

Associations Between Maternal Age, Age at First Marriage, Marital Duration, and Long-Acting Contraceptive Method Choice

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ABSTRACT

Background: Indonesia is currently facing a significant trend of early marriage, ranking 10th globally in child marriage rates. Long-acting and permanent contraceptive methods (LAPMs), including intrauterine devices (IUDs), implants, and female sterilization/tubectomy, are important options for spacing or limiting pregnancy. However, evidence from primary healthcare remains limited.

Subjects and Method: A cross-sectional study was conducted involving 60 participants at primary care facilities in Surakarta, Indonesia, from September to October 2025. Respondents were recruited using non-probability, namely total sampling, over two months. Minimal sample size count using central limit theorem (CLT). The outcome variable was LAPM type (tubectomy, IUD, or implant). The independent variables were current maternal age, age at first marriage, and marital duration. Statistical analysis included univariate, bivariate (Chi-square and Fisher-Freeman-Halton exact tests), and multinomial logistic regression.

Results: Most respondents were aged ≥ 35 years (50.0%), first married between 20 and 24 years of age (48.3%), had been married for ≥ 10 years (66.7%), and used an IUD (68.3%). Bivariate analysis showed no statistically significant association between LAPM type and maternal age ($p=0.526$), age at first marriage (exact $p=0.123$), or marital duration ($p=0.460$). In the multivariate model, age at first marriage was significantly associated with LAPM choice after adjustment for maternal age and marital duration ($p=0.030$), but for category-specific comparisons, none of the age-at-first-marriage categories showed a statistically significant association with tubectomy or implant use compared with IUD use. Maternal age and marital duration were not significant variables.

Conclusion: Age at first marriage showed a statistically significant contribution to the overall multinomial model after adjustment. However, because none of the category-specific adjusted estimates were statistically significant and the sample size was limited, these findings should be interpreted cautiously.

Keywords: age at first marriage, maternal age, long-acting contraceptives,

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BACKGROUND

Maternal and neonatal outcomes are fundamentally rooted in the biological readiness and reproductive health of women. Factors like reproductive readiness, pregnancy timing, and family planning have crucial impacts for both of mother and child. Nevertheless, contemporary data from the Indonesian Ministry of Population and Family Development (known as *Kementerian Kependudukan dan Pembangunan Keluarga* or BKKBN) reveals a troubling trend in early-age marriages, defined as unions involving woman under the age of 20 (Indonesian Ministry of Population and Family Development, 2017). According to UNICEF (2020), Indonesia reported approximately 1.22 million instances of child marriage, ranking it 10th globally in terms of absolute volume. This situation leads to a demographic shift in Indonesia, threatening long-term socio-economic equilibrium and national public health indicators.

The onset of early marriage typically precedes the attainment of comprehensive psychological and emotional maturity. Prevailing scientific discourse suggests that women under 20 often lack the cognitive-emotional resilience necessary to navigate the complex pressures of marital life, ranging from fiscal stability to the physiological rigors of gestation and the cognitive demands in raising child (Indonesian Ministry of Population and Family Development, 2017). Literature generally identifies the 20–24 age bracket as the optimal window for marriage, balancing biological peak with psychological readiness. In contrast, unions occurring after age 25 are categorized as delayed marriages, a phenomenon often propelled by higher educational attainment. While such delays may bolster socio-economic status, they simultaneously introduce unique reproductive health variables, particularly regarding the

timing of primiparity and the clinical management of interbirth intervals through contraceptive intervention (UNICEF, 2023).

To counter the prevalence of early marriage, the Indonesian government has intensified the National Family Planning Program (*Program Keluarga Berencana*) as a cornerstone strategic intervention. This program is designed to mitigate the multi-sectoral risks in marriage, focusing specifically on curbing early pregnancies, mitigating stunting, and encouraging healthy birth spacing. Within the primary health-care ecosystem, the Community Health Center (*Puskesmas*) serves information and support for voluntary contraceptive choice. These facilities offer a diverse spectrum of modern contraceptives, including short-term hormonal options like injectables and oral pills, alongside Long-Acting Reversible Contraceptives (LARCs) such as Intra-uterine Devices (IUDs) and subdermal implants, and also final contraceptive like tubectomy for woman and vasectomy for man.

Yet, the widespread availability of these services has not yet secured universal coverage. Data from Family Data Update (Indonesian Ministry of Population and Family Development, 2025) indicates that the national unmet need for contraception persists at 11.1% (7.9% for limiting births and 3.2% for spacing). This statistic underscores a glaring discrepancy in healthcare utilization: roughly one in nine married women desire to manage their fertility but remain clinically unprotected.

Previous studies have focused on the use of LARCs and factors influencing it, such as current age, parity, and socioeconomic conditions (Tefas et al., 2022; Harfiz et al., 2019; Sambah et al., 2022). Other studies have been conducted about the use of long-term and permanent contraceptive

methods (LAPMs), including IUDs, implants, and tubectomy, as well as factors influencing them, such as knowledge, views and beliefs, availability of services, and husband's support (Mesfin and Kibret, 2016; and Demeke et al., 2020). Other studies have described factors influencing the decision to use contraception without specifying the type of contraception chosen (Purwanti and Latifah, 2025). Research related to the relationship of maternal age at first marriage, age at marriage, and maternal age at the time of the study with decision-making using LAPMs has not been widely explored. Therefore, this study aimed to analyze the association of maternal age, age at first marriage and marital duration with the specific LAPM chosen among women attending public health centers in Surakarta.

SUBJECTS AND METHOD

1. Study Design

This study employed an analytical observational with a cross-sectional design. The research population comprised patients seeking long-acting and permanent contraceptive method (LAPMs) services at Public Health Centers (*Puskesmas*) within the Surakarta from September to October 2025.

2. Population and Sample

Population in this study was woman at productive age that come to public health care at Surakarta to use or control for long-acting contraceptive. A non-probability sampling, namely total sampling, was utilized, in which participants were selected as sample if they met the inclusion criteria over the two-month study period. Minimum sample size was determined using central limit theorem (CLT). By the end of study period, total sample of 60 was reached.

3. Study Variables

This part consists of dependent and independent variables under study. All independent variables were measured on an ordinal scale and dependent variable was measured on a nominal scale. The independent variables included maternal age at the time of contraceptive initiation, age at first marriage, and marital duration. The outcome variable is type of long-acting and permanent contraceptive method (LAPMs), including tubectomy, Intrauterine Devices (IUDs) and implants.

4. Operational Definition of Variables

Maternal age was defined as the respondent's age, which categorized into three level based on risk of maternal birth: young maternal age (<20 years old), optimal maternal age (20-35 years old), advanced maternal age (≥ 35 years old).

Age at first marriage was defined as respondent's age when she entered first marriage, classified into three levels: early marriage (<20 years), optimal (20–24 years), and delayed marriage (>25 years).

Marital duration was calculated as the difference between current age and age at first, classified into three levels: early (<5 years), intermediate (5–10 years), and longer (≥ 10 years).

Long-Acting and Permanent Contraceptive Method (LAPM) was type of long-acting and permanent contraceptive method used by the participant, categorized as intrauterine devices (IUDs), implant, or tubectomy based on family planning records. This dependent variable is nominal scale.

5. Study Instruments

The research instrument included an online questionnaire (using the Google Forms website) containing name, age, contact information, type of contraception (LAPM), specific location of the community health center, age at first marriage, and marital

duration. Participants completed the questionnaire with the researcher's assistance during their primary health care visit. The questionnaire was completed only once.

6. Data Analysis

Data was conducted with independent variables is ordinal categoric scale and dependent variable is nominal categoric scale. For this type of scale, normality test is not necessary. Statistical analysis was conducted through univariate (descriptive) methods, bivariate analysis using the Chi-square test followed by Fisher-Freeman-Halton exact test, and multivariate analysis by multinomial logistic regression.

7. Research Ethic

Research ethical issues including informed consent, anonymity, and confidentiality,

were addressed carefully during the study process. Ethical clearance was obtained from the Research Ethics Committee of the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada (Ref. No: KE/FK/1280/EC/2025) on August 8, 2025.

RESULTS

1. Sample Characteristics

Under 60 respondents collected by using total sampling dominated by women aged ≥35 years (50.0%), women who first married at 20-24 years (48.3%), women with marital duration ≥10 years (66.7%), and IUD users (68.3%). The following are the descriptive data (Table 1).

Table 1. Characteristics of Respondents

Characteristics	Frequency	Percentage
Age when research was conducted		
< 20 years old	1	1.6
20-35 years old	29	48.3
≥ 35 years old	30	50
Age at first Marriage		
< 20 years old	10	16.7
20-24 years old	29	48.3
≥ 25 years old	21	35
Marital Duration		
<5 years	6	10
5-10 years	14	23.3
≥ 10 years	40	66.7
LAPM		
Tubectomy	11	18.3
IUD	41	68.3
Implants	8	13.3

2. Bivariate Analysis

The statistical analysis was initiated with a bivariate examination using the Chi-square test. Because cells with an expected frequency of less than five in more than 20% of the distribution, the Fisher-Freeman-Halton exact test was subsequently employed to maintain analytical rigor. Bivariate analysis using exact testing

showed no statistically significant association between LAPM type and current maternal age (p= 0.526), age at first marriage (p=0.123), or marital duration (p= 0.460) (table 2). Although the p-values were not significant, the pattern remains clinically relevant for counseling because the majority of respondents were older, had longer marital duration, and chose IUDs.

The non-significant bivariate findings should be interpreted with caution because several categories had small cell counts,

particularly respondents aged <20 years and implant users.

Table 2. Bivariate analysis

Variable	p
Recent age	0.526
Age at first marriage	0.123
Marital duration	0.460

3. Multilevel Logistic Regression Analysis

Despite the lack of bivariate significance, the study proceeded with multinomial logistic regression to evaluate the independent influence of each predictor while controlling for potential confounding factors. This multivariate approach aimed to isolate the true effect of current age on the choice of contraception. The model demonstrated a robust goodness-of-fit, as evidenced by the Pearson test ($p = 0.903$) and the deviance test ($p = 0.827$). Furthermore, the Nagelkerke R-square was 41.6% of variance explained, indicating that the remaining 68.2% is influenced by external factors not captured in this study. The external variables that were not measured in this study include parity, number of living children, education, socioeconomic status, perceived side effects, previous

contraceptive experience, partner support, and counseling quality (Tefas et al., 2022; Harfiz et al., 2019; Sambah et al., 2022; Mesfin and Kibret, 2016; and Demeke et al., 2020).

The likelihood-ratio test suggested that age at first marriage contributed to the overall multinomial model ($p = 0.030$); however, none of the category-specific adjusted estimates reached statistical significance (Table 3). Therefore, this finding should be interpreted with caution. This pattern suggests that age at first marriage may act as an independent marker of reproductive trajectory or fertility intention. However, because the bivariate association was not significant and the sample was small, the finding should not be interpreted as evidence of a strong causal relationship.

Table 3. Multinomial Logistic Regression Analysis of Factors Associated with LAPM Choice

Outcome Comparison	Independent variable	aOR	95% CI		p
			Lower Limit	Upper Limit	
Tubectomy vs IUD	Maternal age <20 years vs ≥ 35 years	0.14	Not Estimable		
	Maternal age 20–35 years vs ≥ 35 years	0.27	0.05	1.50	0.134
	Age at first marriage <20 years vs ≥ 25 years	3.22	0.33	31.32	0.313
	Age at first marriage 20–24 years vs ≥ 25 years	2.65	0.46	15.35	0.276
	Marital duration <5 years vs ≥ 10 years	5.50×10^{-8}	Not Estimable		0.998

Outcome Comparison	Independent variable	aOR	95% CI		p
			Lower Limit	Upper Limit	
Implant vs IUD	Marital duration 5–10 years vs ≥10 years	1.37	0.18	10.70	0.765
	Maternal age <20 years vs ≥35 years	4.73 × 10 ⁻¹⁰	Not Estimable		
	Maternal age 20–35 years vs ≥35 years	0.23	0.02	2.43	0.220
	Age at first marriage <20 years vs ≥25 years	9,84 × 10 ⁷	Not Estimable		0.995
	Age at first marriage 20–24 years vs ≥25 years	9,38 × 10 ⁷	Not Estimable		0.995
	Marital duration <5 years vs ≥10 years	18.58	0.78	440.92	0.071
	Marital duration 5–10 years vs ≥10 years	2.91	0.11	59.77	0.489

Table 4 presents the results of the multinomial logistic regression analysis. By the likelihood-ratio test, there is a significant relationship between age at first marriage and the type of LAPM use after adjusting for other variables. This relates to the age at marriage variable, which is influenced by current age and age at first marriage. However, the AOR values have wide confidence intervals or cannot be estimated, so the category-specific multivariable estimates should be interpreted with caution.

DISCUSSION

This study examined whether current maternal age, age at first marriage, and marital duration were associated with the type of LAPM chosen by women attending public health centers in Surakarta. The descriptive findings showed that IUDs were the most commonly used LAPM, while implants and tubectomy were less frequently selected. The statistical analysis revealed that the age of the respondents at the time of the study did not significantly correlate with their choice of LAPM in either bivariate or multivariate analysis. This finding should not be interpreted as

evidence that age is clinically unimportant. Age remains central to reproductive counselling because fertility intentions and pregnancy risks change across the reproductive life course. Women aged under 20 years are frequently associated with biological and emotional immaturity, particularly regarding uterine readiness for gestation. Conversely, the age range of 20 to 35 years is considered the optimal window for pregnancy and childbirth; however, during this period, birth spacing is highly recommended to safeguard both maternal and neonatal health (Tiyas et al., 2025). This is supported by another study conducted by Demeke et al. (2020), which shows that increasing age is accompanied by an increase in the percentage of LAPM use.

As women transition beyond 35 years of age, uterine conditions are often no longer optimal, posing higher risks that require intensive obstetric intervention if pregnancy occurs. Consequently, women in this age group are generally advised to prioritize pregnancy prevention. Fundamentally, the demand for contraception within a marriage is closely linked to age-related reproductive goals, whether the objective is to delay, space, or limit further

pregnancies. The selection of a specific contraceptive method is therefore a multifaceted decision, influenced by maternal age and long-term fertility intentions. This is also supported by previous research conducted by Zeleke (2022), which found that maternal age influences the decision to use LAPM. However, this influence is not the primary determinant, as other factors such as knowledge, husband's support, health services, and socioeconomic conditions also influence it.

The lack of significance in certain age groups may also be attributed to an uneven sample distribution, such as the limited representation of participants under 19 years old (only 1 sample). In fact, younger people will prefer to use short-acting contraception due to their desire and opportunity to have children in the future (Sambah et al, 2022). Beyond age, other determinants significantly influence contraceptive behavior, including parity, educational attainment, and healthcare literacy. Families characterized by high parity often exhibit a tendency to utilize long-acting contraception (Gayatri, 2022.). Moreover, Indonesia's patriarchal culture remains a decisive factor, where decisions frequently rest with the husband as the head of the household. Therefore, family support and male involvement are essential for women intending to use contraception (Tiyas et al., 2025; Purwanti and Latifah, 2025).

Age at first marriage did not show a statistically significant crude association with LAPM choice in bivariate analysis ($p = 0.123$). However, the likelihood-ratio test in the multinomial logistic regression model suggested that age at first marriage contributed to the overall model after adjustment for maternal age and marital duration. This finding should not be interpreted as evidence that a specific age-at-first-marriage category was significantly more

likely to choose tubectomy or implant compared with IUD, because none of the category-specific adjusted estimates reached statistical significance. Limited data likely also contributes to wide confidence intervals and non-estimable parameters in category-specific estimates. This discrepancy suggests an independent interaction effect after adjusting for other variables. Essentially, these results do not indicate a relationship between whether earlier or later age of marriage is associated with the use of long-acting and permanent contraception. Women who marry younger (<20 years) tend to have an extended reproductive period and reach their desired parity sooner. Research by Ibrahim and Rufus (2023) identifies early marriage as a pivotal predictor for contraceptive use due to the prolonged duration of pregnancy risk exposure. On the other hand, early age at first marriage correlates with limited education and knowledge about the essentials of using contraception. This is supported by previous research in Jember, where of 107 women who married at an early age, 51 chose not to use contraception (Handini et al., 2021).

In contrast, both bivariate and multivariate analyses for marital duration yielded non-significant results. From a biological and physiological perspective, this suggests that the demand for specific contraceptive methods is governed more by other factors than by the chronological length of a marriage. Marital duration might give opportunity for pregnancy, but the actual decision to use LAPM is more closely linked to the attainment of desired parity and the physiological risks associated with advanced maternal age. As a woman approaches the latter stages of her reproductive lifespan, the increase in follicular-stimulating hormone (FSH) and the decline in oocyte quality often prompt a shift

toward more reliable, long-term contraceptive methods to avoid high-risk pregnancies, regardless of how long she has been married and influenced her to use contraceptives (Tesfa, 2022). Other factors like reproductive milestones achieved during marriage, including parity, number of living children, prior contraceptive experience, and desire for additional children, are key determinants of long-acting and permanent contraceptive use (Gayatri, 2022). Furthermore, research by Harzif et al. (2019) in similar socio-demographic settings demonstrated that marital duration often loses its influence when adjusted for age and parity, as the biological drive to limit fertility becomes the primary motivator once the intended number of children is reached. Consequently, the non-significance in this study reinforces the notion that contraceptive behavior is a response to biological readiness and reproductive goals rather than a mere function of marital time. Therefore, marital duration should be viewed as an indirect variable rather than a direct determinant of contraceptive method selection.

The limitation of this study is the small sample size and uneven distribution of participants across several variables. Some bivariate cross-tabulations had expected cell counts below five, requiring exact testing. However, the multinomial logistic regression model demonstrated a robust goodness-of-fit, indicating that the model explains 31.8% of the variance in contraceptive selection. This implies that the remaining 68.2% is influenced by external factors not captured in this model, such as socioeconomic status or specific partner preferences. Future studies with larger and more balanced samples should include additional variables such as parity, number of living children, fertility intention, knowledge, husband support, and

counseling exposure to clarify the mechanism between age at first marriage and long-acting and permanent contraceptive method (LAPMs) choice.

AUTHOR CONTRIBUTION

Syah Rini Wisdayanti: Conceptualization, Data Collection and Analysis, Data Review, Writing-Original Draft, Supervision; Betsyeba Panjaitan: Data Collection and Analysis, Data Review, Writing-Original Draft, Graphical Work, Writing-Review and Editing, Methodology. All authors have approved the final version of the manuscript.

CONFLICT OF INTEREST

This research has no conflicting interest.

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