. The study population consisted of 705 postpartum women, from which a sample of 281 respondents was selected using probability sampling through the proportionate stratified random sampling method.

Data collection was conducted through a systematic review of medical records using a structured data extraction form. The Modified Early Obstetric Warning System (MEOWS) variable was classified based on physiological parameters, including blood pressure, body temperature, respiratory rate, heart rate, and lochia, into four categories: white zone (only white), yellow zone (one yellow), red zone (>2 yellow or 1 red), and severe red zone (>2 red), indicating increasing levels of obstetric emergency. Modes of delivery were categorized as vaginal delivery and cesarean section (CS), while neonatal outcomes were classified as live birth and stillbirth.

Data analysis was performed using descriptive statistics to summarize respondent characteristics and the distribution of study variables. Bivariate analyses were conducted using the Chi-square test and Fisher's exact test to examine the associations between MEOWS scores and obstetric factors with modes of delivery and neonatal outcomes, at a significance level of $\alpha < 0.05$. To assess simultaneous effects and control for potential confounding variables, binary logistic regression analysis was

applied. The model was evaluated using goodness-of-fit tests, odds ratio (OR) estimates, and the Pseudo R^2 coefficient to determine the predictive strength for modes of delivery and neonatal outcomes. All analytical results were systematically presented to support the study conclusions. This study received ethical approval from the Health Research Ethics Committee of Universitas Gunadarma (KEPK-UG), approval number 001/EA/KEPK-UG/I/2025.

3. Results and Discussion

3.1.Results

3.1.1.Distribution of Respondent Characteristics

An evaluation of 281 samples revealed that the majority of mothers had final MEOWS scores in the white zone, accounting for 227 individuals (80.8%). Cesarean section was the predominant mode of delivery, observed in 87.9% of cases. Regarding neonatal outcomes, 98.2% (n = 276) of newborns were live births, and all required admission to the neonatal intensive care unit (NICU). Demographically, the study population was predominantly composed of women aged 20–35 years (79.4%) with term pregnancies (90.7%). The largest parity group consisted of primigravida mothers (39.1%), and nearly half of the respondents (45.2%) had a history of previous cesarean delivery. Overall maternal health status was generally favorable, as 86.1% of participants had no documented comorbid conditions. The distribution of respondent characteristics is summarized in **Table 1**.

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics	Distribusi Frekuensi	
	f	%
Zona MEOWS		
Only white	231	82.2
One yellow	32	11.4
> 2 yellow or 1 red	15	5.3
> 2 red	3	1.1
Mode of Delivery		
Vaginal Delivery	34	12.1
Cesarean Section	247	87.9
Neonatal Outcomes		
Stillbirth	5	1.8
Live Birth	276	98.2
Obstetric Factors		
Maternal Age		
At risk (< 20 Years)	2	0,7
No risk (20-35 Years)	223	79,4
At risk (>35 Years)	56	19.9
Pregnancy Age		
Premature (< 37 weeks)	26	9.3
Aterm (37 – 42 weeks)	255	90.7
Parity		
Nulliparous (Parity 0)	84	29.9
Primipara (Parity 1)	110	39.1
Multipara (Parity 2-4)	82	29.2
Grandemultipara (Parity ≥5)	5	1.8
l. History of Previous Delivery		
Cesarean Section	127	45.2
Vaginal Delivery	79	28.1
Never given birth	75	26.7

Characteristics	Distribusi Frekuensi	
	f	%
Medical Condition		
There is a disease	39	13.9
No disease	242	86.1

3.1.2. Association Between the Modified Early Obstetric Warning System (MEOWS) and Mode of Delivery and Neonatal Outcomes

Table 2 presents the association between MEOWS categories and mode of delivery. The analysis showed that cesarean section was the predominant mode of delivery (87.9%), while vaginal delivery accounted for only 12.1% of cases. All mothers classified in the high MEOWS categories severe red zone and red zone (>2 red indicators or >2 yellow indicators or 1 red indicator) underwent cesarean delivery. Vaginal deliveries were observed exclusively among mothers with lower MEOWS categories (yellow and white zones), although in limited proportions. However, statistical analysis revealed no significant association between MEOWS categories and mode of delivery (p = 0.603), indicating that the choice of delivery method was not solely determined by MEOWS scores but also influenced by other clinical considerations.

Table 2. Association Between the MEOWS and Mode of Delivery

MEOWS	Mode of Delivery						Exact Sig.(2-side)
	Cesarean Section		Vaginal Delivery		Total		
	F	%	F	%	F	%	
> 2 Red	3	100	0	0.0	3	100	
> 2 Yellow or 1 Red	15	100	0	0.0	15	100	0.603
1 Yellow	28	87.5	4	13.9	32	100	
Only White	201	87.0	30	12.8	231	100	
Total	**247**	**87.9**	**34**	**12.1**	**281**	**100**	

Table 3 illustrates the association between MEOWS categories and neonatal outcomes. The majority of newborns were live births (98.2%), while stillbirths/intrauterine fetal death (IUFD) accounted for only 1.8% of cases; however, the distribution of these outcomes varied significantly across MEOWS categories. The proportion of stillbirth/IUFD was notably higher among mothers classified in the severe red MEOWS category (>2 red indicators), reaching 33.3%, compared with other categories. Nearly all mothers in the "only white" category delivered live infants (98.7%). In the one yellow and >2 yellow or 1 red categories (yellow and red zones), neonatal outcomes were also predominantly live births, although small proportions of stillbirth/IUFD were observed. Statistical analysis demonstrated a significant association between MEOWS categories and neonatal outcomes (p = 0.048), indicating that higher MEOWS categories were associated with an increased risk of adverse neonatal outcomes.

Table 3. Association Between the MEOWS and Neonatal Outcomes

	Neonatal Outcomes						Exact Sig.(2-side)
	Stillbirth		Live Birth		Total		
	F	%	F	%	F	%	
> 2 Red	1	33.3	2	66.7	3	100	
> 2 Yellow or 1 Red	0	0.0	15	100.0	15	100	0.048
1 Yellow	1	3.1	31	96.9	32	100	
Only White	3	1.3	228	98.7	231	100	
Total	**5**	**1.8**	**276**	**98.2**	**281**	**100**	

3.1.3. Relationship Between Obstetric Factors and Mode of Delivery

Based on Table 4, the analysis of obstetric factors demonstrated that parity and previous delivery history were significantly associated with mode of delivery. For the parity variable (p = 0.042), the highest proportions of cesarean section were observed among primiparous (91.8%) and multiparous women (90.2%). The strongest association was found for previous delivery history (p < 0.001), where nearly all women with a prior cesarean section (98.4%) underwent repeat cesarean delivery. In contrast, maternal age (p = 0.425), gestational age (p = 0.752), and maternal medical conditions (p = 0.061) were not statistically significantly associated with the mode of delivery in this study population.

Table 4. Relationship Between Obstetric Characteristics and Mode of Delivery

Obstetric Factors	Mode of delivery						Exact Sig.(2-side)
	Cesarean Section		Vaginal Delivery		Total		
	F	%	F	%	F	%	
Maternal Age							
At risk (< 20 Years)	2	100	0	0.0	2	100	
No Risk (20-35Years)	193	86.5	30	0.0	223	100	0.425
At risk (>35 Years)	52	92.9	4	7.1	56	100	
Total	**247**	**87.9**	**34**	**12.1**	**281**	**100**	
Gestational Age							
Premature (<37 weeks)	24	92.3	2	7.7	26	100	
Aterm (37-42 weeks)	223	87.5	32	12.5	255	100	0.752
Total	**247**	**87.9**	**34**	**12.1**	**281**	**100**	
Parity							
Nulliparous (Parity 0)	69	82.1	15	17.9	84	100	
Primipara (Parity 1)	101	91.8	9	8.2	110	100	
Multipara (Parity 2-4)	74	90.2	8	9.8	82	100	0.042
Grandemultipara (Parity ≥5)	3	60.0	2	40.0	5	100	
Total	**247**	**87.9**	**34**	**12.1**	**281**	**100**	
History of Previous Delivery							
Cesarean Section	125	98.4	2	17.9	127	100	
Vaginal Delivery	61	77.2	18	8.2	79	100	0.001
Never Given Birth	61	81.3	14	9.8	75	100	
Total	**247**	**87.9**	**34**	**12.1**	**281**	**100**	
Medical Condition							
There is a disease	38	97.4	1	2.6	39	100	
No disease	209	86.4	33	13.6	242	100	0.061
Total	**247**	**87.9**	**34**	**12.1**	**281**	**100**	

3.1.4. Relationship Between Obstetric Factors and Neonatal Outcomes

Table 5 describes the association between obstetric factors and neonatal outcomes. Statistical analysis identified two variables that were significantly associated with the occurrence of stillbirth or intrauterine fetal death (IUFD), namely gestational age (p = 0.006) and parity (p = 0.013). Specifically, the rate of fetal death increased markedly among preterm births (<37 weeks), reaching 11.5%, compared with only 0.8% in term pregnancies. A similar pattern was observed for parity, with the grand multiparous group (parity ≥ 5) exhibiting the highest risk of fetal death at 20.0%. In contrast, other variables, including maternal age (p = 0.090), previous delivery history (p = 0.860), and maternal comorbid conditions (p = 0.529), were not statistically significantly associated with neonatal outcomes.

Table 5. Association Between Obstetric Factors and Neonatal Outcomes

Obstetric Factors	Neonatal Outcomes						
	Stillbirth		Live Birth		Total		
	F	%	F	%	F	%	Exact Sig.(2-side)
Maternal Age							
At risk (< 20 Years)	0	0.0	2	100.0	2	100	0.090
No Risk (20-35 Years)	2	0.9	221	99.1	223	100	
At risk (>35 Years)	3	5.4	53	94.6	56	100	
Total	5	1.8	276	98.2	281	100	
Gestational Age							
Premature (<37 weeks)	3	11.5	23	88.5	26	100	0.006
Aterm (37-42 weeks)	2	0.8	253	99.2	255	100	
Total	5	1.8	276	98.2	281	100	
Parity							
Nulliparous (Parity 0)	1	1.2	83	98.8	84	100	0.0 13
Primipara (Parity 1)	0	0.0	110	100	110	100	
Multipara (Parity 2-4)	3	3.7	79	96.3	82	100	
Grandemultipara (Parity ≥5)	1	20.0	4	80.0	5	100	
Total	5	1.8	276	98.2	281	100	
History of Previous Delivery							
Cesarean Section	2	1.6	125	98.4	127	100	0.860
Vaginal Delivery	2	2.5	77	97.5	79	100	
Never Given Birth	1	1.3	74	98.7	75	100	
Total	5	1.8	276	98.2	281	100	
Medical Condition							
There is a disease	1	2.6	38	97.4	39	100	0.529
No disease	4	1.7	238	98.3	242	100	
Total	5	1.9	276	98.2	281	100	

3.1.5. Results of Logistic Regression Analysis of Obstetric Factors and MEOWS on Mode of Delivery and Neonatal Outcome

Binary logistic regression analysis was performed using two models to assess factors associated with mode of delivery (Model 1) and neonatal outcomes (Model 2), as summarized in Table 6. In Model 1, which examined mode of delivery, parity and previous delivery history showed statistically significant associations. Women with higher parity had approximately twice the odds of experiencing a particular mode of delivery (OR = 2.073; p = 0.012), while previous delivery history emerged as the strongest predictor, increasing the odds by nearly fivefold (OR = 4.858; p < 0.001). MEOWS scores were not significantly associated with mode of delivery (p = 0.114). Similarly, maternal medical conditions, although indicating a tendency toward increased risk, did not reach statistical significance (p = 0.080).

Table 6. Results of Logistic Regression Analysis of Obstetric Factors and MEOWS on Mode of Delivery

Step 1	B	SE	Wald	Df	Sig	Exp (B)	95% CI for EXP (B)	
							Lower	Upper
Model 1 (Mode of Delivery)								
MEOWS	0.758	0.479	2.505	1	0.114	2.133	0.835	5.451
Parity	0.729	0.289	6.352	1	0.012	2.073	1.176	3.653
History of Previous Delivery	1.581	0.370	18.214	1	<0.001	4.858	2.351	10.041

Step 1	B	SE	Wald	Df	Sig	Exp (B)	95% CI for EXP (B)	
							Lower	Upper
Medical Conditions	1.838	1.050	3.066	1	0.080	6.286	0.803	49.203
Constant Model 1	-8.215	1.901	18.672	1	<0.001	0.000		
Model 2 (Neonatal Outcomes)								
MEOWS	0.759	0.540	1.975	1	0.160	2.137	0.7411	6.163
Maternal Age	- 0.646	1.265	0.261	1	0.610	0.524	0.044	6.250
Gestational Age	3.818	1.436	7.065	1	0.008	45.495	2.725	759.436
Parity	-1.764	0.794	4.936	1	0.026	0.171	0.036	0.812
Constant Modal 2	5.021	2.614	3.690	1	0.055	151.548		

In Model 2, which focused on neonatal outcomes, gestational age emerged as the dominant factor, with a significant increase in the odds of specific neonatal outcomes as gestational age advanced (OR = 45.495; p = 0.008). Similar to the findings for mode of delivery, parity was also significantly associated with neonatal outcomes but demonstrated a protective effect (OR = 0.171; p = 0.026). In contrast, neither MEOWS scores nor maternal age showed a statistically significant association with neonatal outcomes.

3.2.Discussion

Among the 281 high-risk pregnancies analyzed, the majority of mothers were classified in the MEOWS white zone (80.8%), indicating relatively stable physiological conditions. Most deliveries both cesarean section (87.0%) and vaginal delivery (12.8%) also occurred within this category, suggesting that obstetric decision-making was driven more by clinical indications than by physiological instability alone. These indications included a history of previous cesarean section without eligibility for vaginal birth after cesarean (VBAC), prolonged labor, premature rupture of membranes, antepartum hemorrhage, preeclampsia, and fetal malpresentation. This finding is consistent with Angolile et al. (2023), who reported that cesarean delivery is not always precipitated by physiological deterioration but is often influenced by preventive considerations, whereas vaginal delivery more frequently occurs in mothers with stable conditions and minimal complications.

Although cesarean section predominated (87.9%) and accounted for all deliveries in the red and severe red MEOWS zones, no statistically significant association was observed between MEOWS categories and mode of delivery (p = 0.603). Clinicians appeared to prioritize comprehensive clinical judgment particularly a history of previous cesarean section over reliance on MEOWS scores alone when determining the method of delivery. While MEOWS has been shown to be effective as an early warning tool for risk detection and for predicting complications and the need for intensive care, it lacks independent predictive power in determining the mode of delivery. Therefore, a holistic clinical assessment remains essential in obstetric decision-making.

In contrast to mode of delivery, the association between MEOWS categories and neonatal outcomes was statistically significant (p = 0.048). The increased proportion of stillbirth or intrauterine fetal death (IUFD) observed in the severe red MEOWS category supports evidence that maternal physiological instability is correlated with a higher risk of adverse neonatal outcomes. Higher MEOWS scores were associated with worsening maternal conditions and poorer neonatal outcomes, as reflected by a lower proportion of healthy live births and increased rates of neonatal intensive care unit (NICU) admission and IUFD in cases with triggered MEOWS. These findings are consistent with previous clinical studies reporting that elevated maternal early warning scores are associated with increased neonatal intensive care needs and adverse perinatal outcomes, although most prior research

has primarily focused on maternal outcomes (Rajput et al., 2025; Singhal et al., 2022).

Parity and previous delivery history were significantly associated with mode of delivery, while maternal age, gestational age, and maternal medical conditions were not. Parity showed a significant association ($p = 0.042$), with high cesarean section rates among primiparous (91.8%) and multiparous women (90.2%). Previous delivery history had the strongest influence ($p < 0.001$), as 98.4% of women with a prior cesarean underwent repeat cesarean delivery. These findings align with previous studies reporting high repeat cesarean rates among women with prior cesarean sections. Uterine scarring increases the risk of uterine rupture during VBAC, leading to repeat cesarean delivery as a preventive measure to reduce maternal and neonatal morbidity and mortality. Nonetheless, other clinical factors should also be considered in determining the mode of delivery.

Gestational age and parity were significant determinants of stillbirth. The elevated risk associated with preterm birth aligns with global evidence identifying prematurity as a leading cause of perinatal mortality (Ohuma et al., 2023; WHO, 2023). In terms of parity, primiparous women had higher live birth rates than multiparous and grand multiparous women, with the increased risk among grand multiparous women supporting previous findings linking high parity to maternal complications, placental dysfunction, and adverse fetal outcomes (Jovanovic et al., 2023; Dai et al., 2023; Khan et al., 2022).

MEOWS was not a significant predictor of mode of delivery at Bhayangkara Brimob Hospital in 2024. Delivery method was not associated with MEOWS scores or maternal medical conditions ($p > 0.05$), but was strongly influenced by parity ($p = 0.012$) and especially previous cesarean history ($p < 0.001$; OR = 4.858). While MEOWS is essential for early detection of maternal complications, its role in directly determining delivery mode is limited. The high cesarean rate, including among women in the safe MEOWS zone, highlights the substantial influence of obstetric factors, institutional policies, and non-medical considerations on clinical decision-making.

Regarding neonatal outcomes, neither MEOWS scores nor maternal age showed a significant association. Gestational age emerged as the strongest determinant, with term infants demonstrating substantially higher survival odds than preterm infants, followed by parity. These findings align with evidence that maturation of vital organs at term significantly reduces the risk of neonatal morbidity and mortality. Although MEOWS focuses on maternal physiological status, maternal complications may indirectly affect fetal well-being; therefore, optimal neonatal outcomes require integration of MEOWS with comprehensive obstetric assessment rather than reliance on MEOWS alone.

4. Conclusion

MEOWS was associated with neonatal outcomes but not with mode of delivery. Delivery decisions were primarily influenced by obstetric factors and maternal comorbidities, while neonatal outcomes were mainly determined by gestational age and parity. Although MEOWS is effective as an early warning tool, it should be integrated with comprehensive obstetric assessment and not used as the sole basis for delivery decisions. Further research is recommended to develop an integrated risk prediction model to improve the accuracy of assessment and enhance safety for both mothers and newborns.

References

Angolile, C. M., Max, B. L., Mushemba, J., & Mashauri, H. L. (2023). Global increased cesarean section rates and public health implications: A call to action. *Health Science Reports*, *6*(5), e1274. https://doi.org/10.1002/hsr2.1274

Balik, O., Karabacak, P., Bindal, A., Özkaya, M. O., & Ceylan, B. G. (2025). Preoperative early physiologic warning scores in the parturients undergoing cesarean section: A prospective study. *BMC Anesthesiology*, *25*(1), 331. https://doi.org/10.1186/s12871-025-03205-9

Dai, J., Shi, Y., Wu, Y., Guo, L., Lu, D., Chen, Y., Wang, Y., Lai, H., & Kong, X. (2023). The interaction between age and parity on adverse pregnancy and neonatal outcomes. *Frontiers in Medicine*, *10*. https://doi.org/10.3389/fmed.2023.1056064

Diana, S., Wahyuni, C. U., & Prasetyo, B. (2020). Maternal complications and risk factors for mortality. *Journal of Public Health Research*, *9*(2), 1842. https://doi.org/10.4081/jphr.2020.1842

Jovanovic, I., Ivanovic, K., Kostic, S., Tadic, J., Dugalic, S., Petronijevic, Milica, Gojnic, M., Petronijevic, Miloš, & Vrzic-Petronijevic, S. (2023). Intrauterine Fetal Death in Term Pregnancy A Single Tertiary Clinic Study. *Life*, *13*(12), 2320. https://doi.org/10.3390/life13122320

Kemenkes RI. (2024). *Profil Program Kesehatan Masyarakat Tahun 2023*. Direktorat Jenderal Kesehatan Masyarakat. https://kesprimkom.kemkes.go.id/assets/uploads/contents/others/Profil_Kesehatan_Masyarakat_Tahun_2023.pdf

Khan, F. H., Alkwai, H. M., Alshammari, R. F., Alenazi, F., Alshammari, K. F., Sogeir, E. K. A., Batool, A., & Khalid, A. A. (2022). Comparison of Fetomaternal Complications in Women of High Parity with Women of Low Parity among Saudi Women. *Healthcare*, *10*(11), 2198. https://doi.org/10.3390/healthcare10112198

Ohuma, E. O., Moller, A.-B., Bradley, E., Chakwera, S., Hussain-Alkhateeb, L., Lewin, A., Okwaraji, Y. B., Mahanani, W. R., Johansson, E. W., Lavin, T., Fernandez, D. E., Domínguez, G. G., Costa, A. de, Cresswell, J. A., Krasevec, J., Lawn, J. E., Blencowe, H., Requejo, J., & Moran, A. C. (2023). National, regional, and global estimates of preterm birth in 2020, with trends from 2010: A systematic analysis. *The Lancet*, *402*(10409), 1261–1271. https://doi.org/10.1016/S0140-6736(23)00878-4

Padmavati, P., Neelima, B., & Begum, P. R. (2024). A Study on Modified Early Obstetric Warning System (MEOWS Chart) As A Screening Tool In Prediction Of Obstetric Morbidity. *European Journal of Cardiovascular Medicine*, *14*, 169–178.

Rajput, A., Upadhyay, A., & Gupta, V. (2025). Role of MEOWS as A Predictor of Peripartum Morbidity: A Prospective Study in A Tertiary Care Teaching Institute. *Asian Research Journal of Gynaecology and Obstetrics*, *8*(1), 308–317. https://doi.org/10.9734/arjgo/2025/v8i1280

Ratu, A. D. P., & Hutagaol, I. E. B. (2023). The Use of Maternal Early Obstetric Warning Score (MEOWS) as a Tool to Predict Treatment Needs in the Intensive Care Unit in Severe Preeclampsia Patients. *Indonesian Journal of Obstetrics and Gynecology*, 215–219. https://doi.org/10.32771/inajog.v11i4.1920

Sampurna, M. T. A., Handayani, K. D., Utomo, M. T., Angelika, D., Etika, R., Harianto, A., Mapindra, M. P., Mahindra, M. P., Efendi, F., Kaban, R. K., Rohsiswatmo, R., Visuddho, V., & Permana, P. B. D. (2023). Determinants of neonatal deaths in Indonesia: A national survey data analysis of 10,838 newborns. *Heliyon*, *9*(1), e12980. https://doi.org/10.1016/j.heliyon.2023.e12980

Singhal, S., Acharya, N., Madaan, S., Mohammad, S., & Acharya, S. (2022). Use of the modified early obstetric warning system chart as a predictor of peri-partum obstetric morbidity in a rural teaching institute: A two-year cross-sectional study. *Journal of Family Medicine and Primary Care*, *11*(12), 7644–7651. https://doi.org/10.4103/jfmpc.jfmpc_320_22

Sulistianto, S., Siswishanto, R., & Attamimi, A. (2023). Manfaat Maternal Early Obstetric Warning Score (MEOWS) dalam Memprediksi Lama Perawatan pada Pasien Preeklamsia Berat di RSUP Dr. Sardjito. *Jurnal Kesehatan Reproduksi*, *9*(3). https://doi.org/10.22146/jkr.77590

Syairaji, M., Nurdiati, D. S., Wiratama, B. S., Prüst, Z. D., Bloemenkamp, K. W. M., & Verschueren, K. J. C. (2024). Trends and causes of maternal mortality in Indonesia: A systematic review. *BMC Pregnancy and Childbirth*, *24*, 515. https://doi.org/10.1186/s12884-024-06687-6

Tuyishime, E., Ingabire, H., Mvukiyehe, J. P., Durieux, M., & Twagirumugabe, T. (2020). Implementing the Risk Identification (RI) and Modified Early Obstetric Warning Signs (MEOWS) tool in district hospitals in Rwanda: A cross-sectional study. *BMC Pregnancy and Childbirth*, *20*(1), 568. https://doi.org/10.1186/s12884-020-03187-1

WHO. (2023, May 10). *Preterm birth*. https://www.who.int/news-room/fact-sheets/detail/preterm-birth

Yadav, P., & Sinha, R. (2023). Validating the Performance of Modified Early Obstetrics Warning Score (MEOWS) for Prediction of Obstetrics Morbidity: A Prospective Observational Study in a Tertiary Care Institute in East India. *Journal of Obstetrics and Gynaecology of India*, *73*(Suppl 2), 227–233. https://doi.org/10.1007/s13224-023-01855-8