

Original Research

The Effect of Family Center Nursing Education on Stunting Prevention Behavior Among Pregnant Women: A Study in East Kebundadap Village, Saronggi, Sumenep

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Article history

Received: 13 October 2025

Revised: 19 November 2025

Accepted: 25 November 2025

Published Online: 30 November 2025

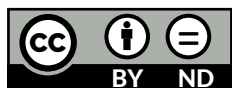
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How to cite this article: Yasin Z, Nawawi A, Wahid A. The Effect of Family Center Nursing Education on Stunting Prevention Behavior Among Pregnant Women: A Study in East Kebundadap Village, Saronggi, Sumenep. *Health Dynamics*, 2025, 2(11), 448-455. <https://doi.org/10.33846/hd21103>



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ABSTRACT

Background: Accelerating stunting prevention remains one of the government's current priority programs. Prolonged nutritional deficiency occurring from the time a child is in the womb through the early stages of life during the first 1,000 days after birth can result not only in failure of physical growth and development, but also in impaired brain development, particularly during the gestational period. Increasing participation in family empowerment through family-centered nursing can help prevent stunting. This study aimed to analyze the effect of family-centered nursing-based education on stunting prevention behaviors among pregnant women in East Kebundadap Village. **Methods:** This study employed a pre-experimental research design with a one-group pre-post test design. The population consisted of pregnant women in their first through third trimesters along with one family member each. A total of 34 participants were recruited using simple random sampling. Data analysis was performed using the paired sample t-test with a significance level of p-value ($\alpha < 0.05$). **Results:** The findings revealed that prior to receiving family-centered nursing education, the majority of pregnant women demonstrated poor preventive behaviors, whereas following the intervention, nearly all participants exhibited good preventive behaviors. The analysis of behavioral outcomes before and after family-centered nursing-based education yielded a p-value of 0.000 ($\alpha < 0.05$), indicating a statistically significant effect on the behaviors of pregnant women following the educational intervention. **Conclusions:** Behaviors during pregnancy are supported by maternal attitudes and knowledge regarding their own pregnancies. Family-centered nursing-based education effectively assists pregnant women and their family members in positively influencing maternal behavior during pregnancy as it relates to stunting prevention.

Keywords: Education; family center nursing; stunting; behavior

1. INTRODUCTION

Stunting remains one of the most pressing global public health challenges, particularly in low- and middle-income countries. Defined by the World Health Organization (WHO) as a height-for-age Z-score below -2 standard deviations from the median growth reference, stunting reflects chronic undernutrition that begins in utero and persists through the first two years of life.⁽¹⁾ Beyond impaired linear growth, stunting is associated with compromised immune function, delayed cognitive development, reduced academic performance, and diminished economic productivity in

adulthood.⁽²⁾ The global target set under the Sustainable Development Goals (SDGs) aims to reduce the prevalence of stunting to 40% by 2025, underscoring its recognition as a priority indicator for child health and national development.⁽³⁾

Indonesia ranked fifth globally in stunting prevalence in 2023. According to the 2022 Basic Health Research (*Riskesdas*), national stunting prevalence reached 30.8%, far exceeding the WHO threshold of 20%.⁽⁴⁾ In East Java Province, stunting affected 22% of children under five in 2021, rising to 26.86% based on the 2023 Indonesian Nutritional Status Survey (SSBGI). At the district level, Sumenep Regency has been designated as a national stunting priority area since 2021. Local data from the Saronggi Primary Health Center recorded 170 stunted toddlers across 14 villages in 2023, with East Kebundadap Village identified as the highest-burden locality with 34 stunting cases and 493 pregnant women registered across the catchment area.⁽³⁾

The etiology of stunting is multifactorial, involving inadequate dietary intake, recurrent infection, and suboptimal caregiving practices.⁽⁵⁾ Among these, maternal nutritional status during pregnancy is a critical determinant. Insufficient intake of macronutrients—energy, protein—and micronutrients such as iron and folic acid during the first trimester, when fetal brain and facial formation occur, significantly increases the risk of intrauterine growth retardation (IUGR) and subsequent stunting.⁽⁶⁾ The first 1,000 days of life, spanning from conception to the child's second birthday, represent a sensitive window during which nutritional interventions yield the greatest impact on growth outcomes.⁽⁷⁾ Despite this evidence, many pregnant women in Indonesia still lack access to supplementary feeding programs and remain unaware of balanced dietary practices during pregnancy.⁽⁴⁾

A major barrier to stunting prevention is limited maternal knowledge and health-seeking behavior. Many mothers do not recognize stunting as a pathological condition, perceiving short stature as a normal familial trait that resolves naturally with age.⁽⁸⁾ Ekayanthi and Suryani (2019) demonstrated that structured antenatal education significantly improved pregnant women's knowledge and attitudes toward stunting prevention.⁽⁹⁾ Similarly, behavioral theory posits that health behavior is shaped by three interrelated domains: knowledge (cognitive), attitude (affective), and practice (psychomotor). Intervening at the level of knowledge and attitude through targeted health education is therefore a

foundational strategy for promoting preventive behaviors.

The Family Center Nursing (FCN) model, conceptualized by Friedman et al. (2013),⁽¹⁰⁾ positions the family as an open, interconnected system in which all members influence each other's health outcomes. In this framework, nursing care extends beyond the individual patient to encompass family dynamics, roles, coping mechanisms, and health literacy. The FCN approach integrates six key assessment domains: sociocultural context, family development stage, environment, family structure, family function, and stress-coping strategies. Fauziyah et al. (2020) found that FCN-based family empowerment programs had a significant indirect effect on stunting prevention behaviors among pregnant women, reinforcing the model's utility in community-based maternal health interventions.⁽¹¹⁾ The Indonesian Ministry of Health has also endorsed family-centered strategies—including supplementary feeding (PMT), antenatal care (ANC), and the 1,000 HPK program—as pillars of the national stunting prevention.

Despite growing evidence supporting educational interventions in stunting prevention, few studies have examined the combined effect of FCN-based education targeting both pregnant women and their family members in resource-limited rural settings. The involvement of family as a motivator, educator, and facilitator represents an understudied dimension of stunting prevention, particularly in areas with high stunting burden such as Kebundadap Timur Village. This study therefore aimed to evaluate the effect of Family Center Nursing education on stunting prevention behavior among pregnant women in East Kebundadap Village, Saronggi District, Sumenep Regency, in 2025. Findings from this study are expected to provide evidence-based recommendations for community nurses and primary health center staff in designing family-inclusive prenatal health education programs.

2. METHODS

2.1 Study Design

This study used a pre-experimental research design with a one-group pre-test post-test approach. In this design, a single group of subjects was observed before the intervention (pre-test), received the Family Center Nursing (FCN) education, and was observed again after the intervention (post-test). This design was selected to identify the causal relationship between FCN-

based education and stunting prevention behavior among pregnant women without a separate control group.

2.2 Location and Date

This research was conducted from May to June 2025 at East Kebundadap Village, Saronggi Sub-district, Sumenep Regency, East Java Province, Indonesia. The village was designated as a local stunting priority area in 2025 by the Saronggi Primary Health Center (Puskesmas Saronggi), with 34 stunting cases recorded among children under five and 493 pregnant women registered across 14 villages in the catchment area as of December 2024.

2.3 Population and Sample Size

The study population consisted of all pregnant women in the first to third trimester residing in East Kebundadap Village, totaling 51 individuals. Sample. A sample of 34 respondents was determined using the Slovin proportional sampling formula with a margin of error of $d = 0.10$, a standard normal value of $Z = 1.96$, and an estimated proportion of $p = 0.5$, yielding $n = 33.5$, rounded up to 34. Sampling Technique. Participants were selected using simple random sampling, in which every member of the population had an equal probability of being selected.

2.4 Inclusion and Exclusion Criteria

Inclusion criteria were: (1) pregnant women in the first to third trimester, (2) willing to participate as respondents, and (3) present at the time of data collection. Exclusion criteria were: (1) not in the first to third trimester, (2) unwilling to participate, or (3) absent during data collection.

2.5 Independent and Dependent Variable

Independent variable: Family Center Nursing (FCN) education—a structured health education program delivered to pregnant women and at least one accompanying family member, covering topics of stunting knowledge, supplementary feeding (PMT), nutritional requirements, balanced dietary patterns, and healthy food choices during pregnancy. Family members were engaged as motivators, educators, and facilitators to support behavior change within the household. Dependent variable: Stunting prevention behavior among pregnant women—defined as a set of health-related actions taken to prevent stunting, including improving dietary patterns, receiving supplementary

food (PMT), consuming folic acid and iron supplements, practicing healthy hygiene behaviors (PHBS), attending routine antenatal care (ANC), attending routine *Posyandu* (primary health care center) visits, consuming pregnancy milk, and implementing the balanced plate concept ('*Isi Piringku*').

2.6 Data Collection

Data were collected using a self-administered checklist questionnaire measuring stunting prevention behaviors. The instrument applied the Guttman scale, with items scored as not performed = 0 and performed = 1. Total scores ranged from 0 to 15, categorized as: Good (11–15), Sufficient (6–10), and Poor (1–5). Data collection was conducted in two phases: (1) pre-test—questionnaire administered before the FCN education session to assess baseline behavior; and (2) post-test—questionnaire re-administered after the education session to evaluate behavioral change. The education was delivered through community health posts (*Posyandu*) with the presence of both the pregnant woman and one family member. Before completing the questionnaire, researchers explained the purpose of the study and the instructions for answering. All respondents provided written informed consent prior to participation.

2.7 Data Processing

Data processing involved four sequential steps: editing (verifying completeness of responses), coding (assigning numeric codes to demographic and behavioral variables), scoring (computing total behavior scores), and tabulating (organizing data into frequency distribution tables).

2.8 Data Analysis

Statistical analysis was performed using IBM SPSS Statistics version 20. Descriptive statistics were used to summarize participant demographics and behavioral scores. To test the effect of FCN education on stunting prevention behavior, inferential analysis was conducted using the paired t-test, comparing mean pre-test and post-test scores within the same group. The level of significance was set at $\alpha = 0.05$.

3. RESULTS

3.1 Demographic Characteristics of Respondents

A total of 34 pregnant women in the first to third trimester participated in this study. The demographic

profile of respondents is presented in Table 1. The majority of respondents were aged 29–32 years (26.5%), had completed senior high school education (41.2%), worked as housewives (70.6%), were in their second pregnancy with one existing child (multigravida with 1 child, 38.2%), and had a monthly income below IDR 500,000 (82.4%).

Table 1. Demographic characteristics of respondents (n = 34)

Characteristic	n	%
Age (years)		
17–20	5	14.7
21–24	7	20.6
25–28	6	17.6
29–32	9	26.5
33–36	5	14.7
37–40	2	5.9
Education Level		
Elementary School (SD)	6	17.6
Junior High School (SMP)	10	29.4
Senior High School (SMA)	14	41.2
University / College	4	11.8
Occupation		
Teacher	2	5.9
Self-employed	5	14.7
Farmer	3	8.8
Housewife (IRT)	24	70.6
Gravidity		
Primigravida	11	32.4
Multigravida (1 child)	13	38.2
Multigravida (2 children)	7	20.6
Multigravida (3 children)	3	8.8
Monthly Income (IDR)		
< 500,000	28	82.4
500,000 – 1,000,000	6	17.6
Total	34	100

IDR: Indonesian Rupiah
Source: Primary data, 2024

3.2. Stunting Prevention Behavior Before FCN Education (Pre-Test)

Prior to the Family Center Nursing (FCN) education intervention, the majority of respondents demonstrated poor stunting prevention behavior (70.6%, n = 24), while 23.5% (n = 8) showed sufficient behavior, and only 5.9% (n = 2) exhibited good behavior. These findings indicate that most pregnant women lacked adequate behavioral practices related to stunting prevention before receiving the educational intervention (Table 2).

Table 2. Distribution of stunting prevention behavior before FCN education (n = 34)

No.	Behavior category	n	%
1	Good	2	5.9
2	Sufficient	8	23.5
3	Poor	24	70.6
Total		34	100

Source: Primary data, 2024

3.3 Stunting Prevention Behavior After FCN Education (Post-Test)

Following the FCN education session, a marked improvement was observed in respondents' stunting prevention behavior. The proportion of respondents with good behavior increased substantially to 82.4% (n = 28), while 14.7% (n = 5) demonstrated sufficient behavior. Only 2.9% (n = 1) remained in the poor category, representing a substantial shift from baseline (Table 3).

Table 3. Distribution of stunting prevention behavior after FCN education (n = 34)

No.	Behavior category	n	%
1	Good	28	82.4
2	Sufficient	5	14.7
3	Poor	1	2.9
Total		34	100

Source: Primary data, 2024

3.4 Effect of FCN Education on Stunting Prevention Behavior

To evaluate the statistical significance of behavioral change, a paired sample t-test was performed comparing pre-test and post-test mean scores. The results are summarized in Table 4.

Table 4. Paired Sample t-Test Results: Stunting Prevention Behavior Before and After FCN Education (n = 34)

Variable	Measurement	n	Mean Score	p-value
Stunting prevention behavior	Pre-test	34	4.29	0.000
	Post-test	34	12.03	
Mean Difference			-7.735	

Source: Primary data, 2024

The mean behavioral score before the intervention was 4.29 (categorized as Poor), which increased to 12.03 (categorized as Good) after the FCN education,

representing a mean increase of 7.74 points. The paired sample t-test yielded a p-value of 0.000 ($p < 0.05$), indicating that the difference between pre-test and post-test scores was statistically significant. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted, confirming that Family Center Nursing education had a significant effect on stunting prevention behavior among pregnant women in Kebundadap Timur Village.

4. DISCUSSION

Stunting Prevention Behavior Among Pregnant Women Before FCN Education

Prior to the Family Center Nursing (FCN) education intervention, the majority of pregnant women in Kebundadap Timur Village demonstrated poor stunting prevention behavior (70.6%). This baseline finding reflects a significant knowledge and behavioral deficit in an area already designated as a stunting priority locality by the Saronggi Primary Health Center. These women largely lacked awareness of the village's stunting status and did not engage in key preventive practices such as routine antenatal care (ANC), supplementary feeding (PMT) consumption, or balanced dietary practices during pregnancy.

The high prevalence of poor behavior prior to the intervention is consistent with broader evidence that maternal knowledge and attitudes are fundamental determinants of preventive health behavior.⁽¹²⁾ According to Pender's Health Promotion Model, prior behavior—whether performed or omitted—directly and indirectly influences the likelihood of future health-promoting actions.⁽¹³⁾ In this study, women's pre-existing behavioral deficits appeared rooted in limited health literacy: most respondents (70.6%) had monthly incomes below IDR 500,000, and the majority were housewives with limited exposure to formal health information. These socioeconomic constraints are recognized contributors to suboptimal maternal nutrition and health behaviors.⁽¹⁴⁾

Although 41.2% of respondents had completed senior high school education, educational level alone did not translate into adequate stunting prevention behavior before the intervention. This is consistent with findings by Rachmah (2020), who observed that education level does not automatically produce correct preventive behavior unless accompanied by targeted and accessible health information.⁽¹⁵⁾ Similarly, Sholecha (2018) reported that most respondents exhibited only sufficient prior

behavior, and that prior behavior was significantly associated with preventive behavior outcomes.⁽¹⁶⁾ These findings reinforce the argument that structured educational interventions, rather than formal schooling alone, are necessary to translate knowledge into health-promoting action.

From the perspective of Lawrence Green's PRECEDE model (2005), three categories of behavioral determinants are relevant here.⁽¹⁷⁾ First, predisposing factors—including limited knowledge about stunting, its causes, and consequences—created a weak motivational foundation for preventive action. Second, enabling factors such as restricted access to health services, low income, and the absence of supplementary food support compounded behavioral deficits. Third, insufficient reinforcing factors—particularly the lack of family support and community health worker guidance—meant that even women who possessed some awareness were not adequately supported to act on it. Taken together, these interlocking factors explain why the majority of women in this setting entered the study with poor stunting prevention behavior.

Stunting Prevention Behavior Among Pregnant Women After FCN Education

Following the FCN education intervention, a substantial improvement in stunting prevention behavior was observed: the proportion of respondents categorized as having good behavior rose sharply from 5.9% to 82.4%, while those with poor behavior decreased from 70.6% to only 2.9%. This shift demonstrates the capacity of a structured, family-inclusive educational intervention to produce meaningful behavioral change within a single session when applied to a high-risk population in a community setting.

The improvement in post-intervention behavior can be attributed to the core principles of the Family Center Nursing model as described by Friedman et al. (2013),⁽¹⁸⁾ which frames the family as an open, interdependent system in which individual health behaviors are shaped by family dynamics, communication, and shared knowledge. By involving both the pregnant woman and at least one family member in the education session, the intervention activated the family's roles as motivator, educator, and facilitator of health behavior. This family-centered approach moves beyond individual-level education to reinforce behavior change through relational support within the household.

These results align with the findings of Fauziyah et al. (2020), who demonstrated that FCN-based family empowerment had a significant indirect effect on stunting prevention among pregnant women, and that involving family members enhances the sustainability of behavioral improvements beyond the intervention period.⁽¹¹⁾ Similarly, Syarifah et al. (2018) found significant differences in stunting prevention knowledge and behavior before and after structured health education.⁽¹⁶⁾ The consistency across studies supports the conclusion that educational interventions incorporating family involvement are more effective than those targeting only the individual pregnant woman.

The delivery method—combining oral health education (*ceramah*) with illustrated leaflets at the *Posyandu*—also likely contributed to the strong post-intervention outcomes. Visual and verbal reinforcement through culturally appropriate materials has been shown to enhance health literacy in low-resource settings.⁽¹⁹⁾ The active participation of respondents during the session, characterized by questions and discussion, suggests that the FCN approach successfully engaged both pregnant women and their family members as active participants in their own health management.

The persistence of poor behavior in a small minority (2.9%, $n = 1$) after the intervention may reflect individual-level barriers such as deeply ingrained cultural beliefs, lack of household decision-making power, or inability of the accompanying family member to attend the session due to work commitments—a limitation acknowledged by the researcher. This underscores the importance of follow-up sessions and ongoing community-based reinforcement to address residual behavioral gaps.

Effect of Family Center Nursing Education on Stunting Prevention Behavior

The paired sample t-test yielded a mean behavioral score increase from 4.29 (pre-test, Poor category) to 12.03 (post-test, Good category), representing a mean difference of 7.74 points (p -value = 0.000, $p < 0.05$). This statistically significant result confirms that Family Center Nursing education had a significant positive effect on stunting prevention behavior among pregnant women in East Kebundadap Village, 2025.

This finding is theoretically grounded in Lawm srence Green's behavioral change framework,⁽¹⁷⁾ which identifies health behavior as the product of predisposing, enabling, and reinforcing factors. The FCN education

addressed all three simultaneously: it enhanced predisposing factors by improving knowledge about stunting and its prevention; it strengthened enabling factors by providing practical guidance on PMT, ANC, iron and folic acid supplementation, and the 'Isi Piringku' balanced plate concept; and it activated reinforcing factors by empowering family members to support and sustain the pregnant woman's behavioral changes at home.

The results are consistent with Nirva Rantesigi et al. (2022), who reported a significant effect of family-based nutrition education on the knowledge, attitudes, and behavioral intentions of pregnant women and mothers of toddlers toward stunting prevention.⁽²⁰⁾ Nuralamsyah. et al. (2025) found a significant improvement in knowledge scores before and after the application of the FCN model at Sanggeng health center,⁽²¹⁾ and Niswa Salamung (2019) demonstrated that respondents with strong family support consistently exhibited good stunting prevention behavior.⁽²²⁾ The convergence of these findings across diverse Indonesian settings reinforces the generalizability of FCN-based educational interventions as an effective community nursing strategy.

From a nursing practice standpoint, the FCN model operationalized by this study followed a structured process: assessment of baseline knowledge and behavior, nursing diagnosis of knowledge deficits and behavioral risks, planning and implementation of the education session with family involvement, and evaluation via pre-test and post-test measurement. This systematic approach, rooted in Friedman's family nursing process,⁽¹¹⁾ demonstrates that community nurses and primary health center midwives can effectively deliver structured FCN education within existing *Posyandu* platforms without additional resources or specialized facilities.

Nevertheless, several limitations of this study should be acknowledged. The pre-experimental design without a control group limits causal inference, as behavioral improvements cannot be fully attributed to the FCN education alone; concurrent *Posyandu* activities and Hawthorne effects may have contributed. The short interval between pre-test and post-test does not permit conclusions about the durability of behavioral change over time. Additionally, the simple random sample was drawn from a single village, limiting the external validity of findings. Future studies should employ randomized controlled designs with longer follow-up periods and

multi-site sampling to more rigorously evaluate the sustained impact of FCN-based education on stunting prevention behavior.

5. CONCLUSION

This study concludes that Family-Centered Nursing Education had a meaningful effect on improving stunting prevention behavior among pregnant women in Kebundadap Timur Village. Before the educational intervention, the majority of participants demonstrated poor preventive behaviors. However, following the intervention, nearly all participants exhibited good preventive behaviors. These findings suggest that Family-Centered Nursing Education is an effective approach to enhancing maternal knowledge and behavior related to stunting prevention, and its implementation in community health settings is strongly recommended to reduce the risk of stunting among children.

Ethical Approval

The study received ethical approval from the Faculty of Health Sciences, Wiraraja University ethics committee (approval No. 072/KEPK-FIK/UNIJA/VI/2025)

Acknowledgement

We would like to express our gratitude to all parties who have helped complete this research.

Competing Interests

All the authors declare that there are no conflicts of interest.

Funding Information

No funds were received for this study.

Underlying Data

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

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