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ORIGINAL ARTICLE

URBAN AND RURAL DISPARITIES IN WOMEN'S REPRODUCTIVE HEALTH KNOWLEDGE AND CONTRACEPTIVE USE IN INDONESIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Reproductive health knowledge is essential for enabling women to make informed family planning decisions and prevent unintended pregnancies. In Indonesia, awareness of the possibility of pregnancy after childbirth before menstruation resumes remains insufficiently explored. This study examined sociodemographic, economic, and behavioral factors associated with women's knowledge of postpartum pregnancy risk using data from 40,978 women aged 15–49 years in the 2017 Indonesian Demographic and Health Survey (IDHS). A cross-sectional analysis was conducted using multivariate logistic regression with sampling weights to ensure national representativeness. The results showed that higher education (AOR: 1.41; 95% CI: 1.13–1.75) and higher wealth status (AOR: 1.35; 95% CI: 1.21–1.50) were positively associated with knowledge. In contrast, rural residence (AOR: 0.91; 95% CI: 0.83–0.98) and lack of formal education were linked to lower awareness. Older age and being currently married were also associated with higher knowledge levels. Women using contraceptive methods, particularly calendar-based methods (AOR: 1.27; 95% CI: 1.15–1.40), were more likely to have adequate knowledge. These findings highlight urban–rural disparities in reproductive health knowledge and emphasize the need to strengthen education, expand healthcare access, and improve family planning counseling, particularly in underserved communities.

Keywords: *Contraceptive use; family planning; Indonesian Demographic Health Survey (IDHS); reproductive health knowledge; urban–rural disparities*

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BACKGROUND

Women need to have good reproductive health knowledge, as this enables them to make informed decisions about their well-being, including fertility and family planning (Kilfoyle, Vitko, O'Connor, & Bailey, 2016; Nandagiri, 2021). Critical aspects of this knowledge include awareness of the potential for conception following childbirth (Aragie & Gedion, 2022; Essien, Chireh, & Essien, 2024), as well as knowledge of how to prevent unintended pregnancies and improve their own and their children's health outcomes (Essien, Chireh, & Essien, 2024).

However, significant gaps in reproductive health knowledge persist, particularly in low- and middle-income countries (LMICs), including Indonesia (Kruk et al., 2018). Indonesia faces significant challenges in ensuring equitable access to reproductive health services and information (Mahendradhata et al., 2017). The nation's vast geographical expanse, along with socioeconomic disparities and cultural

heterogeneity, contributes to inequalities in reproductive health outcomes. Data from the 2017 Indonesian Demographic and Health Survey (IDHS) revealed substantial urban–rural disparities in reproductive health knowledge and outcomes, including higher unmet contraceptive needs and limited access to reproductive health information among rural women compared with their urban counterparts (Asrat, Copas, & Olubukola, 2024; Sedgh, Ashford, & Hussain, 2016).

Variables, such as age, education, marital status, and economic status, are recognized predictors of reproductive health knowledge and contraceptive utilization (Guzzo & Hayford, 2018; Negash, Eshetu, & Asmamaw, 2022). Younger women and individuals with lower educational levels are particularly vulnerable to misinformation about fertility and pregnancy timing (Dong, Zhang, Lam, & Huang, 2024). Similarly, women in rural regions often face barriers to accessing accurate health information due to inadequate healthcare infrastructure and limited exposure to mass media campaigns (Chen et al., 2019; Jones et al., 2024). These deficiencies in reproductive health knowledge can result in elevated rates of unintended pregnancies, maternal mortality, and adverse child health outcomes, thereby perpetuating cycles of poverty and inequality (López, Sriprasert, & Wilson, 2024; Souza et al., 2024).

Contraceptive use plays a critical role in shaping women's understanding of fertility and pregnancy risk. In Indonesia, contraceptive use varies considerably across regions, socioeconomic groups, and education levels, with injectable methods being the most used (Efendi, Sebayang, Astutik, Reisenhofer, & McKenna, 2023). However, a substantial proportion of women do not use any form of contraception, particularly women in rural and underserved areas (Sedgh, Ashford, & Hussain, 2016). Limited or inconsistent contraceptive use has been associated with higher risks of unintended pregnancy and short birth intervals, which may be further compounded by inadequate knowledge of postpartum fertility (Pazol, Zapata, Tregear, Mautone-Smith, & Gavin, 2015). Meanwhile, family planning services offer counseling and education regarding reproductive physiology, including the possibility of conception before the return of menstruation following childbirth, which may enhance women's awareness of fertility timing and pregnancy risk (Armuand, Grandahl, Volgsten, & Stern, 2024

Moreover, women who use contraceptive methods that require user awareness or counseling, such as calendar-based methods, may have greater exposure to information related to fertility timing. Educational interventions and digital learning tools have also been shown to improve women's understanding of contraceptive use and reproductive health information (Pansuwan & Klankhajhon, 2023). Conversely, women who do not use contraception may have fewer contacts with health services and limited access to accurate reproductive health information (Ermias, Averbach, Dey, Gebrehanna, & Holt, 2023).

Although previous research has examined the determinants of contraceptive use and reproductive health behavior in Indonesia, it has not explored women's knowledge of fertility and the timing of pregnancy after childbirth, even though this knowledge is essential for developing effective educational programs and interventions that can bridge knowledge gaps and facilitate informed decision-making among women (Pazol, Zapata, Tregear, Mautone-Smith, & Gavin, 2015; Widiastuti et al., 2024).

Therefore, this study aims to address these gaps by analyzing 2017 IDHS data to identify sociodemographic, economic, and behavioral factors associated with women's awareness of the likelihood of conception before their first postpartum period. This research particularly explores urban-rural disparities and the impact of variables, such as age, education, marital status, economic status, and contraceptive use, on reproductive health knowledge.

The findings of this study are intended to inform policies and programs that enhance reproductive health education and reduce disparities in access to family planning information and services in Indonesia. This study seeks to contribute to the existing literature by providing a comprehensive analysis of factors related to reproductive health knowledge among women in Indonesia, with an emphasis on practical recommendations to address disparities and improve maternal and child health outcomes. By identifying key determinants and areas for intervention, this study can support efforts to achieve universal access to reproductive health services and information, as outlined in the Sustainable Development Goals (SDGs).

METHOD

Study design

This study employed a cross-sectional design and used secondary data from the 2017 Indonesian Demographic and Health Survey (IDHS). The survey was conducted between July 24 and September 30, 2017. It encompassed 34 provinces in Indonesia and was funded by the Indonesian government with technical support from the ICF (International Coaching Federation) through the DHS Program (ICF, 2018). The IDHS employed a nationally representative sampling method, ensuring that the dataset was diverse, comprehensive, and accurately represented the Indonesian population.

Study population

The study population consisted of 40,978 women aged 15–49 years who participated in the 2017 IDHS. Women were included regardless of marital status. Thus, the sample comprised women who were currently married as well as those who were never married, widowed, or divorced, provided that complete data on the outcome variable and key covariates were available. Marital status was treated as an explanatory variable in the analysis to examine differences in reproductive health knowledge across marital groups.

A stratified, multistage sampling design was applied to ensure representation across Indonesia's socioeconomic and geographic regions (ICF, 2018). Sampling weights were incorporated to account for stratification, clustering, non-response, and unequal probabilities of selection, thereby ensuring nationally representative estimates. The analysis utilized the IDIR71FL dataset (Individual Recode, Phase 7), obtained from the DHS Program following formal approval, which was accessed from the DHS Program website (https://www.dhsprogram.com/data/available-datasets.cfm) through a direct application process and downloaded following the necessary approval.

Variables

The dependent variable in this study was the women's comprehension of the likelihood of conceiving before their first postpartum period. This variable was assessed through survey responses to a specific question, which was coded as a binary variable (yes/no). The independent variables included sociodemographic, economic, and behavioral factors: age group (15–19, 20–24, 25–29, 30–34, 35–39, 40–

44, 45–49 years), marital status (currently married, never married/widowed/divorced), educational attainment (no education, primary, secondary, higher), wealth index (poorest, poor, middle, richer, richest), type of residence (urban or rural), employment status (employed or unemployed), and contraceptive use. Contraceptive use was categorized as not using any method, using modern methods (e.g., injectables, intrauterine devices, pills), or using traditional methods (e.g., withdrawal or periodic abstinence). Contraceptive use was not applied as a selection criterion for the study population, but was included as an independent variable to assess its association with women's knowledge of postpartum fertility. This approach minimized potential selection bias related to contraceptive behavior. Additional covariates related to region and household characteristics were also considered.

Statistical analysis

All analyses were conducted using Stata (version 15.1), employing survey commands to account for the complex sampling design. Descriptive statistics were generated to examine the frequency distribution of the sociodemographic, economic, and behavioral characteristics. Bivariate analyses, specifically chi-square tests, were performed to identify potential associations between the independent and outcome variables. A multivariable logistic regression model was used to assess factors associated with awareness of pregnancy risk prior to the resumption of menstruation following childbirth. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated to evaluate the strength of the associations. Statistical significance was set at $p < 0.05$.

Ethical considerations

The Institutional Review Board (IRB) approved the initial IDHS survey through the ICF IRB Review Board (FWA00000845). This study adhered to the DHS Program's ethical guidelines, ensuring the privacy and confidentiality of the survey participants. Access to the 2017 IDHS dataset was granted following registration with the DHS Program, facilitating its subsequent download and analysis. Further information regarding the ethical review process is available on the DHS Program website: DHS Ethics Guidelines.

RESULT

Table 1. Frequency distribution of characteristics among women in Indonesia (N = 40.978)

Variable	Frequency (f)	Percentage (%)
Age (years)		
15-19	4.997	12.19
20-24	5.360	13.08
25-29	5.771	14.08
30-34	6.312	15.40
35-39	6.751	16.47
40-44	6.229	15.20
45-49	5.558	13.56
Marital status		
Currently in union	30.577	74.62
Never in a union/widowed/divorced	10.401	25.38
Education level		
No education	662	1.62
Primary	10.330	25.21
Secondary	22.128	54.00
Higher	7.858	19.18
Wealth index combined		
Poorest	8.730	21.30
Poorer	7.622	18.60
Middle	7.856	18.17
Richer	8.177	19.95
Richest	8.593	20.97
Residence		
Urban	22.175	54.11
Rural	18.803	45.89
Currently working		
No	18.181	44.37
Yes	22.797	55.63
Used anything or tried to delay or avoid getting pregnant		
No	13.144	32.08
Yes, used outside calendar	3.376	8.24
Used in calendar	24.458	59.69
Current use by method type		
No methods	22.007	53.70
Traditional method	2.199	5.37
Modern	16.772	40.93
Knowledge of women get pregnant after birth and before period		
No	14.530	35.46
Yes	26.448	64.54
Current contraceptive method		
Not using	22.007	50.50
Using	18.971	49.50

This study involved a sample of 40,978 Indonesian women. Thus, the data encompasses a diverse array of sociodemographic and reproductive traits. The most represented age group was 35–39 years (16.47% of the participants), followed by 30–34 years (15.40%), and 40–44 years (15.20%). The least represented age group was 15–19 years old, accounting for 12.19% of the sample.

Next, for the marital status variable, 74.62% of the women were married, and 25.38% were single, widowed, or divorced. In terms of education, over half (54.00%) had completed secondary education, 25.21% had primary education, 19.18% had higher education, and 1.62% had no formal education. The wealth index showed a fairly even distribution across economic levels, with the poorest group at 21.30%, followed by 20.97%, 19.95%, 18.17%, and 18.60%, respectively. In this study, economic status was categorized using the DHS wealth index (hereafter referred to as wealth status), which categorizes households into five quintiles (poorest, poorer, middle, richer, and richest) based on asset ownership and living conditions. The majority of the women (54.11%) lived in urban areas, while 45.89% lived in rural regions. The employment statistics also revealed that 55.63% of the respondents were employed and 44.37% were not.

Regarding contraceptive use, 59.69% of women used a calendar-based method to prevent pregnancy, 8.24% used non-calendar methods, and 32.08% did not use any method. Modern contraceptive methods were used by 40.93% of women, 5.37% relied on traditional methods, and 53.70% did not use any method. Regarding reproductive knowledge, 64.54% of the women were aware of the possibility of conceiving before their first postpartum period, while 35.46% were not. Lastly, 49.50% of women reported using some form of contraception, and 50.50% did not (Table 1).

Table 2 illustrates the relationship between residence type (urban or rural) and various sociodemographic, economic, and reproductive health characteristics. A statistically significant association was identified between the location of residence and all the variables examined (p-value of 0.05).

Table 2. The relationship between residential area type and variables tested in this study

Variables	Type of place of residence		*p-value*
	Urban	Rural	
	N (%)		
Age (years)			0.0006
15-19	2.839(6.41)	2.158(5.31)	
20-24	2.969(6.92)	2.391(6.04)	
25-29	3.034(6.89)	2.737(6.87)	
30-34	3.262(7.63)	3.050(7.59)	
35-39	3.660(8.9)	3.091(7.94)	
40-44	3.381(8.06)	2.848(7.21)	
45-49	3.030(7.42)	2.528(6.79)	
Marital status			0.0001
Currently in union	15.691(37.83)	14.886(38.57)	
Never in a union/widowed/divorced	6.484(14.41)	3.917(9.18)	
Education level			0.0001
No education	154(0.34)	508(1.13)	
Primary	3.823(9.95)	6.507(17.71)	
Secondary	12.860(30.72)	9.268(23.86)	
Higher	5.338(11.22)	2.520(5.07)	
Wealth index combined			0.0001
Poorest	1.586(2.76)	7.144(13.53)	
Poorer	3.115(6.49)	4.507(12.29)	
Middle	4.464(10.32)	3.392(10.08)	
Rich	5.712(13.94)	2.465(7.67)	
Richest	7.298(18.74)	1.295(4.18)	
Currently working			0.0048
No	9.723(23.04)	8.458(22.19)	
Yes	12.452(29.2)	10.345(25.57)	
Used anything or tried to delay or avoid getting pregnant			0.0001
No	7.739(16.99)	5.405(11.9)	
Yes, used outside calendar	1.897(4.21)	1.479(3.59)	
Used in calendar	12.539(31.04)	11.919(32.27)	
Current use by method type			0.0001
Not methods	12.426(27.91)	9.581(22.58)	
Traditional method	1.403(3.15)	796(1.96)	
Modern	8.346(21.18)	8.426(23.21)	
Knowledge of women get pregnant after birth and before period			0.0001
No	7.361(16.46)	7.169(16.96)	
Yes	14.814(35.78)	11.634(30.8)	
Current contraceptive method			0.0001
Not using	12.426(27.91)	9.581(22.58)	
Using	9.749(24.33)	9.222(25.17)	

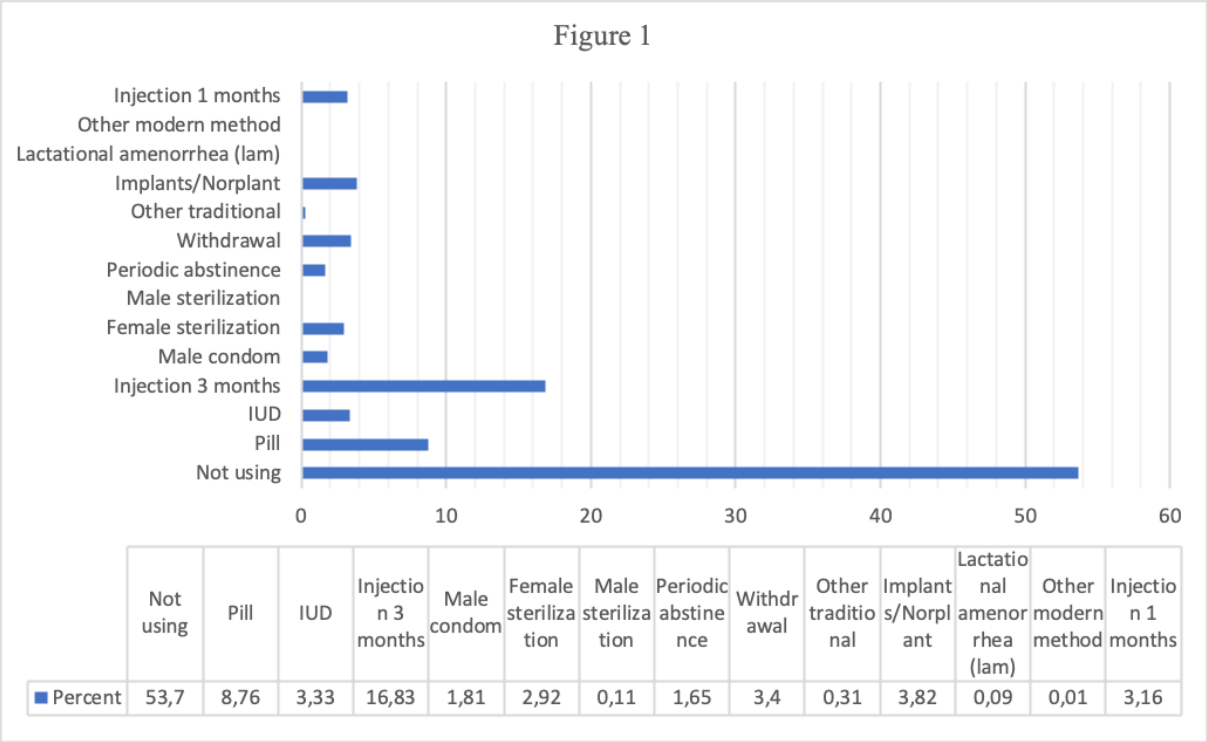
In both urban and rural environments, most women were aged 30–39 years. Notably, urban areas had a higher proportion of women aged 35–39 years (8.90%) than rural areas (7.94%). Similarly, women aged 15–19 years were slightly more prevalent in urban areas (6.41%) than in rural areas (5.31%) (p = 0.0006). Women currently in unions constituted 37.83% of the urban population and 38.57% of the rural population. Conversely, the percentage of women who had never been in a union, were widowed, or were divorced was higher in urban areas (14.41%) than in rural areas (9.18%) (p = 0.0001).

Furthermore, urban women demonstrated significantly higher educational attainment, with 11.22% having completed higher education compared with only 5.07% in rural areas. In contrast, rural areas had a larger proportion of women with no formal education (1.13%) and primary education (17.71%) than urban areas (0.34% and 9.95%, respectively) (p = 0.0001).

Next, the wealth index revealed substantial disparities, with urban women predominantly in the wealthiest category (18.74%) compared to rural women (4.18%). Conversely, rural women were more prevalent in the poorest category (13.53%) than urban women (2.76%) (p = 0.0001). Urban women were slightly more likely to be employed (29.20%) than rural women (25.57%), whereas the proportion of non-working women was similar between the two groups (p = 0.0048).

A higher percentage of urban women reported using any method to delay or prevent pregnancy (35.25%) than rural women (31.86%) (p = 0.0001). Among the methods, traditional contraceptives were more frequently used in urban areas (3.15%) than in rural areas (1.96%). In comparison, the use of modern contraceptives was nearly equivalent in both groups (21.18% in urban vs. 23.21% in rural areas) (p = 0.0001). Awareness of the possibility of becoming pregnant after childbirth, but before the first postpartum menstruation,

was more common among urban women (35.78%) than among rural women (30.80%). A slightly higher percentage of rural women lacked this knowledge (16.96%) compared to urban women (16.46%) (p = 0.0001). Current contraceptive use was similar between the urban (24.33%) and rural (25.17%) women. However, the percentage of women who did not use contraception was slightly higher in urban areas (27.91%) than in rural areas (22.58%) (p = 0.0001).



	Not using	Pill	IUD	Injection 3 months	Male condom	Female sterilization	Male sterilization	Periodic abstinence	Withdrawal	Other traditional	Implants/Norplant	Lactational amenorrhea (lam)	Other modern method	Injection 1 months
Percent	53,7	8,76	3,33	16,83	1,81	2,92	0,11	1,65	3,4	0,31	3,82	0,09	0,01	3,16

Figure 1. Percentage of current contraceptive method among women in Indonesia

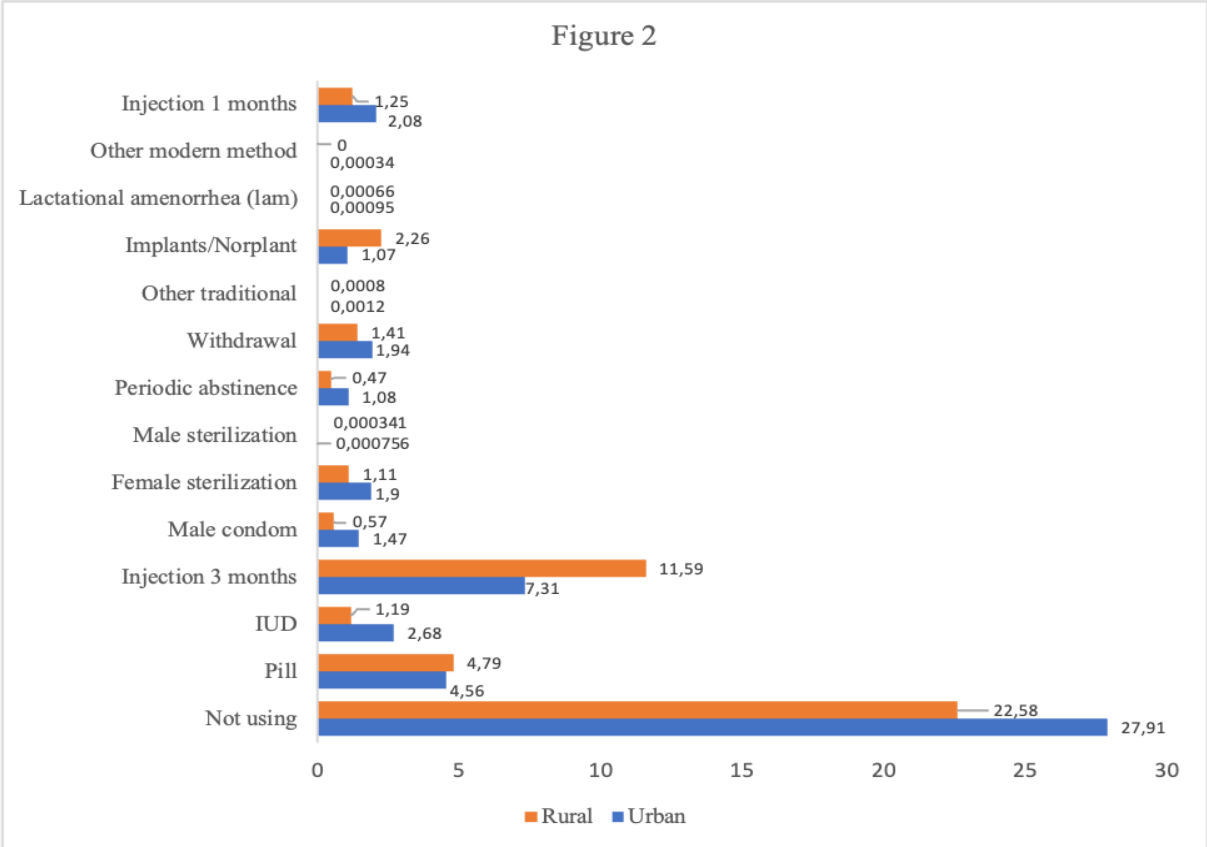


Figure 2. Percentage of current contraceptive method stratified by place of residence

Figure 1 illustrates the distribution of contraceptive methods currently used by women in Indonesia. A significant proportion (53.7%) of women reported not using any form of contraception. Among those who utilized contraceptive

methods, the 3-month injectable method was the most prevalent, chosen by 16.83% of women. Followed by intrauterine devices (IUD) at 8.76% and oral contraceptive pills at 3.31%. Traditional methods, such as withdrawal and periodic abstinence, are employed by a small fraction, at 0.31% and 1.65%, respectively. Male sterilization (0.11%) and female sterilization (2.92%) are among the least utilized methods. The use of male condoms is also relatively low, with only 1.81% of women reporting their use. Other modern methods, including the lactational amenorrhea method (LAM) and implants/non-implants, are used by 0.09% and 0.31% of women, respectively. The 1-month injectable was used by 3.16% of women, indicating that it is less common than the 3-month injectable. Overall, the data underscores a strong preference for injectable contraceptives, and a substantial proportion of women do not employ any contraceptive method.

Figure 2 provides a comprehensive analysis of the distribution of current contraceptive methods among women in Indonesia, differentiated by urban and rural residency. In urban areas, a higher proportion of women (27.91%) reported not using any contraceptive method than their rural counterparts (22.58%). The 3-month injectable contraceptive was identified as the most prevalent contraception method in both settings, with greater usage among urban women (11.59%) than among rural women (7.31%). Similarly, the 1-month injectable contraceptive was slightly more prevalent in urban areas (2.08%) than in rural areas (1.25%). In contrast, oral contraceptive pills were slightly more used in rural areas (4.79%) than in urban areas (4.56%). The intrauterine device (IUD) was more frequently used by urban women (2.68%) than by rural women (1.19%). Sterilization was infrequently practiced among both males and females, with a slightly higher percentage of urban women opting for female sterilization (1.10%) than rural women (0.47%).

Meanwhile, male sterilization was nearly nonexistent in both groups. Traditional methods such as withdrawal and periodic abstinence were slightly more common in urban areas (1.41% and 0.67%, respectively) than in rural areas (1.14% and 0.42%, respectively). Other modern methods, including implants and the lactational amenorrhea method (LAM), are rarely used, with urban women exhibiting slightly higher rates (0.31% and 0.09%, respectively). The use of male condoms was low in both urban and rural areas, but was slightly more prevalent among urban women (1.47%) than among rural women (0.57%).

Table 3. Multivariable logistic model examining factors associated with knowledge of women getting pregnant after birth and before their first postpartum period among women in Indonesia

Variables	AOR	95% CI
Age (years)		
15-19	1.00	-
20-24	1.24	1.12-1.38*
25-29	1.20	1.07-1.36*
30-34	1.24	1.09-1.40*
35-39	1.19	1.04-1.35*
40-44	1.26	1.10-1.43*
45-49	1.29	1.13-1.48*
Marital status		
Currently in union	1.00	-
Never in a union/widowed/divorced	0.88	0.80-0.96*
Education level		
No education	1.00	-
Primary	1.25	1.02-1.52*
Secondary	1.45	1.18-1.78*
Higher	1.41	1.13-1.75*
Wealth index combined		
Poorest	1.00	-
Poor	1.19	1.09-1.31*
Middle	1.29	1.17-1.42*
Rich	1.31	1.18-1.44*
Richest	1.35	1.21-1.50*
Type of residence		
Urban	1.00	-
Rural	0.91	0.83-0.98*
Currently working		
No	1.00	-
Yes	0.98	0.93-1.04
Used anything or tried to delay or avoid getting pregnant		
No	1.00	-
Yes, used outside calendar	1.17	1.04-1.30*
Used in calendar	1.27	1.15-1.40*
Current contraceptive method		
Not using	1.00	-
Using	0.97	0.89-1.06

Table 3 presents the findings of a multivariable logistic regression analysis examining the determinants of women's awareness regarding the potential for conception before their first postpartum period in Indonesia. Several significant relationships were identified ($p < 0.05$). First, the probability of understanding pregnancy timing increases with age. Women aged 20–24 were 1.24 times more likely to possess this knowledge than those aged 15–19 (AOR = 1.24; 95% CI: 1.12–1.38). Similarly, women in the age groups of 25–29 (AOR = 1.20; 95% CI: 1.07–1.36), 30–34 (AOR = 1.24; 95% CI: 1.09–1.40), 35–39 (AOR = 1.19; 95% CI: 1.04–1.35), 40–44 (AOR = 1.26; 95% CI: 1.10–1.43), and 45–49 (AOR = 1.29; 95% CI: 1.13–1.48) also exhibited significantly higher odds of having this knowledge compared to the youngest cohort. Women who were never married, widowed, or divorced were less likely to have this knowledge than those who were currently married (AOR = 0.88; 95% CI: 0.80–0.96). Furthermore, education level was strongly associated with knowledge. Women with primary education (AOR = 1.25; 95% CI: 1.02–1.52), secondary education (AOR = 1.45; 95% CI: 1.18–1.78), and higher education (AOR = 1.41; 95% CI: 1.13–1.75) were significantly more likely to be knowledgeable than those without formal education. Knowledge also increased with wealth status. Women in the poorest category served as the reference group, and those classified as poor (AOR = 1.19; 95% CI: 1.09–1.31), middle (AOR = 1.29; 95% CI: 1.17–1.42), rich (AOR = 1.31; 95% CI: 1.18–1.44), and richest (AOR = 1.35; 95% CI: 1.21–1.50) demonstrated progressively higher odds of knowledge.

Women residing in rural areas were less likely to have reproductive knowledge than those living in urban areas (AOR = 0.91; 95% CI: 0.83–0.98). Women who utilized contraceptive methods other than the calendar system (AOR = 1.17; 95% CI: 1.04–1.30) and employed calendar-based methods (AOR = 1.27; 95% CI: 1.15–1.40) had significantly higher odds of knowledge than those who did not use any method. No significant association was found between current contraceptive use and knowledge (AOR = 0.97; 95% CI: 0.89–1.06).

DISCUSSION

The findings in this study demonstrate that women's reproductive health knowledge is shaped by a combination of sociodemographic, economic, behavioral, and contextual

factors. These results highlight the importance of addressing multiple dimensions simultaneously to reduce disparities in reproductive health knowledge and prevent unintended pregnancies.

Sociodemographic and behavioral factors, including age group, marital status, and education level, were strongly associated with women's knowledge of postpartum fertility. Older women were more likely to understand the risk of pregnancy before the resumption of menstruation, which may reflect accumulated reproductive experience, greater exposure to health information, and more frequent interactions with healthcare services over the life course. Similar patterns have been reported in other low- and middle-income countries, where younger women, particularly adolescents, consistently demonstrate lower levels of reproductive health knowledge (Ahinkorah et al., 2020; Casey et al., 2020; Liang et al., 2019). This finding underscores the urgent need to strengthen age-appropriate reproductive health education for adolescents and young women.

The differences in reproductive knowledge between married and unmarried women further reflect the influence of cultural norms and social structures on access to reproductive health information. Women who were currently married demonstrated greater awareness than those who were never married, widowed, or divorced. In many cultural contexts, including Indonesia, reproductive health education and family planning services are often socially framed within marriage. Consequently, married women are more likely to receive information through antenatal care, postnatal services, and spousal communication. In contrast, unmarried women may have fewer opportunities to engage with health services or may perceive reproductive health information as less socially acceptable or immediately relevant (Chandra-Mouli & Akwara, 2020). These findings support calls for inclusive family planning programs that also target unmarried women to reduce knowledge gaps (Kantorová, Wheldon, Ueffing, & Dasgupta, 2020; Starrs et al., 2018). Education level was also strongly positively associated with reproductive knowledge. This finding is consistent with evidence that formal education enhances health literacy, comprehension of biological processes, and informed decision-making related to fertility and contraception (Maslowski, Reiss, Biswakarma, & Harper, 2023; Lwamba et al., 2022).

Economic factors, measured using the DHS wealth index, were significantly associated with women's understanding of postpartum pregnancy risk. Women in higher wealth quintiles demonstrated greater knowledge than those in lower wealth quintiles. Economic resources may improve access to healthcare services, family planning counseling, and health information through mass media and private healthcare providers. Conversely, women from economically disadvantaged households may experience financial barriers that limit their access to quality reproductive health services, thereby increasing vulnerability to misinformation and unintended pregnancies (Efendi, Sebayang, Astutik, Reisenhofer, & McKenna, 2023; K et al., 2024). Therefore, addressing economic inequalities is essential for achieving equitable reproductive health outcomes.

Type of residence was another critical contextual factor influencing reproductive health knowledge. Women living in rural areas were less likely to be aware of the risk of pregnancy before their first postpartum period compared to urban women. This disparity may be attributed to limited healthcare infrastructure, shortages of trained health professionals, and reduced exposure to health promotion campaigns in rural settings. Previous studies have similarly shown that rural populations face persistent barriers to accessing reproductive health information and services (Chen et al., 2019; Gizaw, Astale, & Kassie, 2022). Thus, to reduce urban–rural disparities, targeted strategies, such as mobile health clinics, community-based education, and strengthened primary healthcare systems are needed.

The next factor, employment status, although not significantly associated with reproductive knowledge in the adjusted analysis, remains an important contextual consideration. Employment may influence women's social interactions, autonomy, and access to information. However, employment alone does not necessarily guarantee exposure to accurate reproductive health education. This finding suggests that improvements in reproductive health knowledge require not only economic participation but also structured access to high-quality health information and counseling services.

A key behavioral factor associated with women's knowledge of postpartum fertility is contraceptive use. Women who reported using contraceptive methods, particularly calendar-based and non-calendar methods, were more likely to be knowledgeable about the risk of pregnancy before their first postpartum period. This association suggests that contact with family planning services provides opportunities for counseling and education on fertility awareness and reproductive physiology (Alano & Hanson, 2018; Pazol et al., 2018). However, the lack of a significant association between current contraceptive use and reproductive knowledge after adjustment indicates that contraceptive use alone does not ensure adequate understanding. This finding highlights the importance of comprehensive and consistent counseling across all contraceptive methods, particularly during antenatal and postpartum care (Armuand, Grandahl, Volgsten, & Stern, 2024; Ermias, Averbach, Dey, Gebrehanna, & Holt, 2023).

Overall, these findings have important implications for policy and practice. Reproductive health interventions should prioritize younger women, women with lower educational attainment, those residing in rural areas, and women from economically disadvantaged households. Strengthening access to education and health services in rural areas through community-based outreach, mobile health services, and capacity building for community nurses and primary healthcare workers can help reduce persistent knowledge gaps. Community nurses and public health practitioners play a critical role in integrating fertility awareness education into routine maternal and community health services, thereby supporting informed reproductive decision-making and preventing unintended pregnancies.

Nevertheless, this study has several limitations. First, the cross-sectional design limits the ability to establish causal relationships between the identified factors and women's knowledge of postpartum fertility. Second, the analysis relied on self-reported data, which may be subject to recall and social desirability bias. Third, although the DHS wealth index provides a robust measure of household economic status, it may not fully capture short-term financial fluctuations. Fourth, the study focused on reproductive knowledge rather than actual reproductive behaviors or decision-making processes. Despite these limitations, the use of a large, nationally representative dataset strengthens the generalizability of the findings.

CONCLUSION AND RECOMMENDATION

Women with high levels of education, greater economic resources, and those residing in urban areas demonstrated higher levels of awareness of the risk of pregnancy before their first postpartum period. In contrast, younger women, rural residents, and women from economically disadvantaged households were less informed of said risk. The observed urban–rural disparities highlight the need to strengthen the implementation of existing maternal and reproductive health policies to address geographic and socioeconomic barriers. Enhancing access to education and health services in rural areas can be achieved through expanded community-based reproductive health education, improved rural healthcare infrastructure, and increased availability of mobile health services. These approaches can help ensure that women in underserved areas receive accurate and timely information on fertility and pregnancy timing.

Education remains a critical factor in empowering women to make informed reproductive decisions, underscoring the importance of both formal and informal educational approaches. In addition, comprehensive counseling during antenatal, postnatal, and family planning services is essential to improve women's understanding of postpartum fertility. Thus, addressing socioeconomic and geographic inequalities is vital for improving reproductive health equity, reducing unintended pregnancies, and supporting Indonesia's progress toward the Sustainable Development Goals. Future research using longitudinal and qualitative designs is needed to assess the long-term effectiveness of targeted community-based educational interventions on women's reproductive health knowledge.

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