

Original Article

Factors associated with antenatal care utilization among national health insurance participants in North Maluku: An analysis of BPJS Kesehatan sample data

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Abstract

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Background: Maternal mortality remains a public health concern in North Maluku. Antenatal care (ANC) is essential for early risk detection, but the utilization recorded in health insurance claims may vary according to participant and healthcare-system characteristics.

Objective: To analyze factors associated with recorded ANC utilization among National Health Insurance (JKN) participants in North Maluku using BPJS Kesehatan Sample Data.

Methods: This cross-sectional secondary-data study used the 2025 BPJS Kesehatan Sample Data, with healthcare claims from 2021–2024. Total sampling included 179 eligible JKN participant–delivery episodes. Recorded ANC utilization was defined as the number of unique primary healthcare facility service dates coded Z32–Z36 within 280 days before an indexed delivery coded O80–O84 and was categorized as <4 or ≥4 visits. Participant and facility characteristics were analyzed using Chi-square or Fisher's exact tests and binary logistic regression.

Results: Of 179 observations, 113 (63.13%) had <4 recorded ANC visits and 66 (36.87%) had ≥4 visits. Residential area ($p=0.049$), type of primary healthcare facility ($p<0.001$), and facility region ($p=0.035$) were associated with ANC utilization in bivariate analysis. In the adjusted model, only the facility-type code remained statistically significant. For each one-level increase in the dataset code (community health center=1, primary clinic=2, general practitioner=3, network facility=4), the adjusted odds of ≥4 recorded visits were 3.55 times higher (adjusted OR=3.550; 95% CI: 1.826–6.901; $p<0.001$). This estimate should be interpreted cautiously because the categories are not clinically ordinal and several cells were small.

Conclusion: Among JKN participants included in the 2025 BPJS Kesehatan Sample Data who met the study algorithm, recorded ANC utilization was associated with facility characteristics. The findings describe claim-recorded utilization and should not be generalized to all pregnant women in North Maluku or interpreted as evidence of causal effects or clinical ANC completeness.

Background

Maternal mortality is an important indicator of health-system performance because it reflects the capacity of health services to prevent, identify, and manage complications during pregnancy, childbirth, and the postpartum period. Sustainable Development Goal target 3.1 aims to reduce the global maternal mortality ratio to fewer than 70 per 100,000 live births by 2030. Globally, approximately 260,000 women died during or after pregnancy and childbirth in 2023 (WHO, 2025). In Indonesia, the maternal mortality ratio in 2024 was reported at 90 per 100,000 live births, and accelerated reduction remains necessary to achieve national health-development targets (Kemenkes RI, 2024).

Causes of maternal mortality in Indonesia include non-obstetric complications, hypertension during pregnancy, childbirth, and the postpartum period, as well as obstetric hemorrhage (Kemenkes RI,

2024). These conditions underscore the importance of early detection and appropriate follow-up through accessible maternal health services. In North Maluku, the maternal mortality ratio in 2024 was reported at 188 per 100,000 live births, slightly above the 2024 National Medium-Term Development Plan (RPJMN) target of 183 per 100,000 live births (BPS, 2024). The archipelagic context and population distribution across islands may also create variation in access to healthcare facilities, although this study did not directly measure distance or transportation (Priscilla et al 2026; Rosa et al 2023).

Antenatal care (ANC) comprises health services provided during pregnancy to monitor maternal and fetal conditions, identify risk factors, prevent complications, and provide health education (Susmitha & Ulandari, 2025). Maternal health services in Indonesia are monitored, among other measures, through the K4 and K6 indicators. K4 denotes receipt of antenatal care at least four

times, whereas K6 denotes at least six visits in accordance with current standards, including examination by a physician (Kemenkes RI, 2023). This study used four visits as the analytical cut-off to compare levels of recorded utilization and maintain comparability with the K4 indicator and previous studies. This cut-off was not intended to assess adherence to the K6 standard, the quality of examinations, or the completeness of clinical ANC components.

The National Health Insurance (JKN) program covers the financing of maternal health services at primary healthcare facilities (FKTP) and advanced referral healthcare facilities (FKRTL). In this study, factors available in the BPJS Sample Data were grouped into participant predisposing characteristics, namely age and marital status; enabling factors, namely residential area, historical JKN inpatient class, participant segment, and membership status; and healthcare-system characteristics, namely the type and region of FKTP. This grouping was used to assess how participant and service characteristics were jointly associated with recorded ANC utilization.

Previous studies of ANC completeness or utilization in Indonesia have largely used survey data such as Riskesdas, SUSENAS, or local surveys, which rely on respondent reports and generally do not capture service transactions recorded in the JKN system (Idris & Sari, 2023; Susmitha & Ulandari, 2025; Wulandari et al., 2021). Studies based on BPJS Sample Data have examined geographic factors, but evidence specific to North Maluku and analyses that simultaneously consider participant characteristics and FKTP type remain limited (Triana, 2024). Administrative data allow observation of utilization patterns actually recorded in the system, although they remain limited by coding and billing practices.

North Maluku was selected because maternal mortality remains high and its archipelagic characteristics may create variation in access across regencies and cities. Therefore, this study aimed to analyze factors associated with recorded ANC service utilization among JKN participants in North Maluku using the 2025 BPJS Kesehatan Sample Data.

Methods

Study Design and Data Source

This study was a cross-sectional observational analysis using secondary data. The 2025 BPJS Kesehatan Sample Data are a dataset version containing membership histories and healthcare

utilization for the 2015–2024 period. This study specifically analyzed healthcare claims from 2021–2024 in the maternal subset of the Maternal and Child Health (MCH) dataset. The data were obtained through the JKN Data Portal in 2025 after proposal submission, signing of an integrity pact, and verification by BPJS Kesehatan.

Longitudinal claims data were used to construct visit histories within a single pregnancy episode, after which all variables were analyzed cross-sectionally at the participant–episode level. The unit of analysis was one JKN participant linked to one index delivery episode and the ANC visits associated with that episode. To maintain independence of observations, each participant was represented by only one episode; if more than one eligible delivery episode was identified during 2021–2024, the first episode was retained.

Population, Sampling, and Eligibility

The source population comprised all participant records in the 2025 BPJS Kesehatan Sample Data. The study used total sampling, or a census of eligible records, in which all records meeting the study algorithm were included. Screening was conducted sequentially from the national dataset to identify participants residing in North Maluku who had a delivery record at an advanced referral healthcare facility (FKRTL) with diagnosis O80, O81, O82, O83, or O84 in the service-diagnosis variable and who also had a pregnancy-related service record at a capitated primary healthcare facility (FKTP) coded Z32, Z33, Z34, Z35, or Z36. After linkage, deduplication, episode restriction, and complete-case analysis, 179 final observations were obtained. Intermediate counts at each screening stage were not available in the retained analytical file and therefore were not reported to avoid presenting unverifiable figures.

Inclusion criteria were JKN participants recorded in the 2025 BPJS Kesehatan Sample Data; residence in North Maluku Province; an FKRTL delivery episode coded O80–O84 during 2021–2024; and at least one pregnancy-related service record at a capitated FKTP coded Z32–Z36 within the index pregnancy episode. Exclusion criteria were records that could not be linked across membership, FKTP, and FKRTL data; claims outside the episode window; duplicate records; mismatched encrypted identities; and incomplete data for the outcome or key variables.

Selecting participants with deliveries recorded at FKRTL means that the study did not include deliveries at FKTP, non-BPJS facilities, or home settings; participants who could not be linked across facilities; or pregnancy outcomes other than O80–O84 deliveries. The consequences of this selection were considered in interpreting and generalizing the findings.

Model adequacy was assessed based on the number of outcome events. There were 66 observations with ≥ 4 visits for four predictor parameters in the final model, equivalent to approximately 16.5 events per parameter. This number was adequate according to the practical events-per-parameter rule, although several FKTP categories remained small and the stability of the estimates should therefore be assessed cautiously.

Data Extraction and Identification of ANC Utilization

The research instrument was a structured data-extraction form developed from the BPJS

Kesehatan Sample Data codebook. The form included encrypted participant identifiers, service dates, diagnosis codes, membership characteristics, residential area, FKTP type and region, index delivery date, and calculated ANC visit counts. Data from the membership, capitated FKTP, and FKRTL tables were linked using encrypted participant identifiers.

ANC visits were operationalized as unique service dates at FKTP with diagnosis codes Z32–Z36 occurring within 280 days before the O80–O84 index delivery date. The 280-day window was used to restrict claims to the pregnancy episode ending in the index delivery. Multiple claims for the same participant on the same date were consolidated as one visit. Thus, the outcome represents the number of pregnancy-related service contacts recorded in claims rather than the number of all service items, the clinical completeness of ANC, or the quality of examinations (See Table 1).

Table 1. Operational Definitions

Variable	Source and definition/code	Category	Scale/reference
Recorded ANC utilization	Unique service dates at capitated FKTP with codes Z32–Z36 within 280 days before an index FKRTL delivery coded O80–O84.	<4 visits; ≥ 4 visits	Binary nominal; <4 as the reference outcome category
Age	Participant age calculated on the index delivery date.	<20 or >35 years; 20–35 years	Nominal; 20–35 years as the descriptive comparison group
Marital status	Marital status in the membership record linked to the index episode.	Married; unmarried/divorced	Nominal
Residential area	Regency/city based on the domicile code in the membership data.	Regency; city	Nominal
Historical JKN inpatient class	Inpatient class entitlement recorded in the membership data during the study period.	Class III; Class II; Class I	Ordinal
Participant segment	Membership group based on contribution-assistance recipient status.	PBI; non-PBI	Nominal
Membership status	Latest status recorded in the membership data within the dataset.	Active; inactive	Nominal
FKTP type	Classification of registered facilities in the FKTP data: community health center, primary clinic, general practitioner, and network facility. Network facilities follow the BPJS classification in the dataset.	Community health center; primary clinic; general practitioner; network facility	Nominal in the description; code score 1–4 in the original model
FKTP region	Regency/city location of the FKTP based on the facility-region code.	Regency; city	Nominal

Data Analysis

Univariate analysis was used to present frequencies and percentages. Bivariate associations between categorical variables and ANC utilization were analyzed using the Chi-square test; Fisher's exact test was used when cells had small expected frequencies. A p-value <0.05 was considered statistically significant.

Variables with $p < 0.25$ in the bivariate analysis were entered into binary logistic regression with ≥ 4 visits as the outcome. The final model included marital status, residential area, FKTP type, and FKTP region. In the original analysis, FKTP type was entered as a 1–4 code score. Therefore, the odds ratio of 3.550 represents the change in odds for each one-level increase in the code rather than a direct nominal comparison among individual facility types. Because these categories have no natural clinical ordering and their distribution was unbalanced, this result was treated as an exploratory estimate and interpreted cautiously. Analyses were performed using Stata.

Ethical Consideration

Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Negeri Semarang (UNNES), Indonesia, under ethical clearance No. 450/KEPK/FK/KLE/2026. The study used de-identified secondary data and involved no direct interaction with participants. Data were obtained after the researchers fulfilled BPJS Kesehatan requirements, including proposal submission and signing an integrity pact. All data were used solely for research purposes, stored with restricted access, not disclosed to unauthorized parties, and not used to identify individuals.

Results

Table 2 showed most participants were aged 20–35 years, were married, lived in regencies, were non-PBI participants, had active membership status, and were registered at community health centers.

Table 2. Characteristics of the Study Sample

Variable	Frequency	Percentage (%)
Recorded ANC utilization		
<4 visits	113	63.13
≥ 4 visits	66	36.87
Age		
<20 or >35 years	33	18.44
20–35 years	146	81.56
Marital status		
Married	134	74.86
Unmarried/divorced	45	25.14
Residential area		
Regency	109	60.89
City	70	39.11
Historical JKN inpatient class		
Class III	82	45.81
Class II	63	35.20
Class I	34	18.99
Participant segment		
PBI	69	38.55
Non-PBI	110	61.45
Membership status		
Active	170	94.97
Inactive	9	5.03
FKTP type		
Community health center	157	87.71
Primary clinic	2	1.12
General practitioner	7	3.91
Network facility	13	7.26
FKTP region		
Regency	97	54.19
City	82	45.81

Table 3. Bivariate Associations with Recorded ANC Utilization

Variable	ANC <4		ANC ≥4		p-value
	n	%	n	%	
Age					0.641
<20 or >35 years	22	66.67	11	33.33	
20–35 years	91	62.33	55	37.67	
Marital status					0.224
Married	88	65.67	46	34.33	
Unmarried/divorced	25	55.56	20	44.44	
Residential area					0.049
Regency	75	68.81	34	31.19	
City	38	54.29	32	45.71	
Historical JKN inpatient class					0.767
Class III	50	60.98	32	39.02	
Class II	42	66.67	21	33.33	
Class I	21	61.76	13	38.24	
Participant segment					0.257
PBI	40	57.97	29	42.03	
Non-PBI	73	66.36	37	33.64	
Membership status					0.350
Active	106	62.35	64	37.65	
Inactive	7	77.78	2	22.22	
FKTP type					<0.001
Community health center	110	70.06	47	29.94	
Primary clinic	1	50.00	1	50.00	
General practitioner	2	28.57	5	71.43	
Network facility	0	0.00	13	100.00	
FKTP region					0.035
Regency	68	70.10	29	29.90	
City	45	54.88	37	45.12	

In the bivariate analysis, residential area, FKTP type, and FKTP region were associated with the category of recorded ANC utilization. The proportion with ≥4 visits was higher among participants living in cities than in regencies and among participants registered at FKTP located in cities than in regencies. By FKTP type, the proportion with ≥4 visits was 29.94% at

community health centers, 50.00% at primary clinics, 71.43% among general practitioners, and 100.00% at network facilities. However, primary clinics, general practitioners, and network facilities included only 2, 7, and 13 observations, respectively; therefore, these proportions are unstable and should be interpreted cautiously (Table 3).

Table 4. Binary Logistic Regression for ≥4 Recorded ANC Visits

Variable	Coefficient (β)	p-value	Adjusted OR	95% CI
Marital status	0.523	0.172	1.688	0.796–3.579
Residential area	0.306	0.663	1.358	0.341–5.398
FKTP-type code score (1–4)	1.267	<0.001	3.550	1.826–6.901
FKTP region	0.091	0.895	1.095	0.283–4.243
Constant	–1.160	<0.001	0.313	0.188–0.520

Table 4 showed After marital status, residential area, FKTP type, and FKTP region were entered simultaneously, only the FKTP-type code score remained statistically associated with ≥4 recorded ANC visits (adjusted OR=3.550; 95% CI: 1.826–6.901; p<0.001). Residential area and FKTP region, which were significant in the bivariate

analysis, were no longer significant after adjustment. Because FKTP type was analyzed as a code score and some categories contained very small numbers, this result cannot be interpreted as a ranking of facility quality or as a causal comparison among community health centers,

clinics, general practitioners, and network facilities

Discussion

This study showed that almost two-thirds of participants in the sample had <4 recorded ANC visits. In the bivariate analysis, residential area, FKTP type, and FKTP region were associated with the utilization category. After adjustment, participant region and facility region were no longer significant, whereas the FKTP-type code score was the only variable that remained significant in the model. These findings indicate an association between patterns of ANC recording/utilization and facility characteristics but do not establish a causal relationship or differences in quality of care.

No statistical evidence of an association between age and ANC utilization was found in this sample ($p=0.641$). The proportion with <4 visits was relatively similar between the at-risk age group and those aged 20–35 years. This finding is consistent with Misliati et al. (2022) but differs from Khati and Nopriyanti (2025), who found an association between healthy reproductive age and ANC completeness. Differences may reflect outcome definitions, populations, and data sources. The lack of statistical significance in this study does not mean that age is entirely unrelated to ANC utilization, particularly because only 33 participants were in the at-risk age group.

Marital status also showed no association in either the bivariate analysis or the final model. Partner support cannot be measured directly from marital status alone; therefore, this variable may not be sufficiently sensitive to represent social support. Sepeh and Taslulu (2025) reported that husband support was associated with K4 coverage, whereas Triana (2024) reported findings that could change after controlling for other variables. Accordingly, marital status and partner support should not be treated as identical concepts.

Residential area and FKTP region were significant in the bivariate analysis but not after being entered together in the regression model. These two variables may capture overlapping geographic dimensions. Participants living in regencies tend to use facilities that are also located in regencies, so the variation explained by one variable may diminish after the other is controlled. The bivariate findings remain consistent with studies

reporting urban–rural disparities in ANC utilization (Idris & Sari, 2023; Wulandari et al., 2021), but this study lacked data on distance, travel time, transportation, or island conditions to explain the mechanism directly.

Historical JKN inpatient class, participant segment, and membership status showed no statistical association in this sample. These findings differ from several studies linking economic status and health insurance to ANC completeness (Triana, 2024; Wulandari & Laksono, 2021). In this study, all participants were covered by JKN, which may have narrowed variation in financial barriers. In addition, the available active/inactive status was the latest status in the dataset and may have differed from the status at the time of service. The presence of nine participants recorded as inactive despite having service claims may reflect status changes over the observation period or a mismatch in measurement timing.

FKTP type showed the most pronounced distributional differences, but the findings require very cautious interpretation. Community health centers accounted for 157 of 179 observations and were likely more heterogeneous in location, capacity, governance, and participant characteristics. General practitioners accounted for only seven observations and network facilities for 13 observations; all network-facility observations were in the ≥ 4 category, resulting in a zero cell. These conditions can produce unstable estimates and should not be used to conclude that general practitioners or network facilities are generally better than community health centers.

Differences in the number of recorded visits may also arise from variation in administrative practices across facilities, including billing mechanisms, diagnosis entry, referral processes, service consolidation, and coding accuracy. Codes Z32–Z36 indicate contacts related to pregnancy examination or pregnancy status, but they do not necessarily ensure that each record represents a complete ANC visit. Therefore, the association with FKTP type may reflect a combination of actual utilization and differences in claims recording.

Using a 1–4 code score for FKTP type is an analytical limitation because these categories have no natural clinical ordering. The adjusted OR of 3.550 describes the change in odds for each one-

level increase in the code according to the original model, rather than a direct comparison of each facility type with community health centers. Further analyses using larger datasets should treat FKTP type as a nominal variable using category indicators or use penalized logistic regression methods to address small cells and separation.

This study has several limitations. First, selecting participants with 080–084 deliveries at FKRTL may introduce selection bias and excludes deliveries at FKTP, at home, or in non-BPJS facilities, as well as other pregnancy outcomes. Second, identifying ANC through administrative diagnosis codes may introduce misclassification bias. Third, intermediate counts at each selection stage were not available in the retained analytical file. Fourth, the data did not include education, parity, occupation, income, pregnancy complications, knowledge, family support, distance, transportation, or quality of care; therefore, residual confounding remains possible. Fifth, several facility categories contained very small numbers, limiting statistical power and the precision of estimates.

Nevertheless, this study provides a description of ANC utilization recorded in the JKN system in the North Maluku context and highlights the need for further evaluation of variation in recording practices and service access across FKTP types and regions. The findings can serve as a basis for data audits and future research planning rather than as a direct assessment of the quality of individual facilities.

Conclusion and Recommendation

Among 179 JKN participants in the 2025 BPJS Kesehatan Sample Data who met the study algorithm, 63.13% had <4 recorded ANC visits. Residential area, FKTP type, and FKTP region were associated with ANC utilization in the bivariate analysis, but after adjustment only the FKTP-type code score remained significant. This association should be interpreted as exploratory because FKTP type was modeled using a code score, several categories were small, and the outcome was derived from administrative claims.

The findings cannot be generalized to all pregnant women in North Maluku and do not indicate the clinical completeness of ANC or a causal relationship. BPJS Kesehatan and healthcare-service managers may audit the consistency of

ANC coding, assess continuity of recording across FKTP, and identify access barriers in regencies and island areas. Future studies should use larger samples, validated episode definitions, FKTP type as a nominal variable, and include education, parity, socioeconomic conditions, family support, distance, transportation, pregnancy complications, and indicators of quality of care.

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Declaration of conflict of interest

The authors declare no competing interests.

Declaration on the Use of AI

No AI tools were used in the preparation of this manuscript.

Data Availability Statement

Data sharing is not applicable to this article.

References

- BPJS. (2025). Launch of the 2025 BPJS Kesehatan Sample Data (2015–2024). Social Security Administering Body. <https://data.bpjs-kesehatan.go.id/bpjs-portal/action/blog-detail.cbi?id=853f0fd6-cf24-11f0-8091-9fbaba5817bf>
- BPS. (2024). Maternal and Child Health Profile 2024 (Directorate of Welfare Statistics, Ed.; Vol. 10). Statistics Indonesia.
- Engge, E. T., Mado, F. G., Nayoan, C. R., & Littik, S. K. A. (2025). Factors associated with the utilization of antenatal care services at Alak Community Health Center in 2024. *Prepotif: Jurnal Kesehatan Masyarakat*, 9. <https://doi.org/10.31004/prepotif.v9i2.46049>
- Idris, H., & Sari, I. (2023). Factors associated with the completion of antenatal care in Indonesia: A cross-sectional data analysis based on the 2018 Indonesian Basic Health Survey. *Belitung Nursing Journal*, 9(1), 79–85. <https://doi.org/10.33546/bnj.2380>
- Kemenkes RI. (2023). Indonesia Health Profile 2023.
- Kemenkes RI. (2024). Indonesia Health Profile 2024.
- Khati, S. A., & Nopriyanti, A. (2025). Association of maternal age and parity with completeness of antenatal care (ANC) examinations in Kualu Village, Tambang Community Health Center Working Area, Kampar Regency.

- Corona: Jurnal Ilmu Kesehatan Umum, Psikolog, Keperawatan dan Kebidanan, 3(1), 174–190. <https://doi.org/10.61132/corona.v3i1.1120>
- Maulinda, F. (2023). Determinants of healthcare utilization for outpatient treatment in Riau Province during the COVID-19 pandemic. *Jurnal Ilmiah Universitas Batanghari Jambi*, 23(1), 471. <https://doi.org/10.33087/jiubj.v23i1.2448>
- Misliati, M., Maidar, M., & Wardiati, W. (2022). Factors associated with the utilization of antenatal care (ANC) services in the working area of Simpang Tiga Community Health Center, Aceh Besar Regency, in 2022. *Sehat Rakyat: Jurnal Kesehatan Masyarakat*, 1(4), 439–447. <https://doi.org/10.54259/sehatrakyat.v1i4.1224>
- Priscilla, V., Sari, Y. P., Sarfika, R., & Akbar, M. A. (2026). The Meaning of Breastfeeding in Shaping Maternal Identity Among Indonesian Mothers: A Qualitative Study. *Breastfeeding Medicine*, 15568253261473726.
- Rosa, E. F., Arianti, W., & Akbar, M. A. (2023). Penerapan Massage Effleurage terhadap Penurunan Nyeri Akut Punggung Bawah pada Ibu Hamil Trimester III. *NURSING UPDATE: Jurnal Ilmiah Ilmu Keperawatan*, 14(2), 104–110.
- Sari, N. N., Idris, H., & Syakurah, R. A. (2023). Analysis of healthcare utilization among National Health Insurance participants: A literature review. *Health Information: Jurnal Penelitian*, 15(3).
- Sepeh, Y. R., & Taslulu, D. H. (2025). Association between husband support and K4 visit coverage at Napan Community Health Center in 2024. *Jurnal Kesehatan Komunitas Santa Elisabeth*, 3(1), 11–18.
- Sumlang, G. P. B., Adrianto, R., Sumarni, A. R., C., & Pakki, I. B. (2025). Healthcare utilization among outpatients at Bontang Selatan 1 Community Health Center. *JMIK: Jurnal Manajemen Informasi dan Administrasi Kesehatan*, 8(1).
- Susmitha, I. G. A., & Ulandari, L. P. S. (2025). Factors associated with K4 antenatal care utilization in Jambi Province (analysis of 2022 SUSENAS data). *Archive Community Health*, 12, 829–841. <https://doi.org/10.24843/ACH.2025.v12.i03.p03>
- Syairaji, M., Nurdianti, D. S., Wiratama, B. S., Prüst, Z. D., Bloemenkamp, K. W. M., & Verschuere, K. J. C. (2024). Trends and causes of maternal mortality in Indonesia: A systematic review. *BMC Pregnancy and Childbirth*, 24(1). <https://doi.org/10.1186/s12884-024-06687-6>
- Tanjung, F., Effendy, I., Niswati Utami, T., & Syafitri Nasution, R. (2024). Analysis of factors influencing antenatal care (ANC) visits. *Jurnal Kebidanan Khatulistiwa*, 10, 79–90.
- Triana, R. (2024). Association between geographic factors and antenatal care utilization: Analysis of the 2023 BPJS Kesehatan Sample Data. Universitas Indonesia.
- WHO. (2025, April 7). Maternal mortality. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>
- Wulandari, R. D., & Laksono, A. D. (2021). Does health insurance affect the completeness of antenatal care? *Unnes Journal of Public Health*, 10(2), 110–119. <https://doi.org/10.15294/ujph.v10i2.38096>
- Wulandari, R. D., Laksono, A. D., & Rohmah, N. (2021). Urban-rural disparities of antenatal care in South East Asia: A case study in the Philippines and Indonesia. *BMC Public Health*, 21(1). <https://doi.org/10.1186/s12889-021-11318-2>