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Original Article

Determinants of intrauterine device use among reproductive-age women in a province implementing Islamic Sharia law in Indonesia: An application of the theory of planned behavior

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Abstract

The utilization of the intrauterine device (IUD) in Indonesia remains low at 3.9%, despite its high effectiveness (99.4%) and designation as a national family planning priority, suggesting the presence of psychosocial barriers influencing contraceptive behavior among women of reproductive age. This study aimed to analyze psychosocial factors influencing IUD use behavior based on the theory of planned behavior, including attitudes, subjective norms, perceived behavioral control, actual behavioral control, and intention, in Banda Aceh—the only province in Indonesia implementing holistic Sharia law. A quantitative cross-sectional study was conducted among women of reproductive age from six urban public health centers using cluster random sampling. Data were collected through face-to-face interviews using a structured TPB-based questionnaire validated for reliability. Statistical analyses included linear regression and binary logistic regression with a significance level set at $p<0.05$. A total of 442 women were included in the final analysis. Attitude toward IUD use, subjective norms, and perceived behavioral control were all significantly associated with intention to use an IUD; all had $p<0.001$. Attitudes toward IUD use (B=0.410; $p<0.001$; $R^2=0.213$), subjective norms (B=0.552; $p<0.001$; $R^2=0.413$), perceived behavioral control (B=0.273; $p<0.001$; $R^2=0.255$), and actual behavioral control (B=0.273; $p<0.001$; $R^2=0.255$) were all significantly associated with IUD use behavior. Intention to use an IUD emerged as the strongest predictor of IUD use behavior (B=0.780; $p<0.001$; $R^2=0.566$). Intention to use an IUD emerged as the strongest predictor of IUD use behavior (B=0.78; $p<0.001$; $R^2=0.56$). This study highlights that all intentions were shaped by positive attitudes, strong subjective norms, and a high level of behavioral control. Efforts to increase IUD use should therefore focus on educational interventions, strengthening partner and social support, and improving the accessibility and quality of long-acting contraceptive services.

Keywords: Family planning, intrauterine device, contraceptive behavior, psychosocial factor, theory of planned behavior

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Introduction

Contraception plays a central role in reproductive health and population health strategies worldwide. Effective contraceptive use enables women and couples to plan and space pregnancies, reduce unintended births, and lower the risk of maternal and infant morbidity and mortality [1]. Modern contraceptive methods include short-acting methods (such as oral contraceptives and injectables), long-acting reversible contraceptives such as intrauterine devices (IUDs) and implants, as well as permanent methods [1,2]. Despite its high effectiveness, with an efficacy rate of approximately 99.4% [3,4], patterns of contraceptive use vary substantially across populations and settings.

The utilization of IUDs is influenced by individual perceptions, social support, and access to healthcare services [3,5]. Positive attitudes toward IUD use are generally shaped by adequate knowledge regarding its effectiveness and safety, whereas misconceptions and myths often lead to negative attitudes that hinder its adoption [5,6]. Subjective norms, particularly support from spouses, family members, and sociocultural or religious leaders, also play a critical role in shaping women's contraceptive choices [7,8]. Additionally, perceived behavioral control, such as confidence in undergoing the insertion procedure and perceived accessibility of services, has been shown to strengthen intention to use IUDs [3,7].

IUD utilization in Indonesia remains low at approximately 3.9%, significantly lower than in several other Asian countries [9]. Barriers include limited knowledge, negative perceptions, fear of side effects, and insufficient availability of trained healthcare providers [9]. In Banda Aceh City, the capital city of Aceh Province, IUD use remains low at 7.71%, while short-term methods such as injectable contraceptives and oral pills dominate contraceptive practices, highlighting a gap between national family planning policies and community preferences [10]. Aceh has a distinct sociolegal context within Indonesia. Under its special autonomy framework, Aceh is formally mandated to implement Islamic Sharia through provincial regulations (*qanun*). Although family planning is not prohibited under Islamic law, contraceptive decision-making is strongly influenced by religious interpretations, the authority of religious leaders, and prevailing community norms regarding reproductive roles. Long-acting reversible contraceptives, such as IUDs, may be perceived as less acceptable due to beliefs concerning religious permissibility and concerns about interference with fertility. This context is important for interpreting family planning behaviors, as community norms, perceived social expectations, and perceived behavioral control related to contraceptive decisions, including IUD uptake, may be shaped by the province's distinctive religious and regulatory environment.

The use of IUD represents a planned health behavior that can be systematically explained through the theory of planned behavior (TPB), developed by Ajzen [5]. TPB posits that behavior is primarily determined by attitude toward behavior, subjective norms, and perceived behavioral control, with intention serving as the most immediate predictor of action. This framework has been widely applied in reproductive health research to identify psychosocial factors influencing contraceptive decision-making [3,5]. TPB further emphasizes the role of actual behavioral control, referring to objective factors that facilitate or obstruct behavior execution, including the availability of services, provider competence, cost, and healthcare system support [11,12]. Even strong intentions may not translate into behavior when structural barriers persist.

Given these contextual and theoretical considerations, this study aimed to analyze the determinants of IUD use behavior among women of reproductive age in Banda Aceh using the TPB. By elucidating the relative contributions of attitudes, subjective norms, and perceived behavioral control within Aceh's distinctive socioreligious and health system context, findings are expected to provide evidence-based insights to support the development of more effective strategies for promoting long-acting contraceptive methods, particularly IUDs, in Aceh.

Methods

Study design and setting

This study employed an analytical cross-sectional design to assess determinants of IUD utilization among women of reproductive age using the TPB framework. The design was selected

to assess the associations between psychosocial constructs such as attitudes, subjective norms, perceived behavioral control, and intention, as well as current IUD use within a defined population at a single point in time. The study was conducted at public primary healthcare centers (*Puskesmas*) from October 27 to November 24, 2025, in Banda Aceh, Indonesia. Banda Aceh is an urban area with access to primary and secondary healthcare facilities, including community health centers (*Puskesmas*) and hospitals that provide family planning services. The study population comprised women of reproductive age residing in Banda Aceh who were eligible for family planning services. Data collection was conducted across selected health service areas within the city.

Participants and criteria

Women were eligible for inclusion if they were aged 15–49 years, had resided in Banda Aceh for at least six months prior to the study, were married or had been married in accordance with national family planning service eligibility, were not pregnant at the time of data collection, and provided written informed consent to participate. Women were excluded from the study if they reported or had documented medical contraindications to IUD use, had undergone permanent contraception, were unable to complete the interview due to cognitive impairment, severe cognitive illness, or communication difficulties.

Sample size and sampling strategy

The study population comprised women of reproductive age who were contraceptive users in Banda Aceh (n=43,029). A minimum sample size of 396 respondents was required based on calculations using the Slovin formula with a 5% margin of error. Cluster random sampling was applied by classifying *Puskesmas* into high, moderate, and low IUD coverage clusters, followed by random cluster selection. Participants were recruited from selected *Puskesmas* and community settings within the study area during the data collection period.

Data collection procedure

Data were collected through face-to-face interviews using a structured questionnaire. Interviews were conducted by trained data collectors to ensure consistency in questionnaire administration and to minimize information bias. Prior to data collection, the research team provided standardized training to interviewers regarding study objectives, interview techniques, ethical considerations, and questionnaire content. Eligible participants were approached in selected *Puskesmas,* and informed consent was obtained before the interview. Each interview was conducted in a private setting to maintain confidentiality and encourage honest responses. Completed questionnaires were checked on-site for completeness and accuracy before data entry and analysis.

Data collection and measurements

The IUD use behavior was assessed as the real contraceptive practice of women of reproductive age in using an IUD. This variable was measured by asking respondents whether they were currently using an IUD at the time of data collection. Responses were recorded dichotomously as “yes” or “no” and treated as an ordinal variable for analysis.

The TPB constructs assessed in this study consist of attitude toward IUD use, subjective norms regarding IUD use, perceived behavioral control related to IUD use, intention to use an IUD, and actual behavior control among women of reproductive age. All TPB constructs were measured using five-point Likert-scale items ranging from “strongly disagree” to “strongly agree,” scored from 1 to 5. Attitude toward IUD use was assessed using five items, yielding a possible score range of 5 to 25. Subjective norms were measured using six items with a total score range of 6 to 30. Perceived behavioral control was assessed using seven items, with possible scores ranging from 7 to 35. Intention to use an IUD was measured using four items, producing scores ranging from 4 to 20. Actual behavior control was measured using eight items and assessed based on the proportion of affirmative responses, reflecting respondents’ current contraceptive behavior. Higher scores for these constructs indicated more favorable attitudes, stronger perceived social support, greater perceived behavioral control, and stronger intention to use an IUD.

Other variables

Sociodemographic characteristics were also collected using the structured questionnaire. Age was assessed through self-report and categorized according to the Indonesian Ministry of Health guideline on age classification, including early reproductive age (18–20 years), early young adulthood (20–24 years), young adulthood (25–29 years), early middle adulthood (30–34 years), middle adulthood (35–39 years), late middle adulthood (40–44 years), and perimenopausal age (45–49 years). Educational level was measured based on the highest formal education completed by the respondent and categorized as primary school or equivalent, junior secondary school or equivalent, senior secondary school or equivalent, and diploma or bachelor's degree. Employment status was assessed by asking respondents about their main income-generating activity and categorized as housewife, civil servant, trader, or private-sector employee. Reproductive and socioeconomic characteristics were also recorded. The number of living children was measured as a ratio-scale variable based on the total number of children reported by the respondent. Monthly household income was assessed through self-reported average family income and classified into below or above the Banda Aceh per capita poverty line for 2024 (IDR 872,944).

Study instrument

The instrument assessing the data sociodemographic, five main TPB constructs, and IUD use behavior among women of reproductive age. Prior to data collection, the questionnaire underwent expert judgment by five experts to evaluate content validity and clarity of the items. A pilot test was subsequently conducted among 18 women with similar characteristics to the target population at *Puskesmas* Kuta Alam. Construct validity was assessed using Spearman's rank correlation by correlating individual item scores with the total score of each construct. Items were considered valid if the correlation coefficient was equal to or greater than the critical value at a 5% significance level ($p<0.05$). With 18 pilot respondents, the critical correlation value was 0.468. All items across the attitude, subjective norm, perceived behavioral control, intention, and IUD use behavior constructs demonstrated positive and statistically significant correlations, indicating acceptable validity. Reliability was assessed using Cronbach's alpha to evaluate internal consistency within each construct. A Cronbach's alpha value of 0.70 or higher was considered indicative of satisfactory reliability. All TPB constructs demonstrated Cronbach's alpha values exceeding this threshold (ranging from 0.752 for attitude to 0.927 for perceived behavioral control), indicating good internal consistency and reliability of the measurement instrument.

Statistical analysis

Descriptive statistics were used to summarize respondents' sociodemographic characteristics and study variables. A linear regression analysis was performed to examine predictors of intention to use an IUD. Binary logistic regression analysis was applied to identify determinants of IUD use behavior. All statistical tests were two-sided, and statistical significance was defined as $p<0.05$. Data were analyzed using SPSS Statistics software (IBM, New York, USA).

Results

Participant characteristics

A total of 449 women of reproductive age were interviewed from six public *Puskesmas* in Banda Aceh between 27 October and 24 November 2025. After data cleaning, seven respondents were excluded due to ineligibility or incomplete questionnaires, resulting in a final analytic sample of 442 respondents. The characteristics of respondents are presented in **Table 1**. Most respondents were aged 30–39 years (56.34%), were housewives (88.46%), and had completed senior high school education (53.62%). The majority had two to three children (69.23%) and were categorized as having income below the poverty line (73.53%). Overall, 82.35% of respondents used contraception, with injectable contraception being the most common method (25.34%), followed by IUDs (24.21%) (**Table 1**).

Table 1. Characteristics of women of reproductive age included in the study (n=442)

Characteristics	Frequency	Percentage
Age group (year)		
18–20 (early reproductive age)	0	0.00
20–24 (early young adulthood)	17	3.85
25–29 (young adulthood)	60	13.57
30–34 (early middle adulthood)	110	24.89
35–39 (middle adulthood)	139	31.45
40–44 (late middle adulthood)	76	17.19
45–49 (perimenopausal age)	40	9.05
Occupation		
Housewife	391	88.46
Civil servant	26	5.88
Trader	13	2.94
Private sector employee	12	2.71
Highest educational attainment		
Primary school	17	3.85
Junior high school	49	11.09
Senior high school	237	53.62
Diploma/bachelor's degree	139	31.45
Parity		
1	63	14.25
2	173	39.14
3	133	30.09
4	60	13.57
5	11	2.49
6	2	0.45
Per capita income		
Below the poverty line (<IDR 872.944)	325	73.53
Above the poverty line (≥IDR 872.944)	117	26.47
Contraceptive use		
Yes	364	82.35
No	78	17.65
Current contraceptive method		
Injectable contraception	112	25.34
Intrauterine device (IUD)	107	24.21
Oral contraceptive pills	59	13.35
Implant	49	11.09
Condom	37	8.37
None	78	17.65
Duration of IUD use		
<1 year	19	17.76
1 year	16	14.95
2 years	22	20.56
3 years	16	14.95
4 years	11	10.28
5 years	13	12.15
≥6 years	10	9.35

Factors associated with intention to use an intrauterine device (IUD)

The results of linear regression analyses examining psychosocial factors associated with intention to use an IUD among women of reproductive age are presented in **Table 2**. Attitude toward IUD use was significantly associated with intention to use an IUD (B=0.613, p<0.001), explaining 26.2% of the variance in intention (R^2=0.262). This finding indicates that women who held more favorable attitudes toward IUDs were more likely to express a stronger intention to adopt this contraceptive method.

Subjective norms demonstrated the strongest association with intention to use an IUD (B=0.704, p<0.001), accounting for 49.2% of the variance (R^2=0.492), suggesting that perceived social expectations and influences play a substantial role in shaping contraceptive intentions. Perceived behavioral control also had a strong association with intention to use an IUD (B=0.576, p<0.001), explaining 58.7% of the variance in intention (R^2=0.587). Together, these findings

highlight the central role of TPB constructs—attitude, subjective norms, and perceived behavioral control—in determining women's intention to use an IUD, indicating the importance of addressing both individual perceptions and social influences in interventions aimed at improving IUD uptake.

Table 2. Factors associated with intention to use an intrauterine device (IUD) among women of reproductive age (n=442)

Independent variable	Dependent variable	B	*p*-value*	R^2
Attitude toward IUD use	Intention to IUD use	0.613	<0.001	0.262
Subjective norms	Intention to IUD use	0.704	0.000	0.492
Perceived behavioral control	Intention to IUD use	0.576	0.000	0.587

*Analyzed using the linear regression test

Factors associated with intrauterine device (IUD) use behavior

The results of logistic regression analyses examining factors associated with IUD use behavior among women of reproductive age are presented in **Table 3**. Attitude toward IUD use was significantly associated with IUD use behavior (B=0.410, p<0.001), explaining 21.3% of the variance (R^2=0.213). Subjective norms regarding IUD use showed a stronger association with IUD use behavior (B=0.552, p<0.001) and accounted for 41.3% of the variance (R^2=0.413), indicating the important influence of social expectations and normative pressures on contraceptive behavior.

Perceived behavioral control was also significantly associated with IUD use behavior (B=0.273, p<0.001), explaining 25.5% of the variance (R^2=0.255) (**Table 3**). A similar magnitude of association was observed for actual behavioral control (B=0.273, p<0.001; R^2=0.255), suggesting that both perceived and objective capacities to use contraception contribute to behavioral adoption (**Table 3**). Collectively, these findings indicate that attitude, subjective norms, and actual behavior control function as important underlying contributors to IUD use.

The association between intention to use an IUD and IUD use behavior was further examined using a logistic regression test. Intention to use an IUD showed a strong and statistically significant association with IUD use behavior (B=0.780, p<0.001), accounting for 56.2% of the variance in actual use (R^2=0.562) (**Table 3**). This finding indicates that women with a stronger intention to use an IUD were substantially more likely to report actual IUD utilization. This result is consistent with the theoretical framework in which intention functions as a proximal determinant of behavior, mediating the effects of underlying psychosocial factors on contraceptive uptake.

Table 3. Factors associated with intrauterine device (IUD) use behavior among women of reproductive age (n=442)

Independent variable	Dependent variable	B	*p*-value*	R^2
Attitude toward IUD use	IUD use behavior	0.410	<0.001	0.213
Subjective norms regarding IUD use	IUD use behavior	0.552	<0.001	0.413
Perceived behavioral control	IUD use behavior	0.273	<0.001	0.255
Actual behavioral control	IUD use behavior	0.273	<0.001	0.255
Intention to IUD use	IUD use behavior	0.780	<0.001	0.562

*Analyzed using a logistic regression test

Structural model and total effects

All paths in the TPB structural model were statistically significant (p<0.000). Intention had the strongest direct effect on IUD use behavior, while subjective norms demonstrated the largest total effect when combining direct and indirect pathways through intention. Overall, the TPB model explained 56.20% of the variance in IUD use behavior, confirming that intention acts as a key mediator linking psychosocial determinants to actual contraceptive use behavior (**Figure 1**).

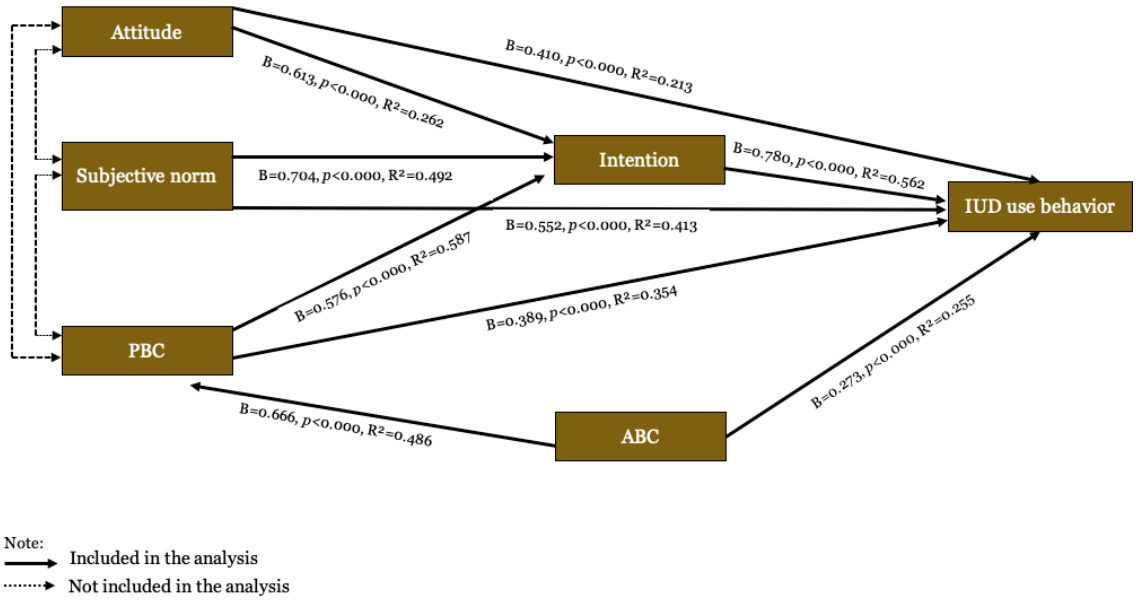

Figure 1. Path model illustrating the direct and indirect effects of attitudes, subjective norms, perceived behavioral control (PBC), intention, and actual behavioral control (ABC) on intrauterine device (IUD) use behavior among women of reproductive age in Banda Aceh using the theory of planned behavior (TPB). The findings indicate the presence of two complementary behavioral pathways: (1) a cognitive–motivational pathway operating through intention; and (2) a normative–compliance pathway driven by strong subjective norms, including influencer-mediated social pressure.

Discussion

This study provides empirical evidence on the determinants of IUD use among women of reproductive age in Banda Aceh by applying the TPB framework. The findings demonstrate that intention is the strongest direct predictor of IUD use behavior. At the same time, attitudes, subjective norms, and perceived behavioral control influence contraceptive behavior both directly and indirectly through intention. In the present study, the sociodemographic data are comparable to previous studies [13-21].

Our study confirmed that attitude toward IUD use demonstrated a positive and significant influence on intention and indirectly on IUD use behavior, confirming the theoretical framework of the TPB [5]. This finding is consistent with prior studies indicating that favorable evaluations of contraceptive effectiveness, safety, and convenience strengthen behavioral intention [18,20]. The mechanism underlying this relationship can be explained through expectancy–value theory, where attitudes emerge from beliefs about outcomes and the subjective valuation of those outcomes [19]. In this present study, attitudes were shaped by beliefs regarding IUD effectiveness, non-interference with breastfeeding, weight neutrality, and economic efficiency. These beliefs collectively formed a favorable evaluative framework that increased readiness to use IUDs. Importantly, the influence of attitude was predominantly mediated by intention, rather than exerting a direct effect on IUD use behavior (**Figure 1**). This pattern aligns with findings by a previous study, which demonstrated that attitude influences contraceptive behavior primarily through intention [20]. Thus, attitude functions as a cognitive precursor that requires motivational translation before behavioral realization.

Subjective norms emerged as the most influential determinant of both intention and IUD use behavior, exhibiting the strongest total effect among TPB constructs. This finding highlights the centrality of social influence in contraceptive decision-making within collectivistic cultural contexts such as Banda Aceh. The dominance of subjective norms suggests that perceived expectations and approval from significant others, particularly husbands, family members, community leaders, and healthcare providers, carry greater behavioral weight than individual evaluations of benefits or risks. This is consistent with a previous study that identified subjective norms as the strongest predictor of long-term contraceptive intention, surpassing attitude and perceived behavioral control [13]. In addition, the total effect analysis indicated that subjective

norms may influence IUD use behavior both indirectly through intention and directly, bypassing the intentional pathway (**Figure 1**). This phenomenon suggests that when normative pressure is sufficiently strong, individuals may adopt behavior in response to social expectations without a fully formed personal intention. In such cases, compliance-driven behavior replaces deliberative intention-driven behavior. Furthermore, the role of media exposure and influencers appears to strengthen this pathway. As demonstrated by a previous study, access to media and social support significantly shapes contraceptive planning [21]. In the digital era, influencers, particularly healthcare professionals and public figures, function as normative authorities who legitimize behaviors and accelerate social acceptance. Their influence amplifies subjective norms by creating perceived social consensus, thereby reducing the cognitive burden of individual decision-making. Therefore, subjective norms in this study reflect a hybrid influence system, combining digital normative reinforcement through media exposure [21] with traditional social authority, such as family planning counseling [22]. This dual mechanism explains why subjective norms exert the largest total effect and why behavior adoption may occur even in the absence of strong individual intention.

Perceived behavioral control demonstrated a strong effect on intention and a moderate direct effect on IUD use behavior. This pattern indicates that women's confidence in their ability to access IUD services and manage potential barriers plays a crucial role in shaping readiness to act. The stronger influence of perceived behavioral control on intention compared to IUD use behavior aligns with TPB assumptions, which recognize that perceived capability does not guarantee behavioral execution in the presence of external constraints [23]. This finding is consistent with a previous study that reported that perceived behavioral control significantly predicts both intention and use of long-acting reversible contraception, particularly when supported by healthcare system facilitation [24].

Our study found that actual behavior control exerted a significant direct effect on IUD use behavior, highlighting the importance of objective structural conditions. Actual behavior control encompasses tangible facilitators such as service availability, accessibility, administrative simplicity, and partner support, which are critical for translating intention into action [5,25]. This finding corroborates evidence from previous research that demonstrated that structural barriers can prevent behavior realization despite strong intention [26]. The distinction between perceived and actual control highlights the necessity of addressing systemic barriers alongside psychosocial determinants.

Intention emerged as the strongest proximal predictor of IUD use behavior, explaining more than half of behavioral variance. This result reinforces the central premise of TPB that intention serves as the immediate antecedent of action [11]. The consistency of this finding with previous evidence [13] further validates the model across cultural contexts. However, the presence of strong normative and structural influences suggests that intention operates within a broader system of social and contextual forces, rather than as an isolated determinant.

Our total effect analysis reveals a structured and hierarchical influence pattern within the TPB model. The findings indicate the existence of two complementary behavioral pathways: (1) a cognitive–motivational pathway mediated by intention; and (2) a normative–compliance pathway driven by strong subjective norms, including influencer-mediated social pressure (**Figure 1**). This dual-pathway model provides a nuanced explanation for contraceptive behavior in collectivistic and digitally connected societies, where social validation can directly trigger behavior adoption without prolonged intentional deliberation.

Some limitations of this study should be acknowledged. The cross-sectional design precludes causal inference between TPB constructs and IUD use. The contraceptive behaviors and psychosocial variables were self-reported, which may be subject to recall and social desirability bias, particularly in a sociocultural context where reproductive decisions are sensitive. Although the study was conducted across multiple primary healthcare centers, the urban focus on Banda Aceh may limit generalizability to rural settings or other provinces with different sociocultural and health system contexts. In addition, unmeasured factors such as partner attitudes, provider-level influences, and service quality were not directly assessed and may have contributed to residual confounding.

Conclusion

This study confirms that the TPB effectively explains the determinants of IUD use among women of reproductive age in Banda Aceh. Attitude, subjective norms, perceived behavioral control, actual behavioral control, and intention all have a significant influence on IUD use behavior. Positive attitudes and supportive social norms strengthen women's intention to use IUDs, while perceived and actual behavioral control facilitate the translation of intention into actual use. Intention emerges as the key mediator linking psychosocial and structural factors to contraceptive behavior. These findings indicate that increasing IUD utilization requires integrated interventions that enhance positive attitudes, strengthen social support, and improve access to family planning services.

Ethics approval

Ethical approval was granted by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Syiah Kuala (258/EA/FK/2025). The study adhered to ethical principles of autonomy, beneficence, non-maleficence, and justice, with confidentiality maintained throughout the research process. All respondents provided written informed consent before participating in the study.

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Competing interests

The authors declare no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization, or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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