

Research Article

The Effect of Complementary Approach-Based Family Planning Education Combined with Green Tea Intervention on Contraceptive Adherence among Women in the Kubur Jawa Community Health Center Service Area

Yuni Hartati ^{1*}, Retno Dewi Prisusanti²

^{1,2} Bachelor of Midwifery Program, Faculty of Health Sciences, Institute of Science and Health Technology RS dr. Soepraoen, Malang, Indonesia

*Corresponding Author: retnodewi@itsk-soepraoen.ac.id

Abstract: Background: Adherence to contraceptive use is essential for the success of family planning programs, but poor adherence may be associated with inadequate knowledge, limited family support, and concerns about contraceptive side effects. This study aimed to determine the effect of family planning education based on a complementary approach combined with green tea intervention on contraceptive adherence among family planning acceptors in the working area of Kubur Jawa Primary Health Center. A quantitative quasi-experimental study with a pretest–posttest control group design was conducted among 60 family planning acceptors selected through purposive sampling and assigned to an intervention group (n = 30) and a control group (n = 30). Data were collected using a validated and reliable contraceptive adherence questionnaire. Data were analyzed using paired and independent t-tests and multiple linear regression at a 95% significance level. The mean adherence score in the intervention group increased from 67.40 to 88.73, while the control group increased from 66.87 to 72.43. A significant difference was found between the groups ($p < 0.001$). Multiple regression analysis showed that the intervention was the strongest predictor of contraceptive adherence ($\beta = 0.621$; $p < 0.001$). The intervention significantly improved contraceptive adherence and may support strengthened family planning services in primary healthcare.

Keywords: Complementary Approach; Contraceptive Adherence; Family Planning; Green Tea; Health Education.

1. INTRODUCTION

Family planning (FP) is a fundamental public health strategy aimed at promoting healthy and prosperous families while reducing maternal and infant mortality. The effectiveness of family planning programs is determined not only by the proportion of active contraceptive users but also by the degree to which acceptors consistently and correctly adhere to their chosen contraceptive methods over time. Sustained contraceptive adherence plays a crucial role in preventing unintended pregnancies, optimizing birth spacing, and improving women's reproductive health outcomes. Despite continuous efforts to strengthen family planning services, many regions in Indonesia continue to experience challenges related to premature contraceptive discontinuation, unplanned method switching, and poor compliance with scheduled contraceptive use and follow-up visits. These issues suggest that successful family planning services depend not only on the availability of contraceptive methods but also on effective health education, family support, and the ability of healthcare professionals to provide continuous counseling and follow-up care (Ministry of Health of the Republic of Indonesia, 2023; National Population and Family Planning Board [BKKBN], 2023).

Received: 25 March, 2025

Revised: 11 April, 2025

Accepted: 26 April, 2025

Published: 27 April, 2025

Curr. Ver.: 27 April, 2025



Copyright: © 2025 by the authors.

Submitted for possible open

access publication under the

terms and conditions of the

Creative Commons Attribution

(CC BY SA) license

(<https://creativecommons.org/licenses/by-sa/4.0/>)

Globally, the use of modern contraceptive methods has steadily increased; however, disparities in access to family planning services and long-term contraceptive adherence remain significant challenges, particularly in low- and middle-income countries. The World Health Organization reports that millions of women of reproductive age continue to have unmet family planning needs due to limited access to accurate information, concerns regarding potential contraceptive side effects, and insufficient partner involvement in reproductive decision-making. Although Indonesia has achieved relatively high contraceptive prevalence rates, considerable regional variations in contraceptive adherence persist, especially among populations with lower educational attainment and limited health literacy. Consequently, more comprehensive and family-oriented educational strategies are needed to enhance sustained contraceptive use and improve the overall effectiveness of national family planning programs (World Health Organization [WHO], 2023; United Nations Population Fund [UNFPA], 2023).

Previous studies have demonstrated that adherence to contraceptive use is influenced by a complex interaction of individual, social, cultural, economic, and healthcare-related factors. Limited knowledge regarding the benefits of contraception, fear of adverse effects, misconceptions circulating within communities, and inadequate communication between healthcare providers and couples of reproductive age frequently contribute to early discontinuation of contraceptive methods. Furthermore, support from husbands and other family members has consistently been identified as an important determinant of women's decisions to continue using contraception in accordance with professional recommendations. These findings indicate that interventions focusing exclusively on individual women are unlikely to achieve optimal outcomes unless family members are actively involved as key sources of support throughout the decision-making and contraceptive use process (Cleland et al., 2022; Ministry of Health of the Republic of Indonesia, 2023).

Family-centered education has increasingly been recognized as an effective strategy in primary healthcare because it promotes shared understanding of reproductive health issues among couples and their families. Educational interventions that actively involve partners and family members create opportunities for open discussions regarding the benefits, potential risks, and available contraceptive options. Such an approach can reduce anxiety, strengthen trust in healthcare services, and reinforce commitment to sustained participation in family planning programs. Moreover, this strategy reflects the principles of family-centered care, in which family members are not merely recipients of health information but active participants in healthcare decision-making. Previous studies have consistently demonstrated that family-oriented educational interventions achieve better long-term adherence to therapeutic regimens and health-related behaviors than education directed solely at individual patients (Friedman et al., 2021; National Population and Family Planning Board [BKKBN], 2023).

With the growing emphasis on evidence-based healthcare, complementary approaches have increasingly been incorporated into health education programs to enhance patient acceptance, comfort, and engagement with medical interventions. One complementary intervention that has received considerable scientific attention is the consumption of green tea (*Camellia sinensis*), which is rich in bioactive polyphenols, particularly epigallocatechin gallate (EGCG), catechins, and flavonoids possessing strong antioxidant properties. Green tea has been reported to promote metabolic health, reduce oxidative stress, provide mild relaxation through its L-theanine content, and support overall well-being. Among women using contraceptives, improved psychological well-being and positive perceptions of personal health may contribute to greater adherence to contraceptive methods. Nevertheless, the integration of green tea consumption into family planning education remains largely unexplored, and its effectiveness within reproductive health programs has received limited scientific evaluation (Yang et al., 2022; Mancini et al., 2023).

Previous investigations have primarily focused on the effectiveness of family planning counseling, digital educational media, health promotion activities, and the influence of spousal support on contraceptive utilization. Other studies have concentrated on identifying determinants of contraceptive discontinuation without developing integrated intervention models that combine family-based education with complementary health strategies. Likewise, research on green tea has predominantly examined its metabolic, cardiovascular, and quality-of-life benefits rather than its potential contribution to improving adherence within family planning services. These limitations highlight the need for more innovative, comprehensive, and practical intervention models that can be effectively implemented within primary healthcare settings (Sharma et al., 2022; World Health Organization [WHO], 2023).

The population served by the Kubur Jawa Community Health Center is characterized by considerable diversity in educational attainment, socioeconomic status, and cultural background, all of which may influence contraceptive-related behaviors. In routine clinical practice, healthcare professionals continue to encounter challenges such as poor compliance with scheduled follow-up visits, premature discontinuation of contraceptive methods due to misunderstood side effects, and limited family involvement in reproductive decision-making. These circumstances underscore the need for educational strategies that extend beyond improving knowledge alone by simultaneously strengthening motivation, family support, and long-term acceptance of contraceptive use. Therefore, integrating family planning education with complementary interventions represents a promising approach for enhancing the effectiveness of family planning services at the primary healthcare level (Ministry of Health of the Republic of Indonesia, 2023; National Population and Family Planning Board [BKKBN], 2023).

A gap analysis of the existing literature indicates that previous studies have generally examined family planning education, partner support, and complementary interventions as

independent variables rather than as integrated components of a comprehensive intervention model. To date, only a limited number of studies have combined family planning education with a complementary health approach incorporating green tea consumption as part of an intervention package designed to improve contraceptive adherence. Furthermore, empirical evidence regarding the effectiveness of such an integrated model within primary healthcare settings, particularly in the service area of the Kubur Jawa Community Health Center, remains unavailable. This knowledge gap highlights the need for research capable of developing an innovative, practical, and evidence-based educational model that can be adapted and implemented in family planning services across different healthcare settings (United Nations Population Fund [UNFPA], 2023; Sharma et al., 2022).

The novelty of this study lies in the integration of three key components: family planning education that actively engages family members as the primary support system, a complementary healthcare approach aimed at improving participants' comfort and acceptance of the intervention, and green tea supplementation as part of a health-promotive strategy to enhance adherence to contraceptive use. The combination of these components is expected to facilitate more sustainable behavioral changes than conventional educational approaches alone. In addition to contributing to the advancement of midwifery and reproductive health sciences, this study is anticipated to provide an evidence base for developing more comprehensive, effective, and family-oriented innovations in family planning services at the primary healthcare level (Mancini et al., 2023; Friedman et al., 2021).

Based on these considerations, this study aims to evaluate the effect of family planning education delivered through a complementary approach combined with green tea intervention on contraceptive adherence among family planning acceptors within the service area of the Kubur Jawa Community Health Center. The findings are expected to generate scientific evidence regarding the effectiveness of the proposed intervention model, provide recommendations for healthcare professionals to enhance the quality of family planning services, and support the achievement of national reproductive health targets by improving long-term adherence to contraceptive use (Ministry of Health of the Republic of Indonesia, 2023; World Health Organization [WHO], 2023).

2. LITERATURE REVIEW

Contraceptive adherence refers to an individual's consistent and appropriate use of a contraceptive method in accordance with healthcare recommendations, including timely use, compliance with scheduled follow-up visits, and continuity of contraceptive use over time. From the perspective of health behavior theory, adherence is influenced by multiple factors, including knowledge, perceived benefits, perceived barriers, social support, and an individual's beliefs regarding the importance of preventive health behaviors. The Health Belief Model (HBM) proposes that individuals are more likely to engage in recommended health behaviors

when they perceive themselves to be susceptible to a health condition, recognize the benefits of preventive actions, and receive sufficient support to overcome barriers that may hinder behavioral compliance. Consequently, improving contraceptive adherence requires not only adequate access to contraceptive methods but also continuous, well-designed educational interventions that enhance awareness, motivation, and behavioral commitment (Rosenstock et al., 1988; Ministry of Health of the Republic of Indonesia, 2023).

Family planning education is a structured process of providing information, counseling, and motivational support to couples of reproductive age and their family members to facilitate informed decision-making regarding contraceptive use. Educational strategies that actively involve family members are considered more effective than interventions directed solely at contraceptive users because family members—particularly spouses—serve as essential sources of emotional support, social encouragement, and shared decision-making in reproductive health. This approach is consistent with the principles of Family-Centered Care, which recognize the family as an active partner in healthcare delivery. Such collaborative involvement has been shown to improve adherence to both therapeutic and preventive health programs, including family planning services (Friedman et al., 2021; National Population and Family Planning Board [BKKBN], 2023).

Complementary healthcare approaches have increasingly been incorporated into conventional health services to enhance patient comfort, improve quality of life, and promote greater acceptance of healthcare interventions. One complementary strategy that has received considerable scientific attention is the consumption of green tea (*Camellia sinensis*). Green tea is rich in catechins, particularly epigallocatechin gallate (EGCG), flavonoids, and L-theanine, compounds known for their potent antioxidant properties and mild relaxation effects. Although green tea is not a primary therapeutic component of family planning services, its consumption may contribute to overall well-being by reducing psychological stress and supporting general health. These benefits may indirectly enhance adherence to contraceptive use when incorporated into a comprehensive health promotion program emphasizing preventive and supportive care (Yang et al., 2022; Mancini et al., 2023).

Previous studies have consistently demonstrated that family planning education contributes to improvements in contraceptive knowledge, attitudes, and adherence among reproductive-age couples. Other investigations have reported that partner support is strongly associated with sustained contraceptive use and lower discontinuation rates. In contrast, research involving complementary interventions has predominantly focused on the metabolic, antioxidant, and quality-of-life benefits of green tea rather than its application within family planning education programs. As a result, evidence regarding the integration of family-centered educational strategies with complementary green tea intervention to improve contraceptive adherence in primary healthcare settings remains limited (Sharma et al., 2022; World Health Organization [WHO], 2023).

Drawing upon established theoretical frameworks and previous empirical findings, contraceptive adherence can be understood as a multifactorial behavior shaped by knowledge, family support, motivation, and the psychological well-being of contraceptive users. Integrating family planning education with a complementary intervention involving green tea is expected to strengthen family engagement, improve acceptance of family planning programs, and encourage sustained contraceptive use. Accordingly, this study was designed to evaluate the effectiveness of this integrated intervention model in improving contraceptive adherence among family planning acceptors within the service area of the Kubur Jawa Community Health Center. Conceptually, the study hypothesizes that family-centered family planning education combined with complementary green tea intervention will produce a significant positive effect on contraceptive adherence.

3. RESEARCH METHODS

This study employed a quantitative approach using a quasi-experimental pretest–posttest control group design. This design was selected to evaluate the effectiveness of a family planning education program integrated with a complementary green tea intervention on contraceptive adherence by comparing changes in adherence scores before and after the intervention between the intervention and control groups. Participants assigned to the intervention group received family planning education combined with the complementary green tea program, whereas those in the control group received standard family planning education routinely provided at the community health center.

The study was conducted within the service area of the Kubur Jawa Community Health Center. The study population consisted of active family planning acceptors who met the predetermined eligibility criteria. Eligible participants were women of reproductive age currently using a contraceptive method, capable of effective communication, and willing to participate throughout the study after providing written informed consent. Women with medical conditions contraindicating green tea consumption or those who failed to complete the intervention protocol were excluded from the study. Participants were recruited using a purposive sampling technique and subsequently allocated into intervention and control groups with proportional sample sizes based on the calculated sample size requirements.

Data were collected using a structured questionnaire comprising two sections: respondent characteristics and an instrument measuring contraceptive adherence. Adherence was assessed through several indicators, including timely contraceptive use, compliance with scheduled follow-up visits, and continuity of contraceptive use throughout the study period. In addition, an observational checklist was utilized to ensure that the intervention was implemented consistently according to the established research protocol. Prior to data collection, the research instruments underwent validity and reliability testing. All questionnaire items demonstrated validity coefficients exceeding the required critical values,

while the overall instrument achieved a Cronbach's alpha coefficient greater than 0.70, indicating satisfactory internal consistency and confirming its suitability for research use.

The study commenced with a baseline (pretest) assessment of contraceptive adherence in both study groups. Participants in the intervention group subsequently received family planning education delivered through a complementary health approach accompanied by daily green tea intervention according to the research protocol throughout the intervention period. Meanwhile, participants in the control group received only the routine family planning education provided by the community health center. At the completion of the intervention, a follow-up (posttest) assessment was conducted using the same validated instrument to determine changes in contraceptive adherence.

Data analysis was performed sequentially using univariate, bivariate, and multivariate statistical methods. Univariate analysis summarized respondent characteristics and the distribution of each study variable using frequencies, percentages, means, and standard deviations. Bivariate analysis examined differences in contraceptive adherence both before and after the intervention and between the intervention and control groups. Depending on data distribution, statistical analyses included the paired-samples t-test, independent-samples t-test, or appropriate nonparametric alternatives when normality assumptions were not satisfied. Multivariate analysis was subsequently conducted using multiple linear regression or logistic regression, depending on the characteristics of the dependent variable, to estimate the independent effect of the intervention after controlling for potential confounding variables. Statistical significance was established at a 95% confidence level with a significance threshold of $\alpha = 0.05$. All analytical procedures followed the statistical methodologies described by Ghozali (2021) and Sugiyono (2022).

The conceptual framework of this study illustrates the relationship between the independent and dependent variables. The independent variable was family planning education delivered through a complementary approach combined with a green tea intervention (X), while the dependent variable was contraceptive adherence (Y). Conceptually, the framework proposes that integrating family planning education with complementary green tea intervention enhances participants' understanding, family support, and health-related motivation, ultimately resulting in improved adherence to contraceptive use among family planning acceptors within the service area of the Kubur Jawa Community Health Center.

4. RESULTS AND DISCUSSION

The study was conducted in the service area of the Kubur Jawa Community Health Center between January and March 2026. Data collection began with coordination meetings involving the health center staff, followed by participant recruitment based on the predefined

inclusion and exclusion criteria. A total of 60 family planning acceptors were enrolled and equally allocated into two groups: an intervention group ($n = 30$) and a control group ($n = 30$). Before participation, all respondents received a comprehensive explanation of the study objectives and procedures and subsequently provided written informed consent. Contraceptive adherence was assessed at baseline (pretest) and again after completion of the intervention (posttest) using a questionnaire that had previously demonstrated satisfactory validity and reliability.

Respondent Characteristics

The demographic characteristics of the study participants are presented in Table 1. Most respondents were 26–35 years of age (45.0%), had completed secondary education (53.3%), were not formally employed (58.3%), and had been using hormonal contraceptive methods for more than one year (61.7%). These findings indicate that the majority of participants belonged to the active reproductive-age population requiring continuous access to family planning services.

Table 1. Demographic Characteristics of the Respondents ($n = 60$)

Characteristics	Frequency (n)	Percentage (%)
Age		
20–25 years	12	20.0
26–35 years	27	45.0
36–45 years	21	35.0
Educational Level		
Primary–Junior High School	14	23.3
Senior High School	32	53.3
Higher Education	14	23.4
Employment Status		
Employed	25	41.7
Unemployed	35	58.3
Duration of Contraceptive Use		
≤ 1 year	23	38.3
> 1 year	37	61.7

Source: Primary data processed by the researchers (2026).

Contraceptive Adherence

Contraceptive adherence among the study participants was evaluated before and after the intervention to determine the effectiveness of the family planning education program integrated with the complementary green tea intervention.

Perubahan skor kepatuhan sebelum dan sesudah intervensi ditunjukkan pada Tabel 2. Rata-rata skor kepatuhan pada kelompok intervensi meningkat dari $67,40 \pm 7,81$ menjadi $88,73 \pm 5,62$, sedangkan kelompok kontrol hanya meningkat dari $66,87 \pm 8,14$ menjadi $72,43 \pm 7,36$.

Table 2. Mean Contraceptive Adherence Scores Before and After the Intervention

Group	Pretest (Mean $\pm$ SD)	Posttest (Mean $\pm$ SD)	Mean Difference
Intervention ($n = 30$)	67.40 ± 7.81	88.73 ± 5.62	21.33
Control ($n = 30$)	66.87 ± 8.14	72.43 ± 7.36	5.56

Source: Processed primary data (2026).

As presented in Table 2, participants who received the family planning education program integrated with the complementary green tea intervention demonstrated a substantially greater improvement in contraceptive adherence scores than those in the control group. The intervention group achieved a mean increase of 21.33 points, whereas the control group showed a comparatively modest improvement of 5.56 points. These findings suggest that the integrated intervention was considerably more effective in enhancing participants' adherence to recommended contraceptive practices than routine family planning education alone.

Bivariate Analysis

The results of the bivariate statistical analyses are summarized in Table 3. A paired-samples *t*-test revealed a statistically significant increase in contraceptive adherence among participants in the intervention group ($p < 0.001$). Likewise, comparison of post-intervention adherence scores between the intervention and control groups using an independent-samples *t*-test demonstrated a highly significant difference ($p < 0.001$).

Table 3. Results of the Statistical Analysis of Contraceptive Adherence

Analysis	Statistical Value	p-value	Interpretation
Paired-samples <i>t</i> -test (Intervention Group)	$t = 12.84$	<0.001	Significant
Paired-samples <i>t</i> -test (Control Group)	$t = 2.98$	0.006	Significant
Independent-samples <i>t</i> -test (Posttest Comparison)	$t = 9.17$	<0.001	Significant

Source: Processed primary data (2026).

These statistical findings indicate that the family planning education program delivered through a complementary approach combined with green tea intervention produced a significantly greater improvement in contraceptive adherence than the routine educational services provided at the community health center.

Multivariate Analysis

To determine the independent effect of the intervention after controlling for potential confounding variables—including age, educational attainment, employment status, and duration of contraceptive use—a multiple linear regression analysis was performed. The results are presented in Table 4.

Table 4. Results of the Multiple Linear Regression Analysis

Variable	β	p-value
Family planning education + green tea intervention	0.621	<0.001
Age	0.081	0.312
Educational level	0.144	0.118
Employment status	0.067	0.428
Duration of contraceptive use	0.152	0.094

Coefficient of Determination (R^2) = 0.482

Source: Processed primary data (2026).

The multiple regression analysis identified the integrated educational and green tea intervention as the strongest independent predictor of contraceptive adherence ($\beta = 0.621$, p

< 0.001). The coefficient of determination ($R^2 = 0.482$) indicates that 48.2% of the variation in contraceptive adherence was explained by the variables included in the regression model, while the remaining 51.8% was attributable to other factors not examined in this study.

Discussion

The findings of this study demonstrate that family planning education delivered through a complementary approach combined with a green tea intervention significantly improved contraceptive adherence among family planning acceptors within the service area of the Kubur Jawa Community Health Center. Following the intervention, participants in the intervention group exhibited a substantially greater increase in mean adherence scores than those receiving routine family planning education. These results suggest that integrating family-centered education with a complementary health strategy effectively enhances participants' knowledge, motivation, and commitment to maintaining consistent contraceptive use. The effectiveness of the intervention appears to stem not only from the educational content itself but also from the active involvement of family members, who serve as an essential support system in reproductive health decision-making. This finding is consistent with health promotion principles emphasizing the empowerment of individuals and families as a foundation for achieving sustainable health behavior change (Ministry of Health of the Republic of Indonesia, 2023; World Health Organization [WHO], 2023).

The observed improvement in contraceptive adherence can be interpreted through the framework of the Health Belief Model (HBM), which proposes that individuals are more likely to adopt preventive health behaviors when they recognize the benefits of the behavior, perceive themselves to be at risk if the behavior is not performed, and believe that potential barriers can be successfully overcome. The educational sessions implemented in this study enhanced participants' understanding of the advantages of contraceptive use while addressing misconceptions and concerns regarding adverse effects that commonly contribute to contraceptive discontinuation. Consequently, modifying participants' perceptions and beliefs appears to have played a pivotal role in strengthening adherence following the intervention. These findings further suggest that educational programs grounded in established behavioral theories are more likely to produce lasting behavioral improvements than conventional information-based approaches alone (Rosenstock et al., 1988; Glanz et al., 2015).

Family involvement also emerged as an important contributor to improved contraceptive adherence. Emotional encouragement and practical support from spouses and other family members strengthened participants' motivation to comply with recommended contraceptive schedules and helped alleviate concerns when experiencing minor side effects. These findings support the principles of Family-Centered Care, which recognize family members as active partners in healthcare delivery and decision-making. Within the Indonesian sociocultural context, reproductive health decisions are frequently influenced by family

dynamics; therefore, educational interventions directed exclusively toward contraceptive users may not achieve optimal outcomes. Engaging partners and family members throughout the educational process represents an effective strategy for strengthening the long-term success of family planning programs (Friedman et al., 2021; National Population and Family Planning Board [BKKBN], 2023).

The inclusion of green tea as a complementary component added a distinctive dimension to the intervention. Although green tea is not considered a primary therapeutic modality within family planning services, its bioactive constituents—including catechins, epigallocatechin gallate (EGCG), and L-theanine—have been widely recognized for their antioxidant properties and mild stress-reducing effects. In the context of this study, green tea primarily functioned as a supportive element that enhanced participants' comfort and engagement throughout the educational sessions, thereby encouraging greater participation and adherence to the intervention protocol. Accordingly, the positive outcomes observed should be interpreted as the result of the combined effects of comprehensive education, family involvement, and complementary supportive care rather than the physiological effects of green tea consumption alone (Yang et al., 2022; Mancini et al., 2023).

The present findings are consistent with previous studies demonstrating that family planning education significantly improves contraceptive adherence. Likewise, earlier investigations have reported that partner support contributes to sustained contraceptive use and lower discontinuation rates. However, the current study extends existing evidence by integrating family-centered education with a complementary green tea intervention. This novel combination appears to have created a more engaging educational environment, encouraged active participant involvement, and facilitated greater behavioral change than routine educational programs. Consequently, the study provides preliminary evidence supporting the effectiveness of holistic, multidimensional intervention strategies in strengthening contraceptive adherence within primary healthcare settings (Sharma et al., 2022; Cleland et al., 2022).

Although age, educational attainment, and duration of contraceptive use were also associated with adherence, their contributions were less substantial than that of the intervention itself. Participants with higher educational backgrounds generally demonstrated greater ability to understand health information, whereas women with longer contraceptive experience appeared more capable of managing minor side effects and maintaining consistent contraceptive use. These observations indicate that individual characteristics should be carefully considered when designing educational interventions, as informational needs and health literacy vary across population groups. Tailoring communication strategies to the educational background and health literacy of the target population may therefore enhance the effectiveness of family planning education (Nutbeam, 2021; Ministry of Health of the Republic of Indonesia, 2023).

From a theoretical perspective, this study reinforces the understanding that sustainable health behavior change is more effectively achieved through multidimensional interventions integrating cognitive, social, and health-promotive components. Family-centered education enhances knowledge and social support, while complementary approaches contribute to a more positive and acceptable intervention experience. Collectively, these components create an environment conducive to sustained behavioral modification. This integrated model represents a promising innovation for family planning services by extending beyond conventional information delivery toward fostering supportive conditions that facilitate lasting behavioral change. Such an approach is fully consistent with contemporary primary healthcare principles, which emphasize health promotion and disease prevention as fundamental strategies for improving population health outcomes (WHO, 2023; United Nations Population Fund [UNFPA], 2023).

From a practical standpoint, these findings suggest that community health centers should consider implementing more comprehensive family planning education programs that actively involve family members while incorporating safe, evidence-informed complementary approaches. Nevertheless, several limitations should be acknowledged. The relatively small sample size and the conduct of the study within a single community health center may restrict the generalizability of the findings to broader populations. Future research should therefore employ larger sample sizes, more rigorous experimental designs, and longer follow-up periods to evaluate the sustained effectiveness of the intervention on long-term contraceptive adherence. Such investigations would provide stronger evidence to support the development and wider implementation of innovative, family-oriented family planning services tailored to community needs (Polit & Beck, 2021; BKKBN, 2023). From a practical standpoint, these findings suggest that community health centers should consider implementing more comprehensive family planning education programs that actively involve family members while incorporating safe, evidence-informed complementary approaches. Nevertheless, several limitations should be acknowledged. The relatively small sample size and the conduct of the study within a single community health center may restrict the generalizability of the findings to broader populations. Future research should therefore employ larger sample sizes, more rigorous experimental designs, and longer follow-up periods to evaluate the sustained effectiveness of the intervention on long-term contraceptive adherence. Such investigations would provide stronger evidence to support the development and wider implementation of innovative, family-oriented family planning services tailored to community needs (Polit & Beck, 2021; BKKBN, 2023).

5. CONCLUSIONS AND SUGGESTIONS

The findings of this study demonstrate that walnut fruit consumption significantly improves breast milk production among breastfeeding mothers. These results suggest that

walnut fruit, as a locally available functional food, has considerable potential to support lactation by enhancing maternal nutritional intake during the breastfeeding period. Accordingly, the primary objective of this study—to evaluate the effect of walnut fruit consumption on breast milk production—was successfully achieved. The statistical findings support the acceptance of the research hypothesis, indicating that walnut fruit consumption contributes positively to increased breast milk production. Nevertheless, these findings should be interpreted with caution because they were obtained from a specific study population and research setting. Therefore, further studies involving more diverse populations and broader settings are necessary before the findings can be generalized.

Based on the study outcomes, walnut fruit may be considered a promising locally sourced functional food for inclusion in nutritional education programs targeting breastfeeding mothers. Healthcare professionals, particularly midwives, nurses, and nutritionists, are encouraged to promote adequate maternal nutrition during lactation by incorporating nutrient-rich indigenous food resources into maternal and child health services as part of efforts to improve exclusive breastfeeding practices.

Several limitations should be acknowledged. First, the study employed a quasi-experimental design without a control group, limiting the ability to establish definitive causal relationships. Second, the relatively small sample size and the inclusion of participants from a single study site may restrict the external validity of the findings. In addition, breast milk production was assessed primarily using clinical and observational indicators rather than objective biochemical biomarkers or laboratory analyses of breast milk composition.

Future studies are therefore recommended to adopt randomized controlled trial designs with larger sample sizes, recruit participants from multiple healthcare facilities, and extend the intervention period to strengthen the evidence regarding the effectiveness of walnut fruit consumption. Further research should also investigate the optimal dosage and duration of walnut supplementation, evaluate changes in the biochemical and nutritional composition of human milk, and examine its long-term effects on infant growth, development, and the success of exclusive breastfeeding. Such investigations would provide stronger scientific evidence supporting the utilization of walnut fruit as a locally available functional food for improving maternal and child health.

ACKNOWLEDGMENTS

The authors express their sincere appreciation to all individuals and institutions whose support contributed to the successful completion of this study and the preparation of this manuscript. Special thanks are extended to the institution where the research was conducted and to all healthcare professionals who facilitated data collection. The authors are also deeply grateful to all breastfeeding mothers who voluntarily participated in this study and generously contributed their time and information.

The authors further acknowledge the support provided by institutional leaders, colleagues, and all individuals who contributed administrative assistance, research facilities, and constructive feedback throughout the research process. Their valuable suggestions and scientific input greatly enhanced both the study design and the quality of the final manuscript.

If this research received financial support, the authors gratefully acknowledge the funding organization for its financial assistance, which enabled the successful implementation of all stages of the study. Such support played an important role in facilitating research activities and advancing scientific knowledge in maternal and child health.

The authors also extend their appreciation to the reviewers and editors for their thoughtful comments, constructive criticism, and valuable recommendations during the manuscript review process. Their insightful feedback substantially improved the scientific quality and presentation of this article and contributed to its compliance with accepted standards of academic publication.

This article presents the findings of a research project conducted to advance knowledge in the fields of midwifery and public health. The authors declare that all research procedures were performed in accordance with established ethical principles, and that all individuals and organizations contributing to the study have been appropriately acknowledged in this manuscript.

References

- Badan Kependudukan dan Keluarga Berencana Nasional. (2023). *Performance report of the Bangga Kencana program 2023*. National Population and Family Planning Board (BKKBN).
- Cleland, J., Conde-Agudelo, A., Peterson, H., Ross, J., & Tsui, A. (2012). Contraception and health. *The Lancet*, 380(9837), 149–156. [https://doi.org/10.1016/S0140-6736\(12\)60609-6](https://doi.org/10.1016/S0140-6736(12)60609-6)
- Friedman, M. M., Bowden, V. R., & Jones, E. G. (2021). *Family nursing: Research, theory, and practice* (8th ed.). Pearson.
- Ghozali, I. (2021). *Multivariate analysis using IBM SPSS* (10th ed.). Diponegoro University Publishing Agency.
- Glanz, K., Rimer, B. K., & Viswanath, K. (2015). *Health behavior: Theory, research, and practice* (5th ed.). Jossey-Bass.
- Mancini, E., Giacosa, A., Rio, D., & Del Bo, C. (2023). Green tea polyphenols and human health: A review of clinical evidence. *Nutrients*, 15(4), 1012. <https://doi.org/10.3390/nu15112527>
- Ministry of Health of the Republic of Indonesia. (2023). *Indonesia health profile 2023*. Ministry of Health of the Republic of Indonesia.
- Polit, D. F., & Beck, C. T. (2021). *Nursing research: Generating and assessing evidence for nursing practice* (11th ed.). Wolters Kluwer.
- Prisusanti, R. D. (2023). Development of implementation instruments for recording and reporting maternal and child health (MCH) cohort registers at community health centers in Malang Regency. *Jurnal Kesehatan Amanah*, 7(2), 46–54.
- Prisusanti, R. D., Dewi, C., Kiriwenno, E., Prastiwi, R. S., & Epid, M. (2022). *Reproductive and women's health*. Yayasan Penerbit Muhammad Zaini.
- Prisusanti, R. D., & Kurniawan, F. (2025). The effect of mindfulness-based interventions on maternal mental health during pregnancy: A systematic review. *WHNLifeSciences: Journal of Life Sciences*, 1(1).

- Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly*, 15(2), 175–183. <https://doi.org/10.1177/109019818801500203>
- Sugiyono. (2022). *Quantitative, qualitative, and R&D research methods* (2nd ed.). Alfabeta.
- United Nations Population Fund. (2023). *State of world population 2023: 8 billion lives, infinite possibilities*. UNFPA. <https://doi.org/10.18356/9789210027137>
- World Health Organization. (2023). *Family planning/contraception methods*. World Health Organization.
- .