
Factors Associated With Female Sterilization Use Among Women Of Reproductive Age In Central Java, Indonesia

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Abstract. The use of effective contraception can help prevent unplanned pregnancies and support the health of mothers and families. This study aimed to analyze factors associated with female sterilization use among women of reproductive age in Central Java, Indonesia. A cross-sectional study design was employed using secondary data from the 2023 Indonesian Health Survey (SKI). Bivariate analysis was conducted, followed by logistic regression to identify factors associated with female sterilization use. Multivariate analysis showed that maternal age, parity, family planning counseling, and delivery method were significantly associated with female sterilization use ($p < 0.05$). The odds ratios (OR) were 7.426 (95% CI: 5.280–10.444) for parity, 2.828 (95% CI: 1.941–4.119) for maternal age, 2.046 (95% CI: 1.315–3.183) for family planning counseling, and 22.531 (95% CI: 14.811–34.273) for delivery method. Delivery method had the highest OR. Female sterilization use was associated with maternal age, parity, family planning counseling, and delivery method. Comprehensive family planning counseling is essential to support informed contraceptive decision-making in accordance with women's reproductive goals.

Keywords: Female sterilization, Maternal age, Parity, Family planning counselling, Delivery method

INTRODUCTION

Family planning is a vital component of reproductive health services, enabling women and couples to determine the number and spacing of pregnancies according to their reproductive needs. The use of effective contraception can help prevent unplanned pregnancies and support the health of mothers and families (1,2). In practice, women have a range of contraceptive options, spanning from short-term methods to long-acting and permanent ones. The choice of method depends not only on contraceptive effectiveness but is also influenced by individual characteristics, reproductive status, access to services, and the woman's health condition (3).

One of the permanent contraceptive methods available to women is female sterilization (MOW). This procedure involves sealing, cutting, or blocking the fallopian tubes, thereby preventing the meeting of the egg and sperm (2). As a permanent contraceptive method, MOW is highly effective and does not

require adherence to a periodic usage regimen. However, its permanent nature means that the decision to use MOW differs from the decision to use reversible contraceptive methods (4). Women need to consider their desire to have more children, the number of children they already have, their age, their health status, and information regarding contraceptive alternatives before choosing a method. In Indonesia, the use of female sterilization remains relatively low compared to other contraceptive methods. According to the 2023 Indonesia Health Profile, female sterilization (MOW) is used by approximately 4.1% of modern contraceptive users, whereas the most widely used method is the injectable (35.3%), followed by the pill (13.2%), implants (10.5%), and the IUD (8.9%). This pattern indicates that contraceptive use in Indonesia is still dominated by short-term methods rather than long-term contraceptive methods, including female sterilization (5). This indicates that female sterilization remains a relatively limited contraceptive option in Indonesia.

The choice of female sterilization can be influenced by various characteristics of the woman. Factors such as age and reproductive history—specifically the number of children she already has—are considerations in determining whether she desires future pregnancies. Additionally, health status can influence the suitability and selection of a contraceptive method. Through its Medical Eligibility Criteria for Contraceptive Use, the WHO emphasizes that selecting a contraceptive method requires consideration of the user's medical conditions, physiological characteristics, and individual needs (6). Social factors and access to healthcare services can also influence the choice of contraceptive methods. Differences in place of residence may be linked to access to service facilities and health information, as well as the availability of contraceptive methods. Meanwhile, family planning counseling plays a role in helping women obtain information about various contraceptive options and select a method that suits their specific circumstances and preferences. Recent WHO guidelines increasingly emphasize a family planning service approach centered on individual needs and choices (7).

However, most research on contraceptive choice in Indonesia still focuses on general contraceptive use or long-acting contraceptive methods as a whole. There remains a need for research that specifically identifies factors associated with the use of female sterilization among women of reproductive age using nationally representative data. An analysis of demographic, reproductive, social, healthcare service, and health-related characteristics can provide a more comprehensive picture of the group of women who undergo female sterilization in Indonesia. Based on this context, this study aims to analyze the factors associated with the use of female sterilization among women of reproductive age in Central Java, Indonesia; utilizing data from the 2023 Indonesian Health Survey (SKI).

METHODS

Study Design and Data Sources

This study employed a quantitative, cross-sectional design using secondary data from the 2023 Indonesian Health Survey (SKI). It focused on women of reproductive age in Central Java Province to analyze factors associated with the use of female sterilization—specifically, the Female Operative Method (MOW). The initial dataset comprised 17,529 respondents. Subsequently, a selection and data cleaning process was conducted based on study criteria and the completeness of data for the variables under analysis. Following this process, a final sample of 1,861 respondents was obtained for the study.

Population and Sample

The study population consisted of women of reproductive age in Central Java Province who were included in the 2023 SKI. The study sample was selected from this dataset based on established inclusion and exclusion criteria. The inclusion criteria were women of reproductive age residing in Central Java Province who were included in the 2023 SKI and for whom information regarding contraceptive use and the variables under analysis was available. The exclusion criteria applied to

respondents with incomplete or missing data for the dependent or independent variables used in the study. Respondents who did not meet these criteria were excluded from the analysis. Following the selection and data cleaning processes, 1,861 respondents out of the initial 17,529 were found to meet the criteria and were included in the study analysis.

Research Variables

This study employs 10 variables, consisting of one dependent variable and nine independent variables. The dependent variable is the use of female sterilization (MOW), categorized into "sterilized" and "non-sterilized." The "sterilized" category represents respondents who underwent female sterilization, while the "non-sterilized" category includes respondents using contraceptive methods other than sterilization as well as those not using any contraception. The nine independent variables analyzed are maternal age, parity, place of residence, family planning counseling, place of delivery, mode of delivery, and history of diabetes mellitus, hypertension, and heart disease.

Variable Coding

Contraceptive use was coded as 1 = non-sterilization and 2 = female sterilization. Maternal age was categorized as 1 = 14–19 years, 2 = 20–35 years, and 3 = ≥ 36 years. Parity was categorized as 1 = 0 children, 2 = 1–2 children, 3 = 3–4 children, and 4 = ≥ 5 children. Delivery method was categorized as 1 = normal and 2 = cesarean delivery, while contraceptive counselling was categorized as 1 = no and 2 = yes. The variables of place of residence, place of delivery, and history of diabetes mellitus, hypertension, and heart disease were categorized based on the definitions and coding used in the 2023 SKI data utilized in this study.

Data Analysis

Data analysis was conducted in stages, comprising univariate, bivariate, and multivariate analyses. Univariate analysis was used to describe the distribution of respondent characteristics across all study variables. Categorical variables are presented as frequencies (n) and percentages (%). Bivariate analysis was performed to examine the relationship between each independent variable and the use of female sterilization. This analysis utilized crosstabulation and the Chi-square test. A p-value of <0.05 was set as the threshold for statistical significance. Multivariate analysis was conducted using binary logistic regression to identify factors associated with the use of female sterilization while simultaneously considering all independent variables. Results are presented as Odds Ratios (OR), 95% Confidence Intervals (95% CI), and p-values. A p-value of <0.05 was considered indicative of a statistically significant relationship.

Research Ethics

This study utilizes secondary data from the 2023 SKI, obtained in accordance with applicable procedures and regulations regarding data usage. The analyzed data does not contain respondents' personal identities; thus, respondent confidentiality and anonymity are maintained. The collection of the 2023 SKI data was conducted with ethical approval (reference number LB.02.01.I/KE/L/287/2023, dated May 10, 2023) from the Research Ethics Committee (KEPK) of Poltekkes Jakarta II.

RESULT

This study utilized data from 1,861 women of reproductive age in Central Java Province, Indonesia, who met the inclusion and exclusion criteria. Univariate analysis was conducted to describe the frequency distributions and percentages of the dependent and independent variables, which included female sterilization use, maternal age, parity, place of residence, family planning counseling, place of delivery, mode of delivery, and history of diabetes mellitus, hypertension, and heart disease. The distribution of each study variable is presented in Table 1.

Table 1. Characteristics of study variables among women of reproductive age in Central Java, Indonesia (n= 1,861)

Variable	Category	Frequency	%
Contraceptive Use	Non-sterilization	1595	85,7
	Female sterilization	266	14,3
Maternal age	14-19 years	5	0,3
	20-35 years	1226	65,9
	≥36 years	630	33,9
Parity	0 children	14	0,8
	1-2 children	1270	68,2
	3-4 children	539	29,0
	≥5 children	38	2,0
Place of residence	Rural	386	20,7
	Urban	1475	79,3
Contraceptive counselling	No	444	23,9
	Yes	1417	76,1
Place of delivery	Home	17	0,9
	Doctor or midwifery's clinic	386	20,7
	Puskesmas or polindes	328	17,6
	Hospital	1130	60,7
Delivery method	Normal	1212	65,1
	Caesarean delivery	649	34,9
History of diabetes mellitus	No	1853	99,6
	Yes	8	0,4
History of heart disease	No	1854	99,6
	Yes	7	0,4
History of hypertension	No	1762	94,7
	Yes	99	5,3

This study involved 1,861 women of reproductive age in Central Java who met the study criteria. As shown in Table 1, the majority of respondents belonged to the non-sterilization group (85.7%), while 14.3% had undergone sterilization. Regarding age characteristics, the majority of respondents were aged 20–35 years (65.9%), followed by the group aged ≥36 years (33.9%), whereas respondents aged 14–19 years accounted for only 0.3%. Regarding parity, the majority of respondents had 1–2 children (68.2%), followed by those with 3–4 children (29.0%). Respondents with no children accounted for 0.8%, while those with ≥5 children accounted for 2.0%. Most respondents lived in urban areas (79.3%), whereas 20.7% lived in rural areas.

Regarding contraceptive counseling, 76.1% of respondents had received such counseling, while 23.9% had not. In terms of the place of delivery, the majority of respondents gave birth in hospitals (60.7%), followed by clinics/midwives/doctors (20.7%) and community health centers/village maternity posts (17.6%), while home births accounted for 0.9%. Most respondents underwent a normal delivery (65.1%), whereas 34.9% underwent a caesarean delivery. Regarding medical history, almost all respondents had no history of diabetes mellitus (99.6%) or heart disease (99.6%). Meanwhile, 94.7% of respondents had no history of hypertension, and 5.3% had a history of hypertension.

Bivariate analysis was conducted to identify the relationship between each independent variable and the use of female sterilization among women of reproductive age in Central Java. The independent variables analyzed included maternal age, parity, place of residence, family planning counseling, place of delivery, method of delivery, and history of diabetes mellitus, hypertension, and heart disease. The relationship between the independent variables and the use of female sterilization was analyzed using the Chi-square test via crosstabulation. The results of the bivariate analysis are presented in Table 2.

Table 2. Association between study variables and female sterilization use among women of reproductive age in Central Java, Indonesia (n = 1,861)

Variable	Category	Non-sterilization n (%)	Female sterilization n (%)	p-value
Maternal age	14-19 years	5 (0.3)	0 (0.0)	0,001 ^a
	20-35 years	1153 (62.0)	73 (3.9)	
	≥36 years	437 (23.5)	193 (10.4)	
Parity	0 children	13 (0.7)	1 (0.1)	0,001 ^a
	1-2 children	1220 (65.6)	50 (2.7)	
	3-4 children	336 (18.1)	203 (10.9)	
	≥5 children	26 (1.4)	12 (0.6)	
Place of residence	Rural	336 (18.1)	50 (2.7)	0,398
	Urban	1259 (67.7)	216 (11.6)	
Contraceptive counselling	No	403 (21.7)	41 (2.2)	0,001
	Yes	1192 (64.1)	225 (12.1)	
Place of delivery	Home	17 (0.9)	0 (0.0)	0,001 ^a
	Doctor or midwifery's clinic	369 (19.8)	17 (0.9)	
	Puskesmas or polindes	316 (17.0)	12 (0.6)	
	Hospital	893 (48.0)	237 (12.7)	
Delivery method	Normal	1172 (63.0)	40 (2.1)	0,001
	Caesarean delivery	423 (22.7)	226 (12.1)	
History of diabetes mellitus	No	1592 (85.5)	261 (14.0)	0,002 ^a
	Yes	3 (0.2)	5 (0.3)	
History of heart disease	No	1590 (85.4)	264 (14.2)	0,264 ^a
	Yes	5 (0.3)	2 (0.1)	
History of hypertension	No	1534 (82.4)	228 (12.3)	0,001
	Yes	61 (3.3)	38 (2.0)	

^a Fisher-Freeman-Halton exact test**Note:** p-values were obtained using Pearson's Chi-square test or Fisher-Freeman-Halton exact test, as appropriate.

Bivariate analysis was conducted to examine the associations between maternal characteristics, contraceptive and delivery service factors, and medical history with the use of female sterilization. The results showed that maternal age, parity, family planning counseling, place of delivery, mode of delivery, history of diabetes mellitus, and history of hypertension were significantly associated with the use of female sterilization ($p < 0.05$). Conversely, place of residence and history of heart disease did not show a significant association with the use of female sterilization ($p > 0.05$).

Regarding age groups, the proportion of female sterilization use was higher among respondents aged 36 years or older compared to younger age groups. In terms of parity, the use of female sterilization also tended to be higher among respondents with a greater number of children. Respondents who received family planning counseling showed a higher proportion of sterilization use compared to those who did not receive such counseling. Based on the place of delivery, the highest proportion of female sterilization use was observed among respondents who gave birth in a hospital. Sterilization use was also higher among respondents who underwent a Caesarean section compared to those who had a normal delivery. Based on medical history, the proportion of female sterilization use was higher among respondents with a history of diabetes mellitus and hypertension compared to those without such a history. Meanwhile, the proportion of sterilization use among respondents with and without a history of heart disease did not show a statistically significant difference.

Multivariate analysis was conducted to identify factors independently associated with the use of female sterilization, while simultaneously accounting for the influence of other independent variables. The analysis employed binary logistic regression, with female sterilization—categorized as either non-

sterilization or sterilization—serving as the dependent variable. Based on the bivariate analysis results, seven variables were included in the multivariate analysis: maternal age, parity, family planning counseling, place of delivery, mode of delivery, history of diabetes mellitus, and history of hypertension. Conversely, place of residence and history of heart disease were excluded from the multivariate model. The logistic regression results are presented as Odds Ratios (OR), 95% Confidence Intervals (95% CI), and p-values.

Table 3. Factors Associated with Female Sterilization Use among Women of Reproductive Age in Central Java, Indonesia

Variable	OR	95% CI	p-value
Maternal age	2,828	1,941 – 4,119	<0,001
Parity	7,426	5,280 – 10,444	<0,001
Contraceptive counselling	2,046	1,315 -3,183	0,001
Delivery method	22,531	14,811 – 34,273	<0,001

Note: OR = Odds Ratio; CI = Confidence Interval.

Multivariate analysis was performed using logistic regression with a stepwise selection method. Variables failing to meet the modeling criteria were progressively excluded, resulting in a final model comprising four variables: maternal age, parity, family planning counseling, and method of delivery. The multivariate analysis results indicated that maternal age, parity, family planning counseling, and method of delivery were significantly associated with the choice of permanent contraception ($p < 0.05$). In the final model, maternal age had an OR of 2.828 (95% CI: 1.941–4.119; $p < 0.001$), parity had an OR of 7.426 (95% CI: 5.280–10.444; $p < 0.001$), family planning counseling had an OR of 2.046 (95% CI: 1.315–3.183; $p = 0.001$), and method of delivery had an OR of 22.531 (95% CI: 14.811–34.273; $p < 0.001$). Based on the OR values, method of delivery was the variable with the highest OR in the final model, followed by parity, maternal age, and family planning counseling.

DISCUSSION

Multivariate analysis results indicate that maternal age, parity, family planning counseling, and mode of delivery are significantly associated with the choice of female sterilization. These four variables remained in the final model following multivariate modeling, demonstrating that maternal characteristics, reproductive history, the provision of contraceptive information, and delivery conditions are factors associated with the selection of postpartum sterilization.

Maternal age shows a significant association with the choice of female sterilization as a contraceptive method. Mothers in older age groups are more likely to choose sterilization compared to the reference age group. Advancing age may be linked to changing reproductive goals, particularly when a mother has reached her desired family size and is considering ending her reproductive years. Furthermore, concerns regarding pregnancy risks at an older age can influence the decision to use permanent contraception. These findings align with the study by Uaamnuichai et al. (2023), which found an association between age and the use of postpartum sterilization. Women aged 40–44 years had 2.70 times higher odds of choosing sterilization compared to women aged 20–24 years after adjusting for several factors. Women in their third, fourth, and fifth pregnancies also exhibited higher odds, and cesarean delivery was associated with approximately 5.87 times higher odds of sterilization compared to vaginal delivery (8).

Parity is one of the factors strongly associated with the choice of female sterilization in this study. Mothers with higher parity are more likely to opt for permanent contraception. This tendency may be linked to having reached the number of children considered ideal by the mother or the couple, thereby increasing the need to prevent future pregnancies. As the number of children increases, the decision to use a permanent contraceptive method becomes a viable option for achieving the family's reproductive goals. These findings are consistent with the study by Uaamnuichai et al. (2023), which showed that women in their third, fourth, and fifth pregnancies had higher odds of choosing sterilization compared

to those in their second pregnancy (8). ACOG notes that the choice of female sterilization is more common among women of high parity and explains that sterilization performed immediately after vaginal delivery or during a cesarean section is technically advantageous. ACOG also recommends comprehensive, accurate, and unbiased counseling based on shared decision-making (9). Research on obstetrician-gynecologist counseling for the choice of female sterilization found that parity is a key factor considered by physicians when recommending the procedure. The study also emphasized the importance of unbiased counseling that respects patients' reproductive decisions (10).

Family planning counseling also shows a significant association with the choice of female sterilization. Counseling provides mothers with the opportunity to obtain information regarding the effectiveness, benefits, risks, permanence, and alternative contraceptive methods before making a decision. Adequate information helps mothers understand the consequences of using permanent contraception and align this choice with their reproductive goals. Research on decision aids for tubal sterilization decisions conducted by Borrero et al. (2024) highlights the importance of decision support in helping women consider sterilization options (11).

The relationship between counseling and the choice of female sterilization as a contraceptive method must also be understood within the framework of informed decision-making. ACOG recommends that contraceptive counseling be comprehensive, accurate, unbiased, and centered on shared decision-making, taking into account the patient's values, preferences, and reproductive goals. Counseling regarding sterilization must also explain the permanent nature of the procedure, the associated risks and benefits, and available contraceptive alternatives. Thus, the aim of counseling is not to steer the woman toward a specific method, but to ensure that the decision made is an informed one that aligns with her reproductive needs.

The method of delivery was the variable with the highest odds ratio in the study's final model. This result indicates a strong association between the method of delivery and the choice of sterilization as a contraceptive method. One plausible explanation is that the timing of sterilization is more easily integrated with specific delivery procedures—particularly cesarean sections—as the sterilization procedure can be performed concurrently with the delivery itself. ACOG notes that the immediate postpartum period following vaginal delivery, as well as the time of a cesarean section, represents a technically advantageous window for performing postpartum sterilization (9).

These findings align with the study by Uaamnuichai et al. (2023), which found that women who delivered via cesarean section had 5.87 times higher odds of undergoing sterilization compared to those who delivered vaginally, after adjusting for various factors (8). Those researchers also identified age and parity as additional factors associated with the use of postpartum sterilization. However, the odds ratio (OR) for the delivery method in the present study—reaching 22.531—was higher than that observed in the previous study. One possible explanation is that sterilization can be performed concurrently with a Caesarean section, whereas a vaginal delivery requires a separate procedure, potentially leading to obstacles regarding the intervention itself and facility availability. Differences in the strength of the association may be attributed to population characteristics, the distribution of variable categories, healthcare service characteristics, and variations in variable definitions and measurement methods across studies. Therefore, these results should be understood as indicating a strong statistical association rather than a causal relationship.

Overall, the study results indicate that the choice of female sterilization is associated with age, parity, contraceptive counseling, and the mode of delivery. The mode of delivery showed the highest odds ratio (OR) in the final model, while parity also demonstrated a strong association with the choice of sterilization. These findings underscore the importance of providing contraceptive counseling starting during pregnancy and continuing into the postpartum period. Counseling must be delivered continuously, providing comprehensive information on all contraceptive options while respecting the mother's decision based on her reproductive goals. This approach aligns with the principles of shared decision-making and patient autonomy in contraceptive care.

CONCLUSION

The study results indicate that maternal age, parity, family planning counseling, and the method of delivery are significantly associated with the choice of female sterilization in Central Java. The method of delivery was the factor with the highest odds ratio in the multivariate model (22.531), followed by parity (7.426), maternal age (2.828), and family planning counseling (2.046). These findings suggest that maternal characteristics, reproductive history, the provision of contraceptive information, and the method of delivery should be taken into account in the choice of female sterilization. Comprehensive and continuous family planning counseling—spanning from pregnancy through the postpartum period—is essential to support informed contraceptive decision-making that aligns with the mother's reproductive goals.

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