e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

International Research of Multidisciplinary Analysis
IRMA JOURNAL
Vol. 3, No. 12, December 2025 hal. 1321-1332
Journal Page is available at http://irma.nindikayla.com/index.php/home

Availability of Midwives per Capita and Maternal Health Service Coverage in Each Province in Indonesia

Yuliwati[1], Rizki Hallifah Ashri[2]
[1]Universitas Salakanagara, Tangerang, Indonesia
[2]Universitas Bakti Asih Tangerang, Indonesia
Email: yuliwati@unsaka.ac.id

Abstract

Background. Midwives are the primary providers of maternal health care in Indonesia, and the ratio of midwives to population is often used as a measure of workforce adequacy. However, the relationship between this ratio and maternal and child health (MCH) service outcomes at the provincial level has not been extensively studied using the latest publicly available data.
Objective. To calculate the ratio of registered midwives per capita and per live birth in each province and to analyze its relationship with maternal health service outcomes.
Methods. A cross-sectional ecological study across 34 provinces using data on the number of registered midwives (STR) and population from the 2026 Ministry of Health Directorate General of Health Workforce dashboard, K1 and K4 coverage, deliveries attended by health workers, deliveries at health facilities, and complete postpartum visits (KF lengkap) from the 2020 Indonesia Health Profile, as well as the Long Form Maternal Mortality Rate (AKI) from the 2020 Population Census (SP2020). Analyses employed the Mann–Whitney U test and Spearman's correlation with a 95% confidence interval, accompanied by sensitivity analyses.
Results. The national ratio was 199.0 midwives per 100,000 population, with an interprovincial median of 265.9 (IQR 194.3–315.1), ranging from 119.1 in West Java to 541.9 in Aceh. The ratio in Java–Bali was lower than in other provinces (median 135.3 vs. 286.8; $p < 0.001$), but its MCH indicators were higher. The midwife-to-population ratio was negatively correlated with K4 (rho = −0.52; $p = 0.002$) and complete KF (rho = −0.59; $p < 0.001$), and positively correlated with AKI (rho = 0.61; $p = 0.006$).
Conclusion. The number of registered midwives per capita is not the primary determinant of MCH outcomes at the provincial level. Midwifery workforce planning needs to consider active midwives, competencies, the number of births, geographic accessibility, and the strength of the referral system.
Keywords: midwives, health workforce ratio, health human resources, antenatal care, postpartum visits, maternal health

Introduction

Maternal mortality remains one of the most significant public health issues in Indonesia. Results from the 2020 Long Form Population Census (LF SP2020) recorded a maternal mortality rate (MMR) of 189 per 100,000 live births, with a very wide range across provinces (Central Statistics Agency, 2023). Most maternal deaths can be prevented if every mother receives adequate antenatal care, gives birth with the assistance of

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

trained health personnel at a facility capable of managing complications, and receives postpartum monitoring (Campbell & Graham, 2006). In Indonesia, these three types of care are primarily provided by midwives; therefore, the availability of midwives is a fundamental prerequisite for maternal and child health (MCH) programs.

The Lancet Series' framework for quality midwifery care indicates that educated, regulated midwives who are integrated into the health system can provide most essential interventions for mothers and newborns (Renfrew et al., 2014). A midwife-led model of continuous care is also associated with fewer interventions without increasing adverse outcomes (Sandall et al., 2016). Therefore, the number and distribution of midwives are critical indicators in health human resources planning.

The World Health Organization has set a threshold of 4.45 health workers (doctors, nurses, and midwives) per 1,000 residents to achieve 80% universal health coverage. An analysis of 514 districts and cities found that Indonesia's health worker ratio stands at only 3.84 per 1,000 residents. Among the five types of health workers analyzed, midwives are distributed most evenly, while medical specialists and dentists are heavily concentrated in major cities (Muharram et al., 2024). These findings indicate that, compared to other health workers, midwives are relatively well-distributed even in rural areas.

The history of midwife deployment in Indonesia offers an important lesson. The village midwife program, launched in the early 1990s, accelerated the increase in professional-assisted births, particularly among the poorest populations (Hatt et al., 2007). In two districts in West Java, a minimum density of six midwives per 10,000 residents was associated with nearly three times the likelihood of births attended by health personnel and four times the cesarean section rate, compared to an average density of 2.2 midwives per 10,000 residents (Achadi et al., 2007). However, midwife density in remote villages is lower than in urban areas; midwives stationed in remote areas tend to be less experienced; and many midwives assist in only a few births, making it difficult to maintain their skills (Makowiecka et al., 2008).

The number of midwives on paper also does not necessarily reflect those actually working in their assigned areas. A survey in three districts in West Java found that 30% of village midwives had moved within the past 12 months, mostly to community health centers or other villages, driven by greater opportunities for private practice in urban areas (Heywood et al., 2010). In Banten, nearly two-thirds of midwives' income comes from private practice, and many midwives are reluctant to be transferred to remote areas for nonfinancial reasons (Ensor et al., 2009). These conditions mean that the midwife-to-population ratio risks overestimating the availability of effective midwives.

Methods for measuring midwife adequacy are also not standardized. Studies in Ghana and India show that midwife density drops from 8.59 to 1.30 per 10,000 people when only midwives meeting the International Confederation of Midwives' competency standards are counted, and the figure changes significantly when the denominator is switched from population size to the number of births (Gausman et al., 2023). In Indonesia, an analysis of census data found that the number of midwives did not contribute significantly to differences in the maternal mortality ratio between Java–Bali

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

and other islands, whereas the availability of doctors and distance to hospitals were major contributing factors (Cameron et al., 2019). Provincial-level studies have also found that the availability of obstetric specialists and referral facilities is a more decisive factor in obstetric outcomes (Wenang et al., 2024).

Currently, data on the number of midwives per province is publicly accessible through the Ministry of Health's health workforce planning dashboard, which draws from the Certificate of Registration (STR). Since the enactment of Law No. 17 of 2023 on Health, the STR is valid for life; consequently, the number of registered midwives represents a cumulative figure that may include midwives who are no longer practicing (Law of the Republic of Indonesia No. 17 of 2023 on Health, 2023). Research linking the ratio of registered midwives per province to maternal and child health (MCH) service outcomes using the latest open data remains limited.

This study aims to: (1) calculate the ratio of registered midwives per 100,000 population and per 1,000 live births in each province; (2) compare these ratios between the Java–Bali region and other regions; and (3) analyze the relationship between the midwife-to-population ratio and maternal health service coverage, specifically antenatal visits (K1 and K4), deliveries attended by health personnel and at health facilities, completion of postpartum care visits, and the maternal mortality ratio (MMR).

Methods

Study Design. This study is a quantitative analytical study with an ecological cross-sectional design. The unit of analysis is the province.

Population and Sample. The study population consists of all provinces in Indonesia. The analysis uses a grouping of 34 provinces based on the 2020 regional divisions to ensure comparability with MCH outcome data (*total sampling*). Midwife data for 2026 were available for 38 provinces; therefore, Papua, South Papua, Central Papua, and Mountainous Papua were combined into Papua (designated as Papua*), while West Papua and Southwest Papua were combined into West Papua (West Papua*). Gorontalo did not report K1, deliveries attended by health workers, or complete postpartum visits; therefore, it was included only in the variables for which data were available. The analysis of the relationship with MMR covers 21 provinces for which the 2020 Population and Housing Census (SP2020) MMR values are available in open-source data.

Data sources and collection. All data are aggregated secondary data downloaded from official websites and media outlets in October 2026:

Table 1. Research data sources

Source	Data Year	Data Used	Data Type
Dashboard on the ratio of health workers to population, Directorate General of Health Workforce (Ministry of Health of the Republic of Indonesia	2026	Number of registered midwives (STR) and population by province	Registration data

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

Source	Data Year	Data Used	Data Type
[Kemenkes RI], 2026)			
Indonesian Health Profile (Kemenkes RI, 2021a)	2020	K1, K4, deliveries attended by health workers, deliveries at health facilities, complete postpartum care visits (complete KF), and live birth targets by province (Appendix 23.a)	Health Departm ent Routine Reports
SP2020 Long Form (Central Bureau of Statistics, 2023; Kompas.com, 2024a, 2024b)	2020	Maternal mortality rate by province	Census-based estimates

Operational definitions.

Table 2. Operational definitions of variables

Variable	Definition	Scale
Ratio of midwives to population	Number of midwives with STR divided by the population, multiplied by 100,000	Ratio
Midwife-to-live-birth ratio	Number of midwives with STR divided by the 2020 target for live births, multiplied by 1,000	Ratio
K1 and K4	Percentage of pregnant women who received their first antenatal care visit (K1) and at least four visits as per standards (K4)	Ratio (%)
Deliveries Assisted by Health Personnel	Percentage of deliveries attended by a doctor, midwife, or nurse	Ratio (%)
Deliveries at health facilities	Percentage of births in hospitals, community health centers, clinics, or midwives' private practices	Ratio (%)
Complete postpartum care	Percentage of postpartum mothers who received postpartum visits in accordance with standards through the final visit	Ratio (%)
MMR LF SP2020	Estimated maternal mortality per 100,000 live births	Ratio

The definitions of service indicators follow Ministry of Health Regulation No. 21 of 2021 (Indonesian Ministry of Health, 2021b). The ratio is calculated using two denominators because the denominators—population size and number of births—can yield different pictures of adequacy (Gausman et al., 2023).

Data processing and analysis. Data were processed using Python 3 (pandas and SciPy libraries). The analysis was conducted in four stages:

1. Descriptive analysis: national and provincial midwife-to-population ratios were presented using the median, interquartile range (IQR), and minimum and maximum values. Normality was tested using the Shapiro–Wilk test.

 e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

2. Group comparison: Midwife-to-population ratios in the seven provinces of Java–Bali were compared with those in the other 25 provinces (excluding Papua* and West Papua*) using the Mann–Whitney U test.
3. Correlation analysis: Spearman's rank correlation between the midwife-to-population ratio and each service indicator, since most outcome indicators were not normally distributed. The 95% confidence interval (CI) was calculated using the Fisher-z transformation and the Bonett–Wright standard error ($1.06/\sqrt{(n-3)}$). The significance level was set at $\alpha = 0.05$.

$$z = \frac{1}{2}\ln\left(\frac{1+\rho}{1-\rho}\right), \qquad SE = \frac{1{,}06}{\sqrt{n-3}} \tag{1}$$

$$\text{IK } 95\% = \tanh\left(z \pm 1{,}96 \times SE\right) \tag{2}$$

4. Sensitivity analysis: (a) excluding Papua* and West Papua*, as provincial mergers and territorial expansions may introduce recording artifacts; and (b) replacing the ratio denominator with the number of live births.

Research ethics. This study uses publicly available aggregate data without individual identifiers; therefore, no ethical approval is required. If the target journal requires it, the researcher may submit a request for *an ethical exemption* to the institutional ethics committee.

Results

The national midwife-to-population ratio is 199 per 100,000 people, with an uneven distribution. In 2026, there were 571,458 registered midwives for a population of 287,198,383, or 199.0 midwives per 100,000 people. The interprovincial ratios follow a normal distribution (Shapiro–Wilk p = 0.11) with a median of 265.9 per 100,000 (IQR 194.3–315.1). The lowest ratio was recorded in West Java (119.1) and the highest in Aceh (541.9), a 4.5-fold difference. Using live births as the denominator, the median ratio was 134.0 midwives per 1,000 live births (IQR 115.0–170.8; range 69.2–269.3). The two measures were strongly correlated (rho = 0.89), so the provincial rankings were essentially the same regardless of which denominator was used.

Java–Bali has the lowest midwife-to-birth ratio but the highest MCH service coverage. The seven provinces of Java–Bali are home to 57.0% of Indonesia's population but account for only 37.4% of registered midwives.

Table 3. Midwife-to-population ratio and median MCH service coverage by region

Region	Java–Bali (7 provinces)	Other Provinces (25 provinces)	p (Mann–Whitney)
Midwives per 100,000 population, median (IQR)	135.3 (125.9–153.9)	286.8 (215.0–331.3)	< 0.001
Midwives per 1,000 live births, median (IQR)	93.0 (79.4–118.8)	150.8 (122.9–173.0)	0.002
K4 (%), median	94.9	80.1	

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

Region	Java–Bali (7 provinces)	Other Provinces (25 provinces)	p (Mann–Whitney)
Deliveries at health facilities (%), median	97.0	80.8	
Complete family planning (%), median	95.6	80.8	

Papua* and West Papua* were not included in the comparison. The Mann–Whitney test for the rate per 100,000 population yielded U = 2.

The midwife-to-population **ratio is negatively correlated with service coverage.** Contrary to initial assumptions, provinces with more midwives per capita actually recorded lower coverage rates for K1, K4, deliveries attended by health workers, deliveries at health facilities, and complete postpartum care. This trend is consistent across all indicators and becomes even stronger after excluding Papua* and West Papua*.

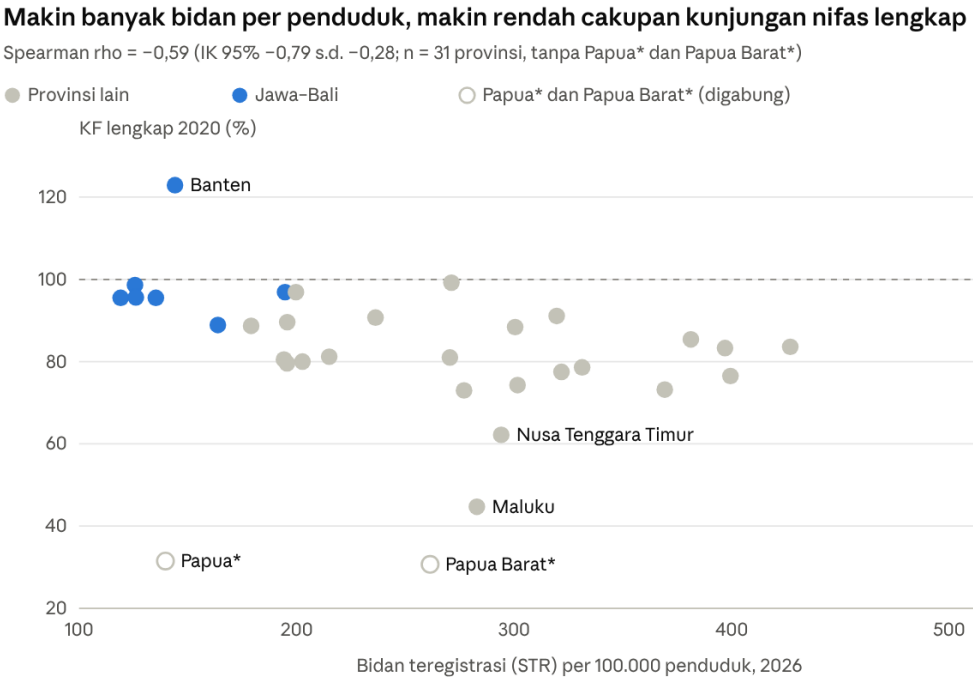


Figure 1. The more midwives per capita, the lower the coverage of complete postpartum visits. Source: Health Workforce Ratio Dashboard, Directorate General of Health Workforce, Ministry of Health (STR, accessed October 2026) and Indonesia Health Profile 2020, Appendix 23.a · 33 provinces; Gorontalo did not report complete postpartum care

The Java–Bali provinces (blue dots) cluster in the upper left: low midwife-to-population ratio, high complete postpartum care coverage. Provinces with the highest ratios, such as Aceh, Southeast Sulawesi, and North Maluku, have complete postpartum care coverage of 76–84%. Maluku and East Nusa Tenggara (NTT) show the lowest complete postpartum care coverage outside of Papua, even though their midwife-to-population

 e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

ratios are above the median. Banten's complete KF rate exceeds 100% because the denominator uses a projected target.

Table 4. Spearman's correlation between the ratio of midwives per 100,000 population and maternal health service coverage

Indicator	All provinces: n	rho (95% CI)	p	Excluding Papua*: n	rho (95% CI)	p
K1	33	−0.36 (−0.64 to 0.01)	0.041	31	−0.47 (−0.72 to −0.12)	0.008
K4	34	−0.40 (−0.66 to −0.05)	0.019	32	−0.52 (−0.75 to −0.19)	0.002
Delivery by a healthcare professional	33	−0.46 (−0.71 to −0.12)	0.007	31	−0.57 (−0.78 to −0.25)	< 0.001
Delivery at a health facility	34	−0.39 (−0.65 to −0.04)	0.023	32	−0.49 (−0.73 to −0.15)	0.004
Complete KF	33	−0.47 (−0.71 to −0.13)	0.006	31	−0.59 (−0.79 to −0.28)	< 0.001
AKI LF SP2020	21	0.36 (−0.11 to 0.70)	0.110	19	0.61 (0.18 to 0.84)	0.006

CI = confidence interval. "Excluding Papua*" means Papua* and West Papua* are excluded.

Sensitivity analysis using live births as the denominator. When the ratios are calculated per 1,000 live births (excluding Papua*), the direction of the relationship remains negative but weakens: K4 rho = −0.36 (p = 0.043), complete KF rho = −0.38 (p = 0.037), deliveries at health facilities rho = −0.27 (p = 0.14), and MMR rho = 0.26 (p = 0.28). This weakening of the relationship indicates that part of the negative correlation in the population denominator is influenced by differences in population structure and birth rates across provinces.

Discussion

A higher number of midwives does not necessarily mean higher outcomes. The main finding of this study is a negative relationship between the ratio of registered midwives per capita and maternal health service outcomes. The Java–Bali provinces have a midwife-to-population ratio that is only half that of other provinces, yet their K4, deliveries at health facilities, and complete KF outcomes are approximately 15 percentage points higher. These findings are consistent with those of Cameron et al. (2019), who found that the number of midwives did not contribute significantly to differences in maternal mortality rates between Java–Bali and other islands, whereas

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

the availability of doctors and distance to hospitals were major contributing factors. These results do not imply that midwives are unimportant, but rather that the midwife-to-population ratio at the provincial level is not a sufficient measure to assess the availability of effective midwifery services.

The population denominator ignores geography and population distribution. Provinces with the highest ratios, such as Aceh, Southeast Sulawesi, North Maluku, and Bengkulu, have many villages with sparsely populated areas. Placing one midwife in each small village results in a high ratio, but each midwife handles only a few deliveries. Makowiecka et al. (2008) showed that midwives in remote areas tend to be less experienced and handle few deliveries, making it difficult to maintain their skills. Muharram et al. (2024) also found that disparities in health personnel between districts are far greater than those between provinces, meaning that a high provincial ratio can mask districts with a shortage of midwives. The weakening of the correlation when the denominator is replaced with live births reinforces the findings of Gausman et al. (2023) that the choice of denominator significantly affects the picture of midwife adequacy.

Registered midwives are not necessarily practicing midwives. The figures in the dashboard are derived from the STR, which, since the enactment of Law No. 17 of 2023, is valid for life. Consequently, the number of registered midwives may include those who are no longer practicing, working outside the health sector, or have moved to a different location. Heywood et al. (2010) found that 30% of rural midwives had relocated within a year, and Ensor et al. (2009) demonstrated that midwives' decisions to work and settle in a particular area are largely determined by opportunities for private practice, which are more abundant in urban areas. Gausman et al. (2023) even found that midwife density dropped by more than sixfold when only midwives meeting competency standards were counted. Thus, high ratios in some provinces may reflect the production of graduates and registrations, rather than the number of competent midwives actively serving mothers.

High outcomes in Java–Bali rely on the referral system, not just midwives. In Java–Bali, pregnant women have easier access to obstetricians, hospitals, and private clinics. Achadi et al. (2007) showed that higher midwife density increases the likelihood of births attended by health personnel, but women's education and wealth remain strong predictors. Wenang et al. (2024) found that the availability of obstetricians and referral facilities at the provincial level is associated with obstetric outcomes. This means that regions with a low midwife-to-population ratio can still achieve high coverage if their health system is well-established and easily accessible, whereas regions with a high midwife-to-population ratio may still lag behind if hindered by distance, transportation, and referral challenges.

The positive relationship between the midwife-to-population ratio and the maternal mortality rate reflects remoteness. The positive correlation between the midwife-to-population ratio and the maternal mortality rate (rho = 0.61 excluding Papua*) does not imply that midwives increase maternal mortality. This relationship more likely reflects a common factor: remote provinces receive more midwife placements and simultaneously have high MMRs due to barriers to access. Within the

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

"three delays" framework, the presence of midwives in villages can reduce the first delay but does not resolve the second and third delays—namely, reaching a facility and receiving adequate care (Thaddeus & Maine, 1994). Maternal mortality audits in East Java also indicate that many deaths result from the quality of care and the tiered referral system, rather than a lack of personnel (Mahmood et al., 2021). Hatt et al. (2007) note that expanding the midwife workforce in villages increases care provided by trained personnel, but access to emergency obstetric care remains unequal.

Implications for midwife workforce planning. Planning for midwife needs must shift from a per-capita ratio to a needs-based approach, taking into account the number of births, the size and accessibility of the region, and the competencies of active midwives. In provinces with high ratios and low coverage, such as Maluku and NTT, the primary issue is likely not the number of midwives, but rather accessibility, competency, and system support. Gaps in service utilization in Eastern Indonesia—including the rate of facility-based deliveries, which stands at only 71.6% (Efendi et al., 2020), and lower utilization of midwifery services in eastern regions (Adnani et al., 2025)—underscore that increasing the number of midwives must be accompanied by strengthening community health centers, referral systems, and transportation. Improving quality through midwifery education and regulation (Renfrew et al., 2014) as well as models of continuous care provided by midwives (Sandall et al., 2016) hold greater promise than simply increasing the number of registered midwives.

Data quality. Provincial routine data contain anomalies; for example, Banten's complete KF is 122.9% due to the denominator being the target projection, and East Kalimantan and Riau's K4 values are very low compared to other indicators in the same provinces. Papua* and West Papua* show very low achievement levels, which may be influenced by incomplete reporting. Sensitivity analysis shows that excluding these two provinces actually strengthens the negative relationship, meaning the main findings do not depend on data from Papua.

Limitations. First, midwife data is from 2026, while MCH achievement data is from 2020, as more recent provincial achievement data is not available in a complete open-access format; during this period, the number of registered midwives likely increased. Second, the number of midwives represents cumulative registrations, not active midwives or those working in health facilities. Third, the consolidation of provinces resulting from the division of Papua may lead to territorial discrepancies. Fourth, the ecological design cannot draw conclusions about relationships at the individual level and has not controlled for confounding factors such as area size, population density, poverty, and the availability of doctors. Fifth, the MMR analysis covers only 21 provinces.

Conclusions and Recommendations

Indonesia has 199.0 registered midwives per 100,000 population, with interprovincial ratios varying by up to 4.5-fold. The Java–Bali provinces have the lowest midwife-to-population ratio but the highest maternal health service coverage. The midwife-to-population ratio is negatively correlated with K1, K4, births attended by a health worker,

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

births in health facilities, and complete KF, and is positively correlated with MMR. This pattern indicates that the number of registered midwives per population is not the primary determinant of MCH outcomes at the provincial level. Geographic accessibility, the distribution of midwives within the province, midwives' activity and competence, and the strength of the referral system are more decisive factors.

Recommendations:

- **For the Ministry of Health and provincial health offices:** supplement STR data with data on active midwives by workplace (e.g., through SISDMK) and present ratios per live birth and per district/city to enable planning based on actual needs.
- **For health workforce planners in provinces with high midwife-to-birth ratios but low achievement levels:** prioritize strengthening competencies, supervision, transportation, and referral systems over increasing the number of midwives.
- **For educational institutions and midwifery professional organizations:** align the number of graduates with regional needs and ensure graduates' competencies meet midwifery practice standards.
- **For researchers:** analyze the relationship between the number of active midwives and MCH outcomes at the district/city level, using data from the same year and controlling for geographic, socioeconomic, and physician availability factors.

References

Achadi, E., Scott, S., Pambudi, E. S., Makowiecka, K., Marshall, T., Adisasmita, A., Deviany, P. E., & Ronsmans, C. (2007). Midwifery provision and uptake of maternity care in Indonesia. *Tropical Medicine & International Health, 12*(12), 1490–1497. https://doi.org/10.1111/j.1365-3156.2007.01957.x

Adnani, Q. E. S., Maulina, R., Ramadhan, K., Argaheni, N. B., Kennedy, H. P., & Telfer, M. (2025). Trends and determinants of antenatal, intranatal, and postnatal care utilization among Indonesian women (2012–2017): Associated factors in midwifery service utilization between midwives and other health professionals. *BMC Nursing, 24*(1), Article 912. https://doi.org/10.1186/s12912-025-03527-6

Central Bureau of Statistics. (2023). *Mortality in Indonesia: Results of the 2020 Long-Form Population Census*. Central Bureau of Statistics. https://indonesia.unfpa.org/sites/default/files/pub-pdf/mortalitas-di-indonesia-hasil-long-form-sensus-penduduk-2020.pdf

Cameron, L., Contreras Suarez, D., & Cornwell, K. (2019). Understanding the determinants of maternal mortality: An observational study using the Indonesian Population Census. *PLOS ONE, 14*(6), Article e0217386. https://doi.org/10.1371/journal.pone.0217386

Campbell, O. M. R., & Graham, W. J. (2006). Strategies for reducing maternal mortality: Getting on with what works. *The Lancet, 368*(9543), 1284–1299. https://doi.org/10.1016/S0140-6736(06)69381-1

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

Efendi, F., Sebayang, S. K., Astutik, E., Hadisuyatmana, S., Has, E. M. M., & Kuswanto, H. (2020). Determinants of safe delivery utilization among Indonesian women in eastern Indonesia. *F1000Research, 9*, 332. https://doi.org/10.12688/f1000research.23324.2

Ensor, T., Quayyum, Z., Nadjib, M., & Sucahya, P. (2009). Level and determinants of incentives for village midwives in Indonesia. *Health Policy and Planning, 24*(1), 26–35. https://doi.org/10.1093/heapol/czn040

Gausman, J., Ramesh, S., Adanu, R. M., Bandoh, D. A. B., Blossom, J., Chakraborty, S., Kenu, E., Khan, N., Langer, A., Odikro, M. A., Saggurti, N., & Jolivet, R. R. (2023). Measuring the adequacy of the midwifery workforce using standards of competency and scope of work: Exploring the density and distribution of midwives in three low- and middle-income countries using cross-sectional and geospatial data. *PLOS ONE, 18*(4), Article e0284034. https://doi.org/10.1371/journal.pone.0284034

Hatt, L., Stanton, C., Makowiecka, K., Adisasmita, A., Achadi, E., & Ronsmans, C. (2007). Did the strategy of skilled attendance at birth reach the poor in Indonesia? *Bulletin of the World Health Organization, 85*(10), 774–782. https://doi.org/10.2471/BLT.06.033472

Heywood, P., Harahap, N. P., Ratminah, M., & Elmiati. (2010). Current situation of midwives in Indonesia: Evidence from 3 districts in West Java Province. *BMC Research Notes, 3*, Article 287. https://doi.org/10.1186/1756-0500-3-287

Ministry of Health of the Republic of Indonesia. (2021a). *Indonesia Health Profile 2020*. Ministry of Health of the Republic of Indonesia. https://layanandata.kemkes.go.id/file/profil-kesehatan/2020/bab-5.pdf

Ministry of Health of the Republic of Indonesia. (2021b). *Minister of Health Regulation No. 21 of 2021 concerning the Provision of Health Services During the Pre-pregnancy, Pregnancy, Childbirth, and Postpartum Periods, Contraceptive Services, and Sexual Health Services*. Ministry of Health of the Republic of Indonesia.

Ministry of Health of the Republic of Indonesia. (2026). *Ratio of health workers to population: Midwives* [Dashboard]. Directorate General of Health Workforce. Retrieved October 2026, from https://eplanning-ditjennakes.kemkes.go.id/indikator/user/rasio_populasi/?nakes=2

Kompas.com. (2024a, February 23). *Maternal mortality rate in Papua is the highest in Indonesia*. https://lestari.kompas.com/read/2024/02/23/120000786/angka-kematian-ibu-di-papua-tertinggi-di-indonesia

Kompas.com. (2024b, February 26). *Maternal mortality rate in DKI Jakarta is the lowest in Indonesia*. https://lestari.kompas.com/read/2024/02/26/110000086/angka-kematian-ibu-di-dki-jakarta-terendah-se-indonesia

Mahmood, M. A., Hendarto, H., Laksana, M. A. C., Damayanti, H. E., Suhargono, M. H., Pranadyan, R., Santoso, K. H., Redjeki, K. S., Winard, B., Prasetyo, B., Vercruyssen, J., Moss, J. R., Bi, P., Masitah, S., Warsiti, Pratama, A. W., Dewi, E. R., Listiyani, C. H., & Mufidah, I. (2021). Health system and quality of care factors

e-ISSN: 2985-4415
DOI: 10.57254/irma.v3i12.94

contributing to maternal deaths in East Java, Indonesia. *PLOS ONE, 16*(2), Article e0247911. https://doi.org/10.1371/journal.pone.0247911

Makowiecka, K., Achadi, E., Izati, Y., & Ronsmans, C. (2008). Midwifery provision in two districts in Indonesia: How well are rural areas served? *Health Policy and Planning, 23*(1), 67–75. https://doi.org/10.1093/heapol/czm036

Muharram, F. R., Sulistya, H. A., Swannjo, J. B., Firmansyah, F. F., Rizal, M. M., Izza, A., Isfandiari, M. A., Ariningtyas, N. D., & Romdhoni, A. C. (2024). Adequacy and distribution of the health workforce in Indonesia. *WHO South-East Asia Journal of Public Health, 13*(2), 45–55. https://doi.org/10.4103/who-seajph.who-seajph_28_24

Renfrew, M. J., McFadden, A., Bastos, M. H., Campbell, J., Channon, A. A., Cheung, N. F., Silva, D. R. A. D., Downe, S., Kennedy, H. P., Malata, A., McCormick, F., Wick, L., & Declercq, E. (2014). Midwifery and quality care: Findings from a new evidence-informed framework for maternal and newborn care. *The Lancet, 384*(9948), 1129–1145. https://doi.org/10.1016/S0140-6736(14)60789-3

Sandall, J., Soltani, H., Gates, S., Shennan, A., & Devane, D. (2016). Midwife-led continuity models versus other models of care for childbearing women. *Cochrane Database of Systematic Reviews, 2016*(4), Article CD004667. https://doi.org/10.1002/14651858.CD004667.pub5

Thaddeus, S., & Maine, D. (1994). Too far to walk: Maternal mortality in context. *Social Science & Medicine, 38*(8), 1091–1110. https://doi.org/10.1016/0277-9536(94)90226-7

Law of the Republic of Indonesia No. 17 of 2023 on Health. (2023). Official Gazette of the Republic of Indonesia, Year 2023, No. 105.

Wenang, S., Emilia, O., Wahyuni, A., Afdal, A., & Haier, J. (2024). Obstetric care in Indonesia: Determinants of maternal mortality and stillbirth rates. *PLOS ONE, 19*(7), Article e0303590. https://doi.org/10.1371/journal.pone.0303590