E-ISSN: 2987-209X
International Journal of Midwifery and Health Sciences
Vol. 4, Issue 2 (2026), October

Effectiveness and Side Effects of Natural and Modern Contraceptive Methods Review

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Submission date: 22-09-2026; Date of received: 21-10-2026

Abstract

Family planning enables couples to regulate childbirth and improve reproductive health. This systematic literature review compares the effectiveness and side effects of natural and modern contraceptive methods among multiparous families in Indonesia. The review followed the PRISMA guidelines. Literature searches were conducted using Google Scholar with the keywords "natural contraception," "modern contraception," "multiparity," "effectiveness," and "side effects". Nineteen articles published between 2015 and 2025 were analyzed. Findings indicate that modern contraceptive methods such as intrauterine devices (IUDs), implants, injections, pills, and surgical procedures have higher effectiveness rates (98–99%) compared to natural methods including the calendar, cervical mucus, and withdrawal techniques (70–95%). However, modern methods are often associated with minor side effects, such as menstrual irregularities, weight changes, and mood fluctuations, while serious complications are rare. Natural methods are generally free from physical side effects but carry a higher failure rate if not practiced consistently. Social, cultural, and economic factors strongly influence contraceptive choice among multiparous families. Although modern contraception is more effective, stigma, misinformation, and limited accessibility continue to hinder optimal utilization. Further large-scale analytical studies are required to assess long-term safety and to identify contextual factors that influence contraceptive decision-making in Indonesia.

Keywords: contraceptive, effectiveness, modern contraception, multiparity, natural contraception, side effects

Introduction

The Indonesian Family Planning (KB) Program, launched in 1970, was designed to help individuals and couples regulate childbirth and improve reproductive health outcomes, and has contributed substantially to reductions in national birth rates[1]. Despite the wide range of available contraceptive options, multiparous families—defined as women who have given birth two or more times—often face complex decisions in selecting methods that balance effectiveness, safety, and longterm suitability. Variations in contraceptive performance, inconsistent adherence to natural methods, and potential side effects associated with modern contraception create ongoing challenges in reproductive health management. Previous research categorizes contraception into natural (KBA) and modern methods, each with distinct mechanisms, benefits, and limitations. Natural KBA methods—including fertility awareness, basal body temperature tracking, cervical mucus monitoring, sympto-thermal approaches, and coitus interruptus—enable birth spacing without tools or chemicals[2]. In contrast, modern methods such as injections, pills, condoms, intrauterine devices (IUDs), implants, and sterilization procedures (female or male) offer varying durations of protection and clinical effectiveness. Empirical studies highlight that method selection is shaped by socioeconomic status[3], partner dynamics, and parity[4], while national data reveal a strong preference for non-LARC options, with injectable contraceptives remaining the most widely used at 52.9%, followed by pills (20.5%), IUDs (8.5%), and implants (7.3%)[5]. However, existing studies often examine individual contraceptive methods rather than comparing natural and modern approaches comprehensively within the specific context of multiparous families. Many investigations also emphasize clinical efficacy without fully integrating sociocultural influences, such as stigma, misconceptions, and accessibility barriers, which shape real-world decision-making. Furthermore, while natural methods are frequently perceived as safer, their higher failure rates in practice are rarely analyzed alongside behavioral determinants like user consistency or knowledge accuracy. These gaps indicate the need for a systematic and

integrative review that synthesizes effectiveness, side effects, and contextual factors in a single analytical framework. Therefore, this systematic literature review aims to consolidate and critically analyze recent findings on the effectiveness and side effects of natural and modern contraceptive methods among multiparous families. By integrating clinical data with socio behavioral determinants, this study seeks to contribute an evidence-based foundation for improving contraceptive counseling, strengthening reproductive health education, and informing the development of more context appropriate family planning policies in Indonesia. The insights derived from this review are expected to guide future research and support the formulation of interventions that enhance safe, effective, and informed contraceptive use.

Method

This research employed a systematic literature review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. A comprehensive literature search was conducted across three electronic databases: ScienceDirect, PubMed, and Google Scholar from September 2015 to Januari 2025. The search strategy utilized Boolean operators combining the following keywords: ("natural contraception" OR "fertility awareness methods") AND ("modern contraception" OR "contraceptive methods") AND ("multiparous" OR "multiparity" OR "multiple pregnancies") AND ("effectiveness" OR "efficacy") AND ("side effects" OR "adverse effects"). Studies were included if they: (1) written in English and Bahasa Indonesia, (2) were published in peer-reviewed journals, (3) focused on contraceptive methods in the context of multiparous families, (4) reported on effectiveness and/or side effects of natural and/or modern contraception, (5) were accessible in full text, and (6) contained original research data relevant to the study objectives. Exclusion criteria included: (1) off-topic articles that did not address contraceptive methods or multiparous populations, (2) overseas research conducted outside the study's geographical scope, (3) duplicate publications with identical titles, (4) articles with redundant content covering the same data from previously published studies, (5) studies without available full text, and (6) articles requiring paid access that could not be obtained. Two independent reviewers screened titles and abstracts, followed by full-text review of potentially eligible studies. Disagreements were resolved through discussion or consultation with a third reviewer.

The selection process was documented in a PRISMA flow diagram showing the number of records identified, screened, excluded (with reasons), and included in the final review. Data were extracted using a standardized form including: study characteristics (author, year, country, design), participant demographics, contraceptive methods examined, sample size, effectiveness rates, reported side effects, and study conclusions. To provide a clear overview of the study selection process, all identified records were screened through multiple stages following the PRISMA guidelines. The flow diagram below summarizes the number of articles retrieved from databases, those excluded during screening and eligibility checks, and the final studies included in this systematic review.

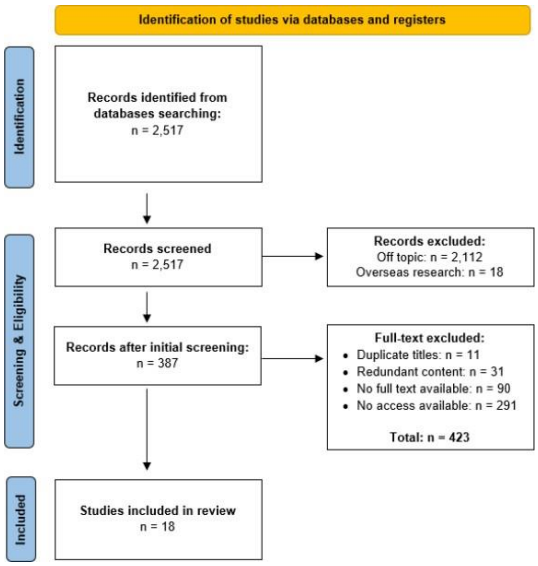


Figure 1. PRISMA Diagram

Results

Presenting the results of the service in accordance with the order of the questions formulated and including three different photos of the service activities and given a brief description relevant to the image or photo. Tables or figures are put in Results no more than six.

After applying all inclusion and exclusion criteria systematically, 18 articles met the eligibility requirements and were included in this systematic review. The result indicates that modern contraceptive methods (MS, FS, implants, IUDs, and injectable contraception) demonstrate substantially higher effectiveness compared to natural methods. However, modern methods may produce minor side effects such as menstrual irregularities, weight changes, mild discomfort, or mood alterations, while serious complications remain rare. Permanent methods also carry small risks, including postoperative infection. In contrast, natural contraceptive methods have minimal physical side effects but are associated with higher pregnancy risk when not used consistently; for example, the calendar method may result in approximately 20 pregnancies per 100 women per year. Selection of an appropriate contraceptive method should involve consultation with qualified healthcare providers, who can assess effectiveness, potential side effects, health status, and individual preferences to determine the most suitable option.

Table 1
Selected Studies

Author, Year	*Type*	Key Findings	Side Effects
Indarti et al., 2019[6]	MS	The Male Sterilization program has effectively reduced population growth in Kasiman Subdistrict and contributed to a decline in Bojonegoro's overall growth rate. Participants perceived MS as a safe and practical method, with one of its key objectives being the prevention of pregnancy at older reproductive ages. The success of the program is further reflected in its role in promoting family welfare through the adoption of the two-child family norm.	These effects are not direct medical side effects of the male Sterilization procedure itself but are largely driven by misconceptions related to sexual activity. Some community members believe that the program may negatively affect sexual performance, which has contributed to low participation in the male permanent contraception program.
Senain, 2017[7]	MS	The Male Sterilization family planning program in Situbondo	Men who undergo vasectomy do not become sterile

		Regency was found to be ineffective. Contributing factors included persistent socio-cultural misconceptions, incomplete outreach efforts, insufficient coordination between program implementers and related institutions, as well as inadequate infrastructure and resources, particularly the limited availability of trained medical personnel.	immediately, as sperm may remain present in the proximal vas deferens and seminal vesicles. Therefore, condoms are provided for use after the procedure, as sterility is typically achieved only after approximately 10–15 ejaculations.
Apriasih & Hapi, 2016[8]	MS	Male sterilization as a permanent contraceptive method, offers the advantage of being a safe procedure with minimal complications.	None of the respondents experienced minor side effects such as ecchymosis, swelling, or pain, and no major side effects— including hematoma, infection, or granuloma—were reported. Regarding other effects, only one respondent (12.5%) reported decreased libido, while the remaining 87.5% reported no additional side effects.
Sulistiyanti et al., 2023[9]	IUD	IUD contraception can be used up to menopause, does not require frequent follow-up visits, does not interfere with sexual activity, has no hormonal side effects, and offers a high level of effectiveness. The use of IUDs demonstrates strong effectiveness, with continuation rates ranging from 70% to 90% after one year.	Use of intrauterine devices (IUDs) is often associated with side effects, including increased menstrual blood loss. Other commonly reported effects include changes in the menstrual cycle, prolonged bleeding, intermenstrual spotting, and dysmenorrhea. Menstrual blood volume among IUD users may rise from approximately 32 mL to 52– 72 mL after 24 months of use. In addition, 65% of IUD users were reported to experience anemia.
Suroso, 2023[10]	IUD	The effectiveness of postplacental IUDs is 96.6%, with 3.4% of users experiencing pregnancy. This method is considered safe, easy to administer, and effective for longterm use, with minimal side effects. It can be used for up to 10 years.	Post-placental IUD use was associated with several side effects, including pain (38.6%), menstrual disturbances (37.5%), bleeding (23.9%), and IUD expulsion (35.2%). Menstrual disturbances comprised prolonged menstruation, increased menstrual blood loss, and intermenstrual spotting. Among the cases of IUD expulsion, 16 occurred spontaneously, while 15 devices were removed at the user's request.
Novianti & Sari, 2018[11]	IUD Cu T 380A	The method is highly effective and reversible, allowing discontinuation at any time,	Menorrhagia (excessive menstrual bleeding) was the most frequently reported side

		and provides long-term contraceptive protection. It is suitable for women across all reproductive age groups and does not require repeated administration, unlike oral or injectable contraceptives. In Indonesia, it ranks as the third most commonly used contraceptive method (10.05%), based on BP3AKB Batam data from 2021.	effect among copper IUD (Cu T 380A) users and was characterized by prolonged menstrual duration exceeding seven days. The average menstrual duration among users with abnormal bleeding was nine days, with a maximum of twelve days. This condition is attributed to the effect of Cu T 380A on endometrial enzymes, leading to increased fibrinolytic activity. In addition, a reduction in hemoglobin (Hb) levels was observed, with 38.4% of respondents exhibiting abnormal hemoglobin values (<12 g/dL) and the lowest recorded level being 9.4 g/dL. Decreased hemoglobin levels were closely associated with prolonged menstruation induced by IUD use. Consequently, women experiencing prolonged menstrual bleeding lose more iron and are therefore at increased risk of developing iron deficiency anemia.
Norazizah & Mulastin, 2024[12]	FS	The failure rate of this method is approximately 0.5% during the first year of use, and female Sterilization provides lifelong contraception by offering continuous and long-term protection against pregnancy	Female Sterilization carries potential health risks, including complications during or after the procedure, and some women may experience hormonal changes that affect their menstrual cycle, with individual variations in reproductive health outcomes following the procedure. Because MOW is irreversible, the decision to undergo this method should be made with careful and thorough consideration.
Anindita, 2017[13]	FS	Tubal ligation is a highly effective contraceptive method, with an effectiveness rate of approximately 98.5%, making it one of the most reliable options for women who no longer desire future pregnancies. The procedure is permanent, does not require repeat interventions, does not interfere with sexual activity, and is free from hormonal side effects, unlike oral or injectable	Post-tubal ligation syndrome may include menstrual disturbances, pelvic pain, dyspareunia, reduced libido, depressive symptoms, and menopause-like complaints. Impaired blood supply to the ovaries can lead to reduced hormone levels, resulting in decreased sexual desire and vaginal lubrication. Studies indicate that the majority of respondents experience a

		contraceptive methods.	decline in sexual function, particularly in sexual arousal and orgasm.
Afdalia & Manaf, 2020[14]	COCs and CHIs	Did not explicitly state the effectiveness rate in preventing pregnancy	Long-term use (>5 years) is associated with an increased risk, and the use of hormonal contraception is linked to a 90% higher risk of breast cancer (p = 0.01). The hormonal effects of estrogen and progesterone are thought to promote the proliferation of abnormal cells in breast tissue.
Norfitri, 2022[15]	Quarterly CHI, DMPA (+)	Did not evaluate the effectiveness of contraceptive methods in preventing pregnancy.	Decreased libido was reported by 90.7% of respondents, with most cases classified as moderate in severity; this condition may result in discomfort during sexual activity and potentially contribute to emotional conflict within intimate relationships. Other effects mentioned in the introduction included changes in menstrual patterns, spotting (intermenstrual bleeding), depression, vaginal discharge, acne, changes in body weight, and reduced bone mineral density associated with long-term use.
Rahayu & Wijanarko, 2017[16]	CHI DMPA (+)	Depo Medroxy-Progesterone Acetate is highly effective as a contraceptive method, with fewer than 1 in 100 women experiencing pregnancy within one year of use.	Menstrual disturbances in the form of amenorrhea were reported by 39 of 74 respondents (52.7%), while weight gain was experienced by 43 respondents (58.1%). After two years of DMPA injectable contraceptive use, the majority of respondents did not experience spotting, with 68 of 74 respondents (91.9%) reporting no spotting. In addition, none of the respondents (74 of 74; 100%) reported vaginal discharge, and 72 respondents (97.3%) did not experience nausea or vomiting after two years of DMPA use.
Mustikarani, 2020[17]	Pills, IUD	The majority of respondents (87.3%) used oral contraceptive pills, indicating that this method is widely used; however, the study did not report specific effectiveness rates in quantitative terms.	The risk of cervical cancer increased among contraceptive users with longer durations of oral contraceptive pill and IUD use. A significant association was found between the duration of contraceptive use (both oral contraceptives and IUDs) and cervical cancer risk (F = 9.02 >

			F critical = 3.98). Among 71 respondents, one individual (1.4%) was detected as positive for cervical cancer based on the IVA test.
Purbawati, 2015[18]	Implant	Contraceptive implants are the most commonly used method, accounting for 52.15% of users, followed by injectable contraceptives (25.36%), oral contraceptive pills (10.80%), and IUDs (7.89%). The high utilization rate is attributed to their effectiveness of over 99%. Supporting factors include the rapid return of fertility after removal and minimal side effects. Consequently, many women in East Java choose implants due to their high effectiveness and convenience.	Not mentioned.
Sugijati & A'ida, 2024[19]	Implant	The effectiveness of implantable contraception in this study demonstrated a high success rate in preventing pregnancy, with an effectiveness level reaching 99% when used correctly.	Any menstrual cycle disturbances, with 76 respondents (82.6%) experiencing amenorrhea. In addition, 34 respondents (46.6%) reported an improvement in their condition after using the implant. Some respondents also reported headaches and pain at the implant insertion site, although no specific prevalence rates were provided for these side effects.
Harmiyah et al., 2025[20]	Implant	The success rate was relatively high, as among 100 implant contraceptive users, only one individual experienced an unintended pregnancy.	Reported side effects included weight gain (76%), weight loss (12.9%), menstrual cycle disturbances (8.5%), increased blood pressure (2.2%), headache (5.5%), and bleeding or other menstrual irregularities (1.6%).

Notes. MS (Male Sterilization), FS (Female Sterilization), IUD (Intrauterine Device), DMPA (Depo Medroxy-Progesterone Acetate), COC (Combined Oral Contraceptive Pills), CHI (Combined Hormonal Injections).

Discussion

Permanent Contraceptive Methods Male Sterilization (Vasectomy)

The marked regional variation in vasectomy program outcomes observed in this review highlights a persistent gap between the procedure's established safety profile and public perceptions. Contemporary evidence confirms vasectomy as a highly safe

and effective procedure. A comprehensive 2021 review documented those common complications including hematoma, infection, and granulomas occur in only 1-6% of cases, with most being minor and self-limiting[21]. The procedure achieves effectiveness rates exceeding 99% when proper techniques are employed.

Critically, the sexual function concerns documented in several Indonesian studies contradict robust scientific evidence. A specialized clinic study in Germany found marked improvements in sexual satisfaction among vasectomized men and their partners across multiple domains including erectile function, arousal, orgasm, and overall satisfaction[22]. These improvements are attributed to elimination of pregnancy anxiety rather than any physiological enhancement from the procedure itself. The delayed onset of sterility following vasectomy—requiring approximately 10-15 ejaculations or 8-16 weeks for complete sperm clearance—represents a critical counseling point that appears inadequately addressed in some program implementations[23]. Men should be advised to use alternative contraception during this transition period and undergo post-vasectomy semen analysis to confirm azoospermia before relying solely on the procedure for contraception.

Female Sterilization

The post-tubal ligation syndrome described in several reviewed studies remains a contested clinical entity. When studies appropriately control for confounding factors including age, previous contraceptive use, and parity, most fail to demonstrate significant changes in menstrual patterns or sexual function attributable to the procedure itself. Individual variation exists, and some women do report post-procedure symptoms, but evidence does not support a distinct syndrome caused by the sterilization procedure[24]. The high effectiveness of female sterilization (98.5-99.5%) makes it an appropriate option for women desiring permanent contraception, though the irreversible nature demands comprehensive pre-procedure counseling addressing both benefits and potential concerns.

Long-Acting Reversible Contraceptives (LARCs)

Intrauterine Devices

The high effectiveness of IUDs found in this review is consistent with global evidence showing that long acting reversible contraceptives (LARCs) are among the most effective reversible methods. However, menorrhagia and anemia remain important

clinical concerns that require careful patient selection and management. Copper IUDs are known to increase menstrual blood loss, while the levonorgestrel-releasing intrauterine system (LNG-IUS) provides similar contraceptive effectiveness and can reduce menstrual bleeding and improve hemoglobin levels[25]. This makes the LNG-IUS a more suitable option for women at risk of anemia, particularly in developing countries such as Indonesia. Management of copper IUD–related menorrhagia may include nonsteroidal anti-inflammatory drugs (NSAIDs) or antifibrinolytic agents, although current evidence on their effectiveness is limited[26]. In addition to contraception, the LNG-IUS offers added benefits such as treatment of heavy menstrual bleeding, endometrial protection, and relief of endometriosis related pain.

Contraceptive Implants

Contraceptive implants show very high effectiveness rates (>99%), supported by international evidence, and provide 3–5 years of reliable contraception with minimal user involvement. This makes them an ideal option for women seeking long-term, reversible contraception. However, menstrual disturbances are the main reason for discontinuation, with 30–50% of users stopping use before the recommended duration due to changes in bleeding patterns, including irregular bleeding and amenorrhea. Effective preinsertion counseling about these potential changes can significantly improve continuation rates by helping women develop realistic expectations. For those who can tolerate bleeding changes, implants offer important benefits such as rapid return to fertility after removal, low systemic hormone exposure, and convenient, lowmaintenance contraception[27].

Short-Acting Hormonal Methods

Depo Medroxy-Progesterone Acetate (DMPA)

The high rates of amenorrhea and weight gain observed in this review are consistent with well-known side effects of DMPA. After one year of use, about 46% of users experience amenorrhea, while only around 12% maintain regular menstrual cycles[28]. Although many women consider amenorrhea beneficial, especially those with anemia or heavy menstrual bleeding, others may find it concerning, underscoring the need for individualized pre-injection counseling. Evidence on weight gain is mixed: while high-quality studies show limited proof that DMPA directly causes weight gain, observational studies report an average increase of around 2 kg, with considerable

individual variation, particularly among younger women[29]. In addition, fertility return after discontinuation of DMPA may be delayed by approximately 15–49 weeks after the last injection, which is an important consideration for women planning pregnancy in the near future[23].

Combined Hormonal Contraceptives

The increased breast cancer risk associated with long-term hormonal contraceptive use observed in this review is consistent with current evidence. Large cohort studies show that current or recent use of combined oral contraceptives is linked to a small increase in breast cancer risk, which declines after discontinuation[30]. At the same time, hormonal contraceptives provide significant longterm protection against ovarian and endometrial cancers, highlighting a complex balance of risks and benefits that requires individualized evaluation. Current guidelines also note that estrogen-containing contraceptives slightly increase the risk of venous thrombosis, although the absolute risk is low in women without additional risk factors. Therefore, contraceptive counseling and clinical decision-making should consider individual risk profiles, personal preferences, and tolerance for unintended pregnancy[23].

Natural and Barrier Methods

The calendar method and coitus interruptus have clear limitations because they require strict adherence and strong partner cooperation. Although fertility awareness–based methods can be appropriate for women who cannot or prefer not to use hormonal contraception, they require proper training, regular cycle monitoring, and consistent use to be effective. Recent fertility awareness apps may improve accuracy by using additional fertility indicators and providing real-time guidance, but failure rates with typical use remain much higher than those of long-acting reversible contraceptives. While these methods avoid the physical side effects of hormonal contraception, they demand greater user involvement and commitment[31].

Limitation

This review has several limitations that should be acknowledged. Significant heterogeneity in study designs, sample sizes, and measurement tools across the included primary literature precluded a quantitative meta-analysis. Additionally, several potentially relevant studies were excluded due to paywalls or unavailable full texts,

introducing potential selection and publication bias. Finally, because many included primary studies were geographically localized to specific regions or healthcare facilities, caution should be exercised when generalizing these findings to the broader Indonesian multiparous population.

Conclusion

This systematic review demonstrates that while highly effective contraceptive methods are available, real-world effectiveness depends critically on factors beyond biomedical efficacy including side effect profiles, user preferences, socio-cultural context, and implementation quality. Permanent methods offer excellent effectiveness but require careful counseling about irreversibility and potential complications. Long-Acting Reversible Contraceptives provide highly effective reversible options though common side effects—particularly menstrual changes—may limit continuation. Shortacting hormonal methods require regular user action but offer flexibility and rapid reversibility. Optimal contraceptive care requires individualized decision-making balancing effectiveness, safety, acceptability, and accessibility within each person's unique context. Comprehensive counseling addressing both benefits and risks, culturally sensitive program implementation, robust side effect management protocols, and diverse method availability are essential for improving contraceptive access and reproductive health outcomes.

Ethical Considerations

As a systematic literature review relying solely on published secondary data, this study did not involve direct human participants or biological interventions, rendering formal ethical committee approval non-applicable. Ethical standards were strictly maintained through transparent attribution and proper citation of all primary sources. To ensure objectivity and eliminate reporting bias, data extraction and quality appraisal were conducted independently by multiple reviewers.

Acknowledgment

The authors would like to express their sincere gratitude to the Faculty of Medicine, Universitas Mulawarman, and the General Compulsory Courses Team

Teaching for their continuous support and guidance throughout the preparation of this review.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. No financial or personal relationships with people or organizations have inappropriately influenced the content of this manuscript.

Author contribution

SP conceptualized the study, developed the methodology, performed formal analysis, drafted the original manuscript, and managed project administration as the corresponding author. SAP contributed to methodology, data curation, formal analysis, and manuscript drafting. VCP handled software tools, data curation, and visual presentation. MAR and ASN participated in investigation, data curation, validation, and drafting. TSDR and MS contributed to data curation, formal analysis, and critical manuscript revision. KR provided overall conceptualization, supervision, validation, and final editing of the manuscript. All authors read and approved the final manuscript.

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