

Understanding the drivers associated with maternal delivery choices: comparative study between urban and rural women in Indonesia

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Urban area



Higher percentage of institutional deliveries (91.37%)

Indonesia's high maternal mortality ratio



Rural area



Lower percentage of institutional deliveries (69.33%)

Urban-specific factor	Common factors (both urban & rural)	Rural-specific factors
Maternal age	- Wealth index - Health insurance - Antenatal care - Pregnancy & delivery complications	- Ease of access to health facilities - Sex of household head

Conclusion

The factors determining maternal delivery choices differ between urban and rural areas, with access to health facilities and the sex of the household head being significant in rural areas. The government must ensure equal health facility availability, especially in rural Indonesia.

Rachmawati T et al. Korean Journal of Family Medicine (2026)

<https://doi.org/10.4082/kjfm.24.0145>

Received: June 24, 2024, Revised: January 14, 2025, Accepted: January 31, 2025, Published online: June 20, 2025

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ABSTRACT

Background: Indonesia faces significant maternal and child health challenges, including a high maternal mortality ratio. The country's vast geography results in disparities in healthcare facility availability. This study aimed to identify factors influencing maternal delivery choices in health facilities across Indonesia's rural and urban areas.

Methods: This cross-sectional study analyzed data from the 2017 Indonesia Demographic Health Survey. The study population included women aged 15–49 who had given birth within 5 years preceding the survey. A total of 14,162 women were included, with 6,339 from urban and 5,009 from rural areas. Logistic regression was performed to identify factors associated with maternal delivery locations.

Results: The findings showed that 91.37% of urban and 69.33% of rural mothers delivered in healthcare facilities. All analyzed variables were significantly correlated with maternal delivery in health facilities across both areas. In rural areas, the sex of the household head (adjusted odds ratio [AOR], 1.32; 95% confidence interval [CI], 1.02–1.71; $P=0.031$) and the absence of barriers to healthcare access (AOR, 1.31; 95% CI, 1.07–1.60; $P=0.008$) were significant factors. Conversely, in urban areas, only maternal age was significantly associated with delivering in health facilities.

Conclusion: Determinants of maternal delivery choices vary between rural and urban settings. In rural areas, healthcare access and household head sex are key factors, while maternal age is significant in urban areas. The government should prioritize equitable healthcare facility distribution, particularly in rural areas, and promote family involvement, especially among husbands, during antenatal care to encourage facility-based deliveries.

Keywords: Choices Behavior; Delivery of Health Care; Maternal Health; Rural Population; Urban Population

Introduction

The maternal mortality ratio (MMR) is defined as the number of maternal deaths during a specific period per 100,000 live births in the same time frame. Globally, maternal mortality remains unacceptably high, with approximately 287,000 women dying during or after pregnancy and childbirth in 2020 [1]. Nearly 95% of all maternal deaths occurred in low and lower-middle-income countries, most of which could have been prevented. This correlates with the increasing use of maternal health services in developing countries. However, disparities persist within specific populations based on geographic location, socioeconomic background, and cultural beliefs [2]. Additionally, global improvements in maternal health services are contingent on the use of skilled healthcare professionals in facilities, particularly for antenatal care (ANC) and delivery, as recommended by the World Health Organization.

In 2020, the MMR in Southeast Asia was estimated at 134 women per 100,000 live births [3,4]. Indonesia's MMR is significantly higher compared to other Southeast Asian nations, with 189 maternal deaths per 100,000 live births. Various efforts have been implemented to reduce the MMR, including facility-based maternal and newborn health programs aimed at increasing the number of women delivering in healthcare facilities [5,6]. Although the number of births in health facilities increased from 88.91% in 2021 to 91.15% in 2023, a significant disparity remains between urban and rural areas [7].

In Indonesia, 79.3% of deliveries occur in health facilities, and skilled attendants assist in 93.1% of births. However, home deliveries still account for 16%, and the cost of facility-based deliveries is partially covered by the government's national health insurance (41.2%) [8]. Despite progress in facility-based childbirth, global disparities persist, particularly in rural areas. Inequality in access

to and quality of healthcare remains in rural areas, where only 59% of births occur in regions with high mortality rates [9]. In 74 countries, 23.1% of low-quintile births occurred in rural areas with low educational attainment (65.2%) [9]. Disparities in access to health services between urban and rural areas persist, affecting both infant survival and service delivery. Education of pregnant women positively impacts the use of skilled birth attendants, as demonstrated by the 2017 Indonesia Demographic Health Survey (IDHS) study [10]. Factors influencing pregnant women's choice of delivery setting include fear management, emotional support, information, and a comfortable environment, with sociocultural elements such as family support and trust in healthcare providers also playing a role [11]. Understanding these factors is critical for targeted interventions in maternal and newborn health. Analyzing patterns of health service use can assist in effective planning and interventions. This study aims to explore the factors associated with delivery in health facilities in both urban and rural areas of Indonesia.

Methods

Study design

This study employed a cross-sectional design and utilized secondary data from the 2017 IDHS. The IDHS is a country-level survey that includes data from 34 provinces. The IDHS dataset is open-access and can be downloaded from the following link: <https://dhsprogram.com/data/available-datasets.cfm>. The sample consisted of women aged 15–49 years who gave birth to their last child within 5 years prior to the survey. We analyzed the IDIR71FL dataset (Indonesian Individual Recode phase 7), a sub-dataset containing specific information for women of reproduc-

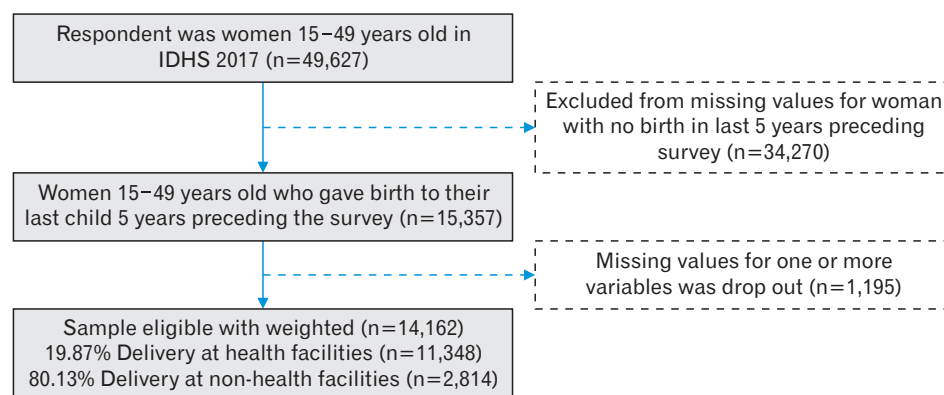


Figure 1. Flow chart of the study screening process on Indonesia Demographic Health Survey (IDHS) 2017 data. Flow chart of the sampling process using IDHS 2017 data with respondents with women aged 15–49 years who had given birth.

tive age. The total number of responses was 49,627. Data exclusion was carried out by removing respondents who had not given birth in the preceding 5 years and excluding records with missing values. After applying weights, the final sample size was 14,162. We used the total sampling for the analysis (Figure 1).

The dependent variable is the delivery location, defined as the physical place where mothers give birth, categorized into health and non-health facilities. Health facilities include health centers, clinics, maternity homes, health practitioner practices, and government or private hospitals. Home deliveries, traditional birth attendants, and other non-health facility births are categorized as non-health facilities. The independent variables include maternal age at delivery, husband's education level, head of household gender, distance to health facilities, health insurance ownership, wealth index, number of children, ANC visits, pregnancy complications, and delivery complications. The questions are based on the Woman's Questionnaire from the 2017 IDHS, with code 17 IDHS-W.

The operational definition of the variable "Barriers to accessing health facilities" refers to challenges faced by mothers in accessing health services due to distance, categorized as "yes" and "no." ANC refers to routine healthcare provided to pregnant women to monitor and promote the health of both mother and fetus throughout pregnancy. "ANC visits 4 times" refers to the operational definition of the Indonesian government program, which requires one ANC visit at 1–3 months of pregnancy, one at 4–6 months, and two at 7–9 months. Respondents meeting these criteria are classified as "appropriate," while others are categorized as "not appropriate." Pregnancy complications refer to the mother experiencing danger signs, with this variable grouped as "yes" or "no." Delivery complications are indicated if the respondent answers "yes" to any of the following conditions: bleeding, seizures, fainting, cloudy or smelly amniotic fluid, weakness during pushing, restlessness, or severe pain.

Ownership of health insurance refers to whether mothers are actively enrolled in any health insurance scheme that provides financial coverage for medical services. Education level refers to the highest grade or level of formal education completed and is categorized into four levels: no education, primary, secondary,

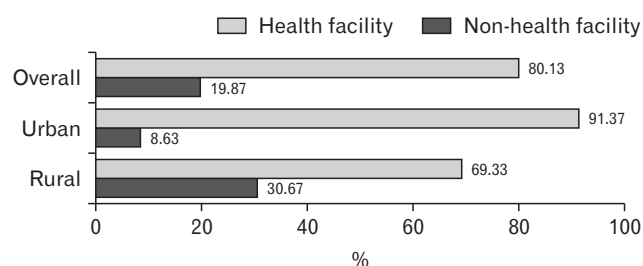


Figure 2. The proportion of mother delivery at health facilities in urban and rural Indonesia (Indonesia Demographic Health Survey, 2017).

and higher education. Sex of household head refers to the biological sex of the primary decision-maker or leader of the household.

Data analysis

Data analysis considers the weighting determined by the IDHS survey design. Weighted variables were created by dividing v005 by 1,000,000. Descriptive analysis examines the proportion of each variable overall and stratifies it into urban and rural areas. Bivariate analysis investigates the relationships between the independent and dependent variables, with the strength of these relationships presented as the crude odds ratio (COR). Significant variables with P-values <0.05 are included in the multivariate analysis, which uses logistic regression and the backward approach. The backward approach in logistic regression starts with a full model and iteratively removes non-significant predictors, simplifying the model while retaining key variables contributing to its predictive power. This method ensures that all potential predictors are initially considered, reducing the risk of excluding important variables prematurely [12]. Results are presented as adjusted odds ratios (AOR), with a 95% confidence interval (CI) and a P-value <0.05. Data analysis was performed using STATA ver. 13 (Stata Corp.).

Results

The research found that eight out of 10 mothers in Indonesia

deliver in health facilities. Almost all mothers (91.37%) in urban areas deliver in health facilities, while in rural areas, only 69.33% do (Figure 2). Table 1 shows the characteristics of mothers giving birth in healthcare facilities. In Indonesia, most mothers (73.97%) are aged 20–34 years, 61.52% have secondary education, and 54.82% have two to three children. Most respondents (90.66%) reported no difficulty accessing healthcare, 61.32% had health insurance, and 83.31% had appropriate ANC visits during pregnancy. The proportion of mothers who experienced complications is 19.46% during pregnancy and 69.8% during childbirth. The proportions of the above variables do not show significant

differences between urban and rural areas, except for delivery complications. The proportion of mothers who experienced complications during childbirth is significantly higher in urban areas (72.10%) compared to rural areas (66.83%).

Results from Table 2 of the bivariate analysis, using the COR, show that all variables are significantly correlated in the overall area. However, in the multivariate analysis, the AOR results showed no significant relationship between the mother's education level and the sex of the household head.

Table 2 also highlights urban-rural disparities in healthcare facility deliveries. Maternal education significantly promotes health

Table 1. Characteristics of respondents delivering in health facilities in urban and rural Indonesia (IDHS, 2017)

Characteristic	Overall	Urban	Rural
Total	11,348 (100.00)	6,339 (100.00)	5,009 (100.00)
Age group (y)			
<20	796 (7.02)	317 (5.01)	479 (9.56)
20–34	8,395 (73.97)	4,747 (74.88)	3,648 (72.83)
≥35	2,157 (19.01)	1,275 (20.12)	882 (17.61)
Education level of mothers			
No education	49 (0.43)	22 (0.36)	27 (0.53)
Primary	2,389 (21.05)	981 (15.47)	1,408 (28.12)
Secondary	6,981 (61.52)	4,017 (63.38)	2,963 (59.16)
Higher	1,929 (17)	1,318 (20.79)	611 (12.19)
Husband education levels			
No education	80 (0.71)	30 (0.47)	50 (1)
Primary	2,616 (23.05)	1,029 (16.23)	1,587 (31.67)
Secondary	6,918 (60.97)	4,009 (63.24)	2,909 (58.09)
Higher	1,734 (15.28)	1,271 (20.06)	463 (9.24)
Sex of household head			
Male	10,371 (91.39)	5,802 (91.54)	4,569 (91.21)
Female	977 (8.61)	537 (8.46)	440 (8.79)
Barriers to accessing health facilities			
Yes	1,060 (9.34)	520 (8.2)	540 (10.77)
No	10,288 (90.66)	5,819 (91.8)	4,469 (89.23)
Ownership of health insurance			
No	4,389 (38.68)	2,200 (34.71)	2,189 (43.7)
Yes	6,959 (61.32)	4,139 (65.29)	2,820 (56.3)
Wealth index			
Poorest	1,652 (14.56)	1,053 (16.61)	560 (11.96)
Poorer	2,142 (18.88)	1,279 (20.18)	863 (17.24)
Middle	2,466 (21.73)	1,370 (21.61)	1,096 (21.88)
Richer	2,537 (22.35)	1,390 (21.91)	1,147 (22.9)
Richest	2,551 (22.48)	1,247 (19.68)	1,303 (26.02)
Parity (child)			
≥4	1,010 (8.9)	579 (9.13)	431 (8.6)
2–3	6,221 (54.82)	3,543 (55.89)	2,678 (53.46)
1	4,117 (36.28)	2,217 (34.98)	1,900 (37.93)
Antenatal care visit			
Not appropriate	1,894 (16.69)	924 (14.57)	970 (19.37)
Appropriate	9,454 (83.31)	5,415 (85.43)	4,039 (80.63)
Pregnancy complication			
No	9,140 (80.54)	5,054 (79.72)	4,086 (81.58)
Yes	2,208 (19.46)	1,285 (20.28)	923 (18.42)
Delivery complication			
No	3,430 (30.23)	1,769 (27.9)	1,661 (33.17)
Yes	7,918 (69.77)	4,570 (72.1)	3,348 (66.83)

Values are presented as number (%).

IDHS, Indonesia Demographic Health Survey.

Table 2. COR and AOR of independent variables related to maternal delivery in health facilities based on urban and rural Indonesia (IDHS 2017)

Variable	Overall (95% CI)			Urban (95% CI)			Rural (95% CI)		
	COR	P-value	AOR	P-value	COR	AOR	P-value	COR	P-value
Age group (y)									
<20 (Ref)									
20–34	1.57 (1.31–1.89)	0.001	1.44 (1.17–1.77)	0.001	1.96 (1.44–2.67)	1.45 (1.01–2.07)	0.039	1.17 (0.93–1.48)	0.155
≥35	1.69 (1.39–2.05)	0.001	2.37 (1.85–3.04)	0.001	2.37 (1.70–3.30)	2.40 (1.58–3.67)	0.001	1.16 (0.91–1.49)	0.219
Education level of respondent									
No education (Ref)									
Primary	2.08 (1.31–3.29)	0.002	-	-	0.87 (0.27–2.78)	-	-	2.54 (1.52–4.25)	0.001
Secondary	5.35 (3.39–8.47)	0.001	-	-	2.48 (0.77–7.98)	-	-	5.02 (3.01–8.37)	0.001
Higher	9.49 (5.86–15.36)	0.001	-	-	5.28 (1.59–17.49)	-	-	6.61 (3.84–11.40)	0.001
Husband education levels									
No education (Ref)									
Primary	1.68 (1.16–2.44)	0.006	1.57 (1.09–2.26)	0.014	1.76 (0.81–3.85)	-	-	1.63 (1.05–2.53)	0.029
Secondary	4.17 (2.85–6.08)	0.001	2.87 (1.99–4.12)	0.001	4.68 (2.18–10.04)	-	-	3.04 (1.94–4.78)	0.001
Higher	8.66 (5.74–13.04)	0.001	3.69 (2.47–5.51)	0.001	13.19 (5.66–30.71)	-	-	3.92 (2.41–6.39)	0.001
Sex of household head									
Male (Ref)									
Female	1.23 (1.02–1.48)	0.026	-	-	0.87 (0.64–1.20)	-	-	1.40 (1.10–1.78)	0.005
Barriers to accessing health facilities									
Yes (Ref)									
No	1.93 (1.62–2.31)	0.001	1.46 (1.22–1.74)	0.001	1.63 (1.10–2.42)	-	-	1.77 (1.45–2.18)	0.001
Ownership of health insurance									
No (Ref)									
Yes	1.54 (1.38–1.73)	0.001	1.40 (1.24–1.58)	0.001	1.74 (1.41–2.16)	1.39 (1.11–1.73)	0.003	1.27 (1.10–1.46)	0.001
Wealth index									
Poorest (Ref)									
Poorer	1.86 (1.59–2.16)	0.001	1.45 (1.23–1.70)	0.001	2.15 (1.68–2.76)	1.96 (1.53–2.53)	0.001	1.92 (1.57–2.35)	0.001
Middle	2.75 (2.31–3.29)	0.001	1.95 (1.62–2.35)	0.001	3.42 (2.57–4.55)	2.94 (2.20–3.93)	0.001	3.03 (2.42–3.80)	0.001
Richer	3.72 (3.05–4.55)	0.001	2.25 (1.82–2.78)	0.001	6.11 (4.28–8.71)	4.88 (3.41–7.00)	0.001	3.93 (3.07–5.04)	0.001
Richest	5.91 (4.73–7.39)	0.001	2.95 (2.31–3.76)	0.001	13.74 (8.55–22.07)	10.46 (6.48–16.88)	0.001	6.64 (5.09–8.66)	0.001
Parity (child)									
≥4 (Ref)									
2–3	1.91 (1.65–2.20)	0.001	1.84 (1.57–2.15)	0.001	2.00 (1.53–2.61)	2.12 (1.58–2.85)	0.001	1.89 (1.58–2.27)	0.001
1	2.26 (1.93–2.64)	0.001	2.46 (2.02–2.98)	0.001	1.99 (1.48–2.67)	2.51 (1.73–3.63)	0.001	2.49 (2.05–3.03)	0.001
Antenatal care visit									
Not appropriate (Ref)									
Appropriate	2.55 (2.25–2.90)	0.001	1.78 (1.56–2.03)	0.001	2.30 (1.86–2.85)	1.46 (1.15–1.85)	0.002	2.28 (1.95–2.66)	0.001
Pregnancy complication									
No (Ref)									
Yes	1.87 (1.63–2.14)	0.001	1.64 (1.42–1.89)	0.001	1.59 (1.24–2.04)	1.36 (1.05–1.76)	0.017	1.86 (1.56–2.21)	0.001
Delivery complication									
No (Ref)									
Yes	1.91 (1.70–2.15)	0.001	1.49 (1.32–1.68)	0.001	1.63 (1.33–2.01)	1.29 (1.04–1.60)	0.017	1.79 (1.54–2.09)	0.001

COR, crude odds ratio; AOR, adjusted odd ratio; IDHS, Indonesia Demographic Health Survey; CI, confidence interval; Ref, reference.

facility births in both rural and urban areas, particularly at higher levels. Paternal education also shows a significant impact across most levels in both settings, with a stronger influence at higher education levels in urban areas (COR, 13.9) compared to rural areas (COR, 3.92). The wealthiest groups exhibit more significant differences in urban (COR, 13.74) than rural areas (COR, 6.64), underscoring the role of wealth in healthcare disparities. Complications, while increasing the likelihood of facility births in both urban and rural areas, do not present insurmountable odds. For ages ≥ 35 years, the odds of facility births increase (AOR, 2.40) in urban areas, while in rural areas, the increase is not significant.

However, findings from the multivariate analysis (AOR) show that husbands' education in both urban and rural areas shows no significant correlation with maternal delivery in health facilities. In rural areas, having a female household head increases the likelihood of facility births (AOR, 1.32). Easy access to health facilities in rural areas also boosts this likelihood (AOR, 1.31). In urban areas, the likelihood of giving birth in a healthcare facility increases with the mother's age group: 20–34 (AOR, 1.45) and 35 or older (AOR, 2.40). Other variables such as wealth index, Parity, ANC visits, and pregnancy and delivery complications remain significant factors in both urban and rural areas after adjustment with logistic regression analysis.

Discussion

Our study shows that 80.13% of mothers delivered at health facilities, with mothers living in urban areas having a higher likelihood of delivering at health facilities (91.37%) than those in rural areas (69.33%). A study by Laksono et al. [13] showed that people living in urban areas in Indonesia are more likely to utilize healthcare services. In the Philippines, 17.92% of mothers delivered at home, with higher rates in rural areas (23.53%) compared to urban areas (10.72%) [14]. Similarly, 65% of urban and 4.7% of rural mothers in Nigeria deliver in health facilities [15]. This indicates that the utilization of delivery services in health facilities is still not optimal, and there is a gap between urban and rural communities in terms of choices of delivery sites. Particularly in eastern Indonesia, access to healthcare facilities is challenging due to the island and mountainous topography [13].

Higher education levels among women and their partners were significantly associated with women's choice of delivering in a health facility in both rural and urban areas. This finding aligns with studies showing that women with highly educated partners are more likely to deliver in health facilities [16–19]. Similarly, when it comes to delivery costs, having health insurance plays a significant role in influencing pregnant women's decisions about where to give birth and whether to have ANC. With low-income-sensitive charges and minimal or no copayments, increasing health insurance coverage can boost the use of maternal health

services [20–23]. Being in the highest wealth quintile is associated with a greater chance of receiving postpartum care compared to those in the lowest wealth quintile who deliver by cesarean section [21]. This is consistent with the 2017 IDHS data analysis results, which showed that religion, ethnicity, place of residence, wealth, media exposure, location, and maternal education influence the place of delivery [10].

ANC contributes significantly to the use of healthcare facilities for delivery. Mothers with ANC are 2.5 times more likely to deliver in a healthcare facility compared to those with no appropriate ANC. Among women who do not receive ANC, 79% deliver at home, while 60% deliver at a healthcare facility that provides ANC [24]. A relationship exists between appropriate ANC use and pregnancy complications. When mothers experience pregnancy and delivery complications, their chances of giving birth in a health facility and receiving adequate ANC improve. Decisions to seek care from an institution, such as a clinic or hospital, are made only when healthcare providers cannot manage the problem at home [18,22,25].

In rural areas, the potential to deliver at a health facility is higher in families with a female head of household compared to families with a male head of household. This finding is particularly interesting because, in Indonesia, the patriarchal culture remains strong. To support his wife during delivery, the husband has a significant say in where the baby will be delivered [26]. Indonesia's efforts to achieve gender equality are reflected in policies such as Presidential Instruction No. 9/2000 on gender mainstreaming, the national strategy for gender-responsive planning and budgeting, and regulations promoting gender integration in development and governance. Furthermore, the government must strengthen women's empowerment programs and involve husbands in reproductive health education to increase their understanding and role in ensuring safe births in health facilities [27]. Azhar et al. [28] found that participation in pregnancy classes is positively associated with adequate ANC, skilled birth attendance, and delivery at health facilities. However, the potential for implementing pregnancy classes is higher in urban areas compared to rural areas [28]. Therefore, efforts should be made to implement pregnancy classes in rural areas to ensure that every pregnant woman can deliver at a health facility [28].

Easy access to health facilities in rural locations also enhances the likelihood of facility deliveries; transportation difficulties are frequently identified as obstacles to rural healthcare access [29]. The study by Rizkianti et al. [30] indicates that distance barriers to accessing healthcare in rural Indonesia increase the risk of pregnancy complications. The government should address specific physical barriers by developing more advanced healthcare systems in rural and geographically isolated areas, bringing health services closer to home.

The strength of this study lies in its ability to capture the problem at a national level with a large-scale sample. However, the study has a limitation in that it uses secondary survey data, which

may only provide a superficial view of the issue, as we could only analyze the variables available. Additionally, secondary data may be prone to recall bias, as respondents might have difficulty remembering or accurately reporting information, particularly if the events occurred in the past.

In conclusions, comparing rural and urban areas, mothers in urban areas were more likely to deliver in healthcare facilities. Among the determinants, the sex of the head of the household and easy access to health facilities were significant factors influencing access to healthcare facilities in rural areas. In contrast, age was a significant factor in urban areas. Factors such as insurance ownership, wealth index, parity, ANC, and complications during pregnancy and delivery were common factors influencing mothers to give birth in health facilities overall, both in urban and rural areas.

It is recommended that the government establish an equal number of health facilities in rural areas, encourage mothers to comply with the ANC program, and improve access and transportation to health services. In addition, husbands should be involved in ANC in both rural and urban areas through counseling during ANC and by optimizing pregnancy class programs that include husbands. This approach aims to ensure that they have sufficient knowledge about pregnancy, delivery preparation, and the importance of delivering at health facilities.

Article Information

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Acknowledgments

None.

Funding

None.

Data availability

Contact the corresponding author for data availability.

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