ORIGINAL RESEARCH ARTICLE

A premarital services education model of preventing stunting among prospective newlyweds from North Sumatera, Indonesia

DOI: 10.29063/ajrh2024/v28i9.10

Lita S. Andayani[1], Juliandi Harahap[2], Rina Amelia[3], Nenni D. A. Lubis[4], Dina Keumala Sari[4], Lili Rohmawati[5], Destanul Aulia[6] and Zulhaida Lubis[7]*

Department of Health Education and Behavioral Sciences, Faculty of Public Health, Universitas Sumatera Utara, Indonesia[1]; Department of Community Medicine, Faculty of Medicine, Universitas Sumatera Utara, Indonesia[2,3]; Department of Nutrition, Faculty of Medicine, Universitas Sumatera Utara, Indonesia[4]; Department of Pediatrics, Faculty of Medicine, Universitas Sumatera Utara, Indonesia[5]; Department of Health Administration and Policy, Faculty of Public Health, Universitas Sumatera Utara, Indonesia[6]; Department of Nutrition, Faculty of Public Health, Universitas Sumatera Utara, Indonesia[7]

***For Correspondence:** Email: *lita.sri@usu.ac.id*

Abstract

Stunting, attributed to insufficient nutrition during the critical first 1000 days of life, remains a pressing public health issue in North Sumatera, Indonesia. This study investigates the influence of pre-marital education on prospective couples' knowledge and nutritional status as a stunting prevention strategy. Employing a quantitative, cross-sectional design, the study involved 1000 prospective couples across 10 districts. Data were collected through structured questionnaires and analyzed using Structural Equation Modeling (SEM). The findings demonstrate that pre-marital education significantly enhances knowledge of nutrition, family planning, and stunting prevention, leading to improved nutritional status. However, increased knowledge of stunting was inversely related to nutritional status. The study concludes that comprehensive pre-marital education is vital for effective stunting prevention. It recommends a thorough revision of pre-marital educational content, emphasizing a tailored and integrative approach to health and nutrition, to address specific regional challenges and enhance overall program efficacy. *(Afr J Reprod Health 2024; 28 [9]:108-121)*

Keywords: Education, Growth Disorders, Nutritional Status, Health Knowledge, Family Planning Services, Indonesia

Résumé

Le retard de croissance, attribué à une nutrition insuffisante au cours des 1 000 premiers jours critiques de la vie, reste un problème de santé publique urgent dans le nord de Sumatera, en Indonésie. Cette étude examine l'influence de l'éducation prénuptiale sur les connaissances et l'état nutritionnel des futurs couples en tant que stratégie de prévention du retard de croissance. Utilisant une conception quantitative et transversale, l'étude a porté sur 1 000 couples potentiels dans 10 districts. Les données ont été collectées au moyen de questionnaires structurés et analysées à l'aide de la modélisation d'équations structurelles (SEM). Les résultats démontrent que l'éducation prénuptiale améliore considérablement les connaissances en matière de nutrition, de planification familiale et de prévention du retard de croissance, conduisant ainsi à une amélioration de l'état nutritionnel. Cependant, une meilleure connaissance du retard de croissance était inversement liée à l'état nutritionnel. L'étude conclut qu'une éducation prénuptiale complète est essentielle pour une prévention efficace du retard de croissance. Il recommande une révision approfondie du contenu éducatif prénuptial, en mettant l'accent sur une approche adaptée et intégrative de la santé et de la nutrition, pour relever les défis régionaux spécifiques et améliorer l'efficacité globale du programme. *(Afr J Reprod Health 2024; 28 [9]: 108-121).*

Mots-clés: CO2 ; Éducation, troubles de la croissance, état nutritionnel, connaissances en matière de santé, services de planification familiale, Indonésie

Introduction

Stunting remains a significant public health challenge in Indonesia, with far-reaching consequences for the nation's development. It is a condition characterized by impaired growth and development in children due to inadequate nutrition, particularly during the critical first 1000 days of life, from conception to two years of age. This condition leads to cognitive, physical, and immune impairments in children, affecting their social and economic well-being in the future[1]. The impact of stunting is profound, as it increases the risks of illness, mortality, suboptimal brain development,

susceptibility to non-communicable diseases, and degenerative conditions[2,3]. Despite efforts to reduce stunting, Indonesia's prevalence rates remain high. According to the Indonesian Nutritional Status Study (SSGI), the stunting rate among toddlers in Indonesia decreased from 24.4% in 2021 to 21.6% in 2022[4,5]. Nonetheless, these figures are still well above the national target of reducing stunting prevalence to 14% by 2024[6]. In North Sumatera Province, the stunting prevalence decreased from 25.8% in 2021 to 21.1% in 2022. However, 21 out of 33 districts/cities in the province reported stunting rates above 20%, with some areas experiencing rates as high as 39.4%. According to the World Health Organization (WHO), a stunting prevalence above 30% is considered high, while a prevalence below 20% is considered low[7].

Despite ongoing interventions, a critical gap persists in addressing the underlying factors contributing to stunting, particularly maternal and child health[8]. Among these factors, the hemoglobin level of pregnant women is crucial in determining the risk of stunting[9]. Hemoglobin is a protein that carries oxygen in the blood, and low hemoglobin levels in pregnant women can lead to reduced oxygen supply to the fetus, hindering fetal growth and development[10]. Studies have shown that pregnant women with hemoglobin levels below 11 g/dL in the first trimester have a 2.5 times higher risk of giving birth to stunted children compared to those with normal hemoglobin levels[11]. However, despite the known association between hemoglobin levels and stunting, the study did not include any variables related to hemoglobin in its analysis, leaving a significant gap in understanding the full spectrum of factors contributing to stunting.

One form of stunting prevention is pre-marital education services. Some activities that can be carried out in pre-marital education include providing information about stunting risk factors, specific and sensitive stunting prevention interventions, and pre-marital counselling[12,13]. In the context of stunting prevention, particularly sensitive nutritional interventions, it is crucial to change the behavior of prospective mothers and fathers[14]. Therefore, before getting married, prospective couples should prepare for optimal health and marry at an ideal age[15]. However, challenges and obstacles in pre-marital education for stunting prevention may encompass various aspects, including the knowledge and attitudes of couples planning to marry.[16,17] Many couples are unaware of the importance of preconception nutrition management that should be applied before pregnancy.[18] This is exacerbated by the high rate of marriage at a young age contributing to up to 35% of stunting incidents.[19]

This study aims to analyze the relationship between pre-marital education services, stunting knowledge, nutrition knowledge, family planning knowledge, and the nutritional status of prospective brides and grooms. Furthermore, the study seeks to develop a model that can improve the quality of health and prevent stunting among prospective couples through pre-marital education services. This research is significant as it addresses the existing gap in developing a comprehensive stunting prevention model that considers the role of prospective couples, particularly bridegrooms, in shaping the future health outcomes of their children. Pre-marital services are a strategic government program designed to enhance human resource quality, yet there is currently no research that develops a stunting prevention model targeting prospective couples through these services in Indonesia. By addressing this gap, the study aims to contribute to the broader effort of reducing stunting prevalence and improving child health outcomes across the nation.

Methods

Study design

This study employs a quantitative research design with a cross-sectional study design. The study was conducted in North Sumatera Province, Indonesia, from September to November 2022. The research area comprises districts/cities with stunting prevalence above 20%, consisting of 10 selected districts/cities: Langkat Regency, Dairi Regency, Pakpak Bharat Regency, Samosir Regency, Simalungun Regency, North Labuhan Batu Regency, Padang Lawas Regency, North Padang Lawas Regency, Mandailing Natal Regency, and Padang Sidempuan City.

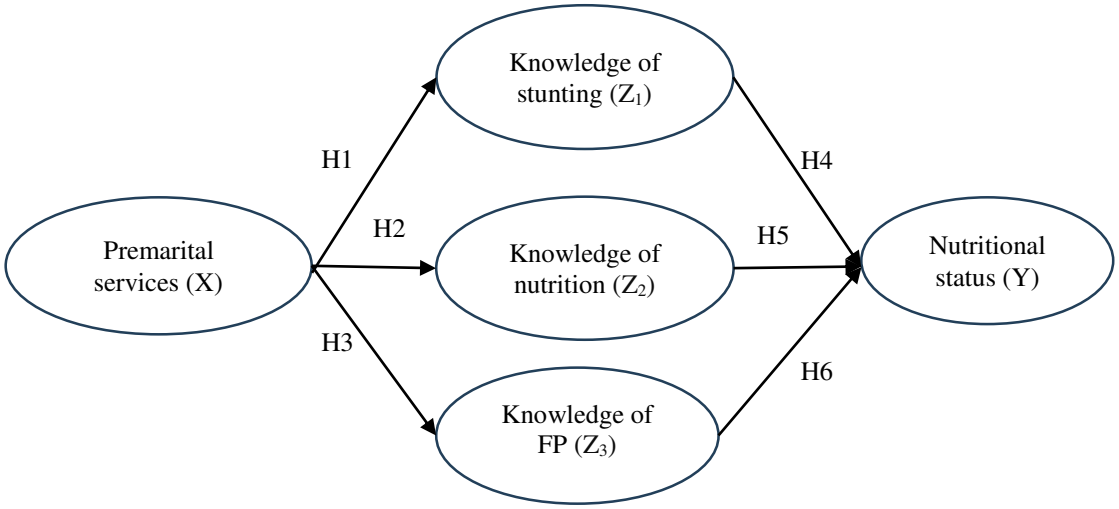

Figure 1: Research Model

Sampling technique and data collection

The population of this study includes all prospective brides and grooms in North Sumatera in 2022. The sampling technique employed is cluster sampling, grouping samples based on the research area's regions or locations. Ten districts/cities were randomly selected as research clusters out of the 33 districts/cities in North Sumatera Province. From each cluster, 100 prospective brides and grooms were randomly selected as research samples, totaling 1000 individuals. Prospective brides and grooms sampled for this research are from families at risk of stunting according to the criteria set by the National Population and Family Planning Board (BKKBN), with one or more risk factors such as low parental education, poor environmental sanitation, and inadequate drinking water availability within the family. Data collection was conducted using a questionnaire that has undergone validity and reliability testing. Validity and reliability testing was performed to assess the research instrument's quality. Validity testing employed confirmatory factor analysis (CFA) to test construct validity and criterion validity. Reliability testing utilized Cronbach's alpha coefficient to test the internal consistency of the instrument, as well as weight and height measuring devices. The questionnaire comprised questions related to the research's independent variables.

Dependent variable

The dependent variable is the nutritional status of prospective brides and grooms. Nutritional status is measured using the body mass index (BMI), which is the ratio of weight to height. BMI is categorized into four groups: underweight (BMI < 18.5 kg/m²), normal (BMI 18.5-24.9 kg/m²), overweight (BMI 25-29.9 kg/m²), and obesity (BMI ≥ 30 kg/m²).

Independent variable

The independent variables are pre-marital services, knowledge of stunting, knowledge of nutrition, and knowledge of family planning (FP). These independent variables are ordinal scales for each research question.

Research model

The research model consists of five variables: pre-marital services (X), knowledge of stunting (Z_1), knowledge of nutrition (Z_2), knowledge of FP (Z_3), and nutritional status (Y). The formed model is as follows: Figure 1

The hypotheses of this model are as follows:

H_1 : Pre-marital services (X) have a positive effect on knowledge of stunting (Z_1)

H_2 : Pre-marital services (X) have a positive effect on knowledge of nutrition (Z_2)

H_3 : Pre-marital services (X) have a positive effect on knowledge of FP (Z_3)
H_4 : Knowledge of stunting (Z_1) has a positive effect on nutritional status (Y)
H_5 : Knowledge of nutrition (Z_2) has a positive effect on nutritional status (Y)
H_6 : Knowledge of FP (Z_3) has a positive effect on nutritional status (Y)

Statistical analysis

The data analysis technique employed is Structural Equation Modeling (SEM). SEM was chosen because it can test relationships between variables simultaneously and evaluate complex models. SEM comprises two parts: the measurement model and the structural model. The measurement model tests the relationship between latent variables and their indicators, while the structural model tests the relationship between latent variables. The analysis steps include selecting an SEM model based on the proposed hypotheses, specifying the model by determining path coefficients according to the hypotheses, estimating the model using PLS algorithm, evaluating the model with validity and reliability tests, and conducting goodness of fit tests using parameters such as R-squared.

Ethics

University of North Sumatera Health Research Ethics Committee no. 955/KEPK/USU/2022. No animals were used in this study. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or research committee and the 1975 Helsinki Declaration, as revised in 2013. Informed consent from the respondents was obtained in writing.

Results

Measurement model

The analysis of Loading Factors indicates that each item on the constructs of pre-marital Services, Knowledge of Stunting, Knowledge of Nutrition, and Knowledge of Family Planning effectively reflects the measured constructs after elimination. High Cronbach's Alpha values indicate a good level of internal consistency among the items used in each construct. Dijkstra-Henseler's Rho (ρA) provides an indication of high composite reliability, affirming that the measurement results are reliable. Furthermore, the Composite Reliability (CR) demonstrates that the constructs consistently contribute to the overall model. The analysis of Average Variance Extracted (AVE) meeting the requirements signifies good convergent validity for the constructs of pre-marital Services, Knowledge of Stunting, Knowledge of Nutrition, and Knowledge of Family Planning. The variance of the constructs explained by their own indicators is greater than the variance explained by error factors. Table 1

Structural model

In addition to focusing on convergent validity, this study also evaluates the Discriminant Validity of the measurement model using the Fornell-Larcker Criterion and Heterotrait-Monotrait (HTMT) ratio. Both methods are employed to ensure that the measured constructs have significant differences from one another. The Fornell-Larcker Criterion is used to assess the extent to which a construct can be distinguished from other constructs. The analysis results show that the AVE values for each construct are greater than the squared correlation between that construct and other constructs. In other words, more than half of the variance of each construct is explained by its own indicators compared to the variance explained by other constructs, fulfilling the necessary conditions for Discriminant Validity.

Furthermore, the Heterotrait-Monotrait (HTMT) ratio is also used to measure how two constructs differ from each other in terms of correlation. The analysis results indicate that all HTMT ratio values are below the established threshold, confirming that the constructs of pre-marital Services, Knowledge of Stunting, Knowledge of Nutrition, and Knowledge of Family Planning are significantly different from each other with adequate significance. Table 2

Thus, this study concludes that the measurement model meets the criteria for Discriminant Validity based on both the Fornell-Larcker Criterion and Heterotrait-Monotrait

Table 1: Measurement model result

Construct/item	Loading	Cronbach' alpha	Dijkstra-Henseler's rho (ρA)	CR	AVE
Pre-marital Services		0.846	0.856	0.928	0.866
When you report to the Office of Religious Affairs for marriage certificate processing, do you receive health counseling from religious leaders (clerics, pastors)?	0.940				
Do religious leaders recommend visiting health services (community health centers/hospitals) for health counseling and health services?	0.921				
Knowledge of Stunting		0.766	0.773	0.849	0.585
Children experiencing stunting generally have lower intelligence compared to non-stunted children.	0.755				
Difficulty in communication and playing with others is not one of the impacts of stunting.	0.788				
Infant babies need stimulation to accelerate their growth and development.	0.763				
Maternal nutrition intake during pregnancy significantly influences the development of the fetus she carries.	0.754				
Knowledge of Nutrition		0.380	0.383	0.763	0.617
What are the food groups that constitute a source of animal protein?	0.796				
Why is the habit of breakfast important?	0.775				
Knowledge of Family Planning		0.906	0.933	0.849	0.585
Hormonal contraception methods are divided into two types, namely combined contraception (estrogen and progesterone) and progestin-only contraception (progesterone only).	0.741				
The side effects of hormonal contraception are all the same.	0.738				
Implants (contraceptive implants) are inserted in the buttocks area.	0.736				
Three-month injections can cause amenorrhea (no menstruation).	0.760				
Combined pills and injections can affect breastfeeding.	0.773				
The mechanism of action of implants differs from pills and contraceptive injections.	0.823				
Long-acting contraceptive methods include implants and IUDs (intrauterine devices).	0.838				
Non-hormonal contraceptives include IUDs and male/female sterilization methods, condoms.	0.764				

Note (s): CR = composite reliability; AVE = average variance extracted

Table 2: Discriminant validity

Fornell–Larcker criterion		**KoN**	**KoFP**	**KoS**	**PS**	**NS**
	KoN	0.786				
	KoFP	-0.046	0.772			
	KoS	-0.229	0.345	0.765		
	PS	0.144	0.112	-0.154	0.931	
	NS	0.106	0.070	-0.062	0.478	1.000
Heterotrait-monotrait (HTMT) ratio	**KoN**					
	KoFP	0.102				
	KoS	0.425	0.424			
	PS	0.253	0.110	0.190		
	NS	0.172	0.070	0.070	0.516	
	Note (S): KoN = Knowledge of nutrition, KoFP = Knowledge of FP, KoS = Knowledge of Stunting, PS = Pre-marital Services, NS = Nutritional Status					

Table 3. Hypothesis Results

Hypothesis	**B**	**T value**	**P value**
H1: PS -> KoS	-0.154	4.878	<0.001
H2: PS -> KoN	0.144	4.802	<0.001
H3: PS -> KoFP	0.112	3.512	<0.001
H4: KoS -> NS	-0.075	2.215	0.027
H5: KoN -> NS	0.093	2.976	0.003
H6: KoFP -> NS	0.100	3.098	0.002

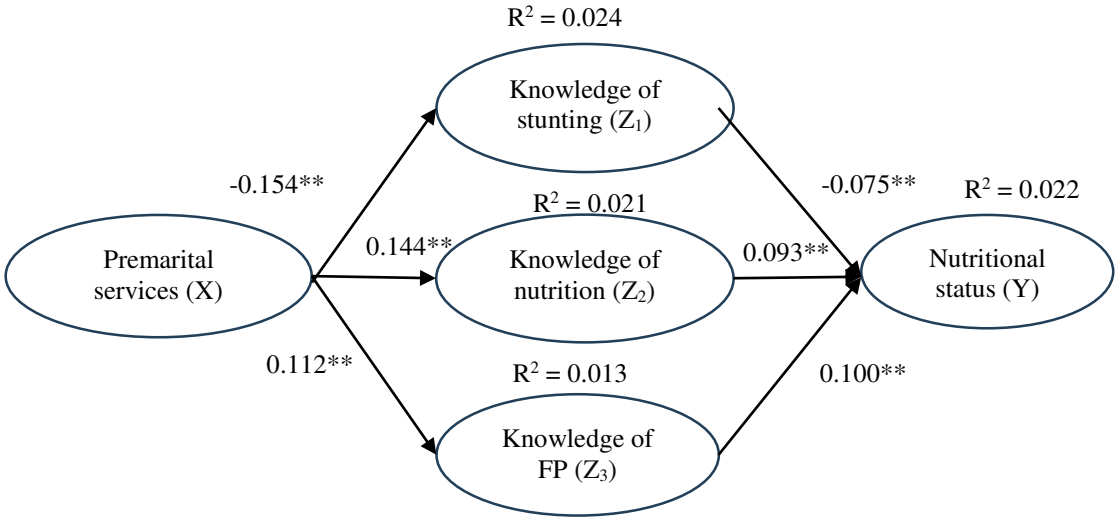

Figure 2: Result model

(HTMT) ratio. These results affirm that the constructs measured in this research have significant differences, providing confidence that they can be effectively distinguished from each other. A good evaluation of Discriminant Validity is crucial to ensure that the results of structural analysis can be interpreted clearly and to prevent issues such as multicollinearity or interpretation ambiguity. Table 3

The analysis of hypotheses reveals significant findings regarding the relationships between variables in this research model. Firstly, H_1,

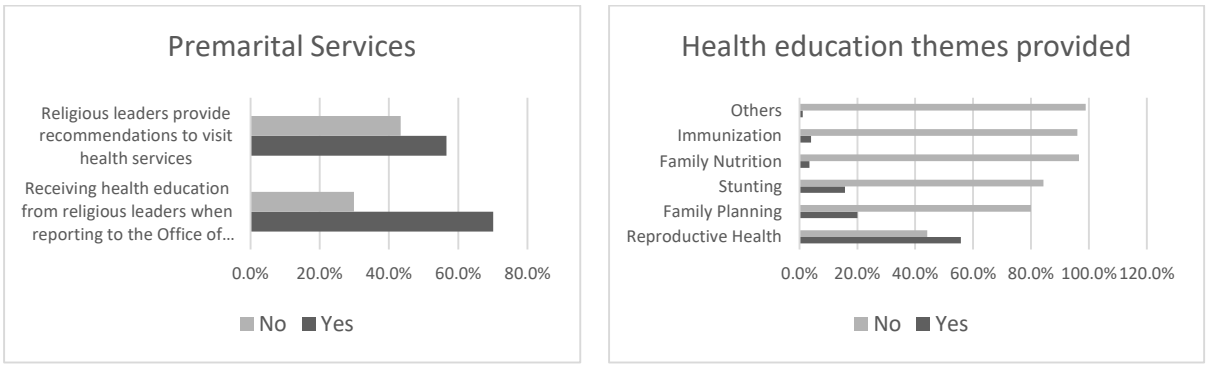

Figure 3: (a). Percentage of prospective brides and grooms receiving pre-marital counseling; (b) Health education themes provided to prospective brides and grooms

stating that pre-marital services (X) have a negative and significant effect on knowledge of stunting (Z_1), is accepted. This indicates strong statistical evidence showing that higher pre-marital services correspond to lower knowledge of stunting among respondents, with a P-value less than 0.001.

Secondly, H_2 is accepted with analysis results indicating that pre-marital services (X) have a positive and significant effect on knowledge of nutrition (Z_2) (P Value < 0.001). This suggests that an improvement in the quality of pre-marital services contributes positively to an increase in knowledge of nutrition among respondents.

Meanwhile, H_3 is also accepted, indicating that pre-marital services (X) have a positive and significant effect on knowledge of family planning (Z_3) (P Value < 0.001). These results suggest that better pre-marital services are associated with increased knowledge of family planning among respondents.

On the other hand, the relationships between knowledge of stunting (Z_1), knowledge of nutrition (Z_2), and knowledge of family planning (Z_3) significantly influence nutritional status (Y) with P-values of 0.027, 0.003, and 0.002, respectively. Furthermore, the influence of knowledge of stunting (Z_1) on nutritional status (Y) is negative. This indicates that higher knowledge of stunting results in lower nutritional status. Meanwhile, knowledge of nutrition (Z_2) and knowledge of family planning (Z_3) on nutritional status (Y) have a positive effect. This suggests that higher knowledge of nutrition and family planning results in higher nutritional status among prospective brides and grooms. Figure 2.

Discussion

The negative effect of pre-marital services on knowledge of stunting

The findings of the hypothesis analysis affirm the crucial role of pre-marital Services in shaping the knowledge of prospective spouses regarding stunting. The results indicating a significant negative influence of pre-marital Services on Stunting Knowledge (Z_1) reflect that enhancing the quality of pre-marital services can strengthen the awareness of prospective spouses regarding the risks of stunting. These findings are consistent with the understanding that educational approaches in the early stages of marriage can be a strategic point in stunting prevention.[20]

One theoretical framework supporting this observation is the Health Belief Model (HBM).[21] According to the HBM, individuals are more likely to adopt health-related behaviors if they perceive vulnerability to a particular health issue, understand the severity of the problem, believe that taking specific actions will reduce the risk, and perceive the benefits of taking those actions outweigh the costs. In the context of this study, pre-marital services may not adequately address individuals' perceptions of vulnerability to stunting, thus resulting in lower levels of knowledge. Figure 3

Based on the percentages (Figure 3), pre-marital Services may not sufficiently address individuals' perceptions of vulnerability to stunting because the health education themes provided for stunting knowledge are still very low, below 20%, as

provided by religious leaders. Although religious leaders provide health education when reporting to the Office of Religious Affairs at a high category of 70%, prospective spouses receiving recommendations to visit health services remain low, below 60%. There are at least two potential negative influences. Firstly, the lack of quality and quantity of materials on stunting conveyed in pre-marital services. Secondly, the lack of interest and attention from couples regarding stunting materials, as they may consider it irrelevant or unimportant.

In the first aspect, Social Cognitive Theory (SCT) can provide additional perspective. SCT emphasizes the role of observational learning and social influence.[22] If pre-marital services do not incorporate opportunities for observational learning or lack positive social reinforcement regarding the importance of stunting knowledge, the impact on respondents' understanding may diminish. Integrating SCT principles into counseling sessions can enhance the effectiveness of this intervention. Various research articles indicate that pre-marital services can be an effective means of conveying health information, including stunting, to prospective spouses.[23–25] However, if the conveyed materials are inadequate in terms of quality and quantity, prospective spouses' awareness of the importance of stunting prevention becomes low.[26] Inadequate materials may not sufficiently emphasize the importance of prospective spouses' understanding of stunting, which, in turn, may reduce their attention to necessary prevention practices. Furthermore, the lack of materials can impact the readiness of prospective spouses. Insufficient information about stunting can result in unpreparedness in addressing health issues in marriage, including a lack of understanding of healthy eating patterns, appropriate nutrition, and necessary stunting prevention measures.[27]

In the second aspect, the Theory of Planned Behavior also provides relevant insights.[28] This theory states that attitudes, subjective norms, and perceived behavioral control influence individuals' intentions and behaviors. If pre-marital services do not positively influence attitudes and subjective norms regarding the importance of stunting knowledge, prospective spouses may not be inclined to enhance their knowledge. Therefore, counseling effectiveness may be limited if these aspects are not considered. Firstly, some couples may perceive stunting as a health issue that is not very relevant to the early phase of marriage.[29] They may be more focused on wedding preparations, household life, and other aspects deemed more pressing. Hence, the lack of relevance in presenting stunting information in the context of married life may result in couples not paying sufficient attention to the material.[30]

Additionally, the perception that stunting is more technical or scientific may lead couples to find it difficult to understand or not suitable for their practical needs in daily life. In this case, delivering overly inaccessible or heavy materials may cause couples to lose interest in understanding and applying the information.[31] A lack of understanding of the long-term impacts of stunting can also make couples feel that this issue lacks sufficient urgency.[32] They may not realize that stunting can have serious consequences for their children's health and overall family life.

Therefore, it is crucial for pre-marital service providers to consider how information is delivered to make it more engaging and relevant to couples. Connecting information about stunting with their roles as parents and its impact on family life can increase their interest and understanding.[33] Additionally, integrating materials with real-life examples and practical solutions can help make the information more understandable and relevant to couples preparing for marriage.

Positive effect of pre-marital services on knowledge of nutrition

The analysis results indicate that pre-marital services have a significant and positive impact on nutrition knowledge. These findings suggest that the improvement in the quality of pre-marital services contributes positively to the enhancement of knowledge about nutrition among prospective brides and grooms. This aligns with several previous studies that have found preconception nutrition education for prospective brides and grooms to enhance knowledge, attitudes, and behaviors towards nutrition, aiding in preventing nutritional issues in mothers and infants.

Nutrition knowledge is one of the factors influencing an individual's nutrition behavior.[34] Good nutrition knowledge can assist an individual in selecting and consuming balanced and nutritious foods according to their body's needs.[35] Good nutrition knowledge can also prevent individuals from suffering from malnutrition or nutrient deficiencies that can adversely affect their health and that of their infants. Malnutrition in pregnant mothers can lead to various complications such as anemia, preeclampsia, premature birth, and maternal or infant mortality. Malnutrition in infants can result in stunting, brain development disorders, decreased immune function, and increased risk of chronic diseases in the future.[36] In the context of research findings, pre-marital services are not just about wedding preparations but also about investing in health and nutrition knowledge. These findings support the idea that a holistic approach to wedding preparation, including health and nutrition aspects, can have a greater positive impact on couples' well-being. Health education theories can be used to explain the positive relationship between pre-marital services and nutrition knowledge.[37] According to this theory, the delivery of information and education before marriage can enhance individuals' readiness to manage their own health, including understanding nutrition. Health education through pre-marital services can be seen as an investment in empowering individuals to make better decisions regarding nutrition.

Therefore, improving nutrition knowledge among prospective brides and grooms through pre-marital services is a crucial step towards realizing a healthy and high-quality generation. It is hoped that prospective brides and grooms can apply the nutrition knowledge they acquire in their daily lives, both before and after marriage. Additionally, prospective brides and grooms also need support from family, society, and government to create a conducive environment for their health and nutrition.

Positive effect of pre-marital services on knowledge of family planning

The analysis results indicate that pre-marital services have a significant and positive impact on family planning (FP) knowledge. These findings suggest that the improvement in the quality of pre-marital services contributes positively to the enhancement of FP knowledge among prospective brides and grooms. This research outcome is consistent with previous literature demonstrating the crucial role of pre-marital services in shaping community knowledge about FP.[17,38,39] Enhancing this knowledge can assist in making better decisions regarding family planning, reproductive health, and population control efforts.

FP knowledge is one of the factors influencing an individual's FP behavior.[40] Good FP knowledge can help an individual select and use FP methods according to their health condition, needs, and preferences.[41] Moreover, good FP knowledge can motivate individuals to actively participate in FP programs, both as acceptors and educators.[42] Positive FP behavior can benefit family health and well-being, such as reducing the risk of unintended pregnancies, decreasing maternal and infant mortality rates, increasing birth spacing, and controlling population growth.[43,44]

Therefore, enhancing FP knowledge among prospective brides and grooms through pre-marital services is a crucial effort to improve family life quality. It is expected that prospective brides and grooms can apply the FP knowledge they acquire in planning and managing the desired number and spacing of children. Additionally, prospective brides and grooms also need support from family, society, and government to access and utilize available FP services.[45]

Negative effect of knowledge of stunting on nutritional status

The knowledge of stunting regarding the nutritional status of prospective brides and grooms has a significant negative effect. This indicates that the higher the knowledge of stunting, the lower the nutritional status of prospective brides and grooms. Stunting knowledge may not be sufficient to change the behavior of prospective brides and grooms in choosing and consuming healthy and nutritious foods due to the lack of quality and quantity of stunting-related materials conveyed in pre-marital services.[46,47]

Low knowledge about stunting can hinder prospective brides and grooms in making healthy and nutritious food choices.[48,49] Without adequate understanding of the impact of stunting on health, prospective brides and grooms may not realize the importance of adequate nutrition for optimal growth. In behavioral theory, the Health Belief Model can be applied to explain why stunting knowledge may not be sufficient to change the behavior of prospective brides and grooms.[21] This model suggests that to change behavior, an individual must feel vulnerable to a particular health issue, perceive significant negative impacts, and believe that specific actions can reduce the risk or consequences. If prospective brides and grooms do not perceive the urgency or importance of addressing stunting, knowledge alone may not sufficiently motivate them to adopt healthier eating patterns.

This study has several important implications for stunting prevention programs in Indonesia. First, there is a need to improve the quality and quantity of materials related to stunting conveyed in pre-marital services. These materials should include information on the causes, impacts, and prevention methods of stunting, as well as recommendations on the energy, protein, vitamin, and mineral intake needed by prospective brides and grooms.[50] Second, there is a need for more effective and interactive nutrition counseling approaches for prospective brides and grooms.[51] Nutrition counseling can assist prospective brides and grooms in making decisions and taking actions to improve their nutrition. Nutrition counseling can also utilize media and methods that are engaging and culturally appropriate.[52,53] Third, there is a need for a conducive environmental support for prospective brides and grooms to adopt good nutritional behaviors.[54,55] This support can include easy and affordable access to nutritional supplements and nutritious foods, as well as the involvement of family, community, and other stakeholders in stunting prevention programs.

Positive effect of knowledge of nutrition on nutritional status

This study demonstrates that nutrition knowledge significantly influences the nutritional status of prospective brides and grooms for stunting prevention. This is consistent with several previous studies that have also found a relationship between pre-marital nutrition knowledge and nutritional status and attitudes of brides and grooms in stunting prevention efforts.[56,57] Pre-marital nutrition knowledge is one of the factors that can influence the nutritional behavior of prospective brides and grooms, such as food choices, meal frequency, and nutrient intake.[33] Good nutritional behavior can improve the nutritional status of prospective brides and grooms, which impacts reproductive health, and fertility.[58] Good nutritional status can also prevent stunting in born children because stunting is influenced by genetic and environmental factors, including maternal nutrition before and during pregnancy.[59] Nutrition education can provide information about the importance of balanced nutrition, types and amounts of needed foods, essential nutrients, and the impact of poor nutrition on reproductive health and children. Nutrition education can also shape the positive attitudes of prospective brides and grooms towards stunting prevention efforts, thereby motivating them to adopt good nutritional behaviors.[33] Therefore, nutrition education should be tailored to the characteristics and needs of prospective brides and grooms, and involve various stakeholders such as family, community, healthcare providers, and government.

Positive effect of knowledge of family planning on nutritional status

The study findings indicate that family planning (FP) knowledge has a significant and positive impact on nutritional status. This implies that the higher the FP knowledge, the better the nutritional status of prospective brides and grooms. This study is consistent with several previous studies that have found a positive relationship between FP knowledge and the nutritional status of prospective brides and grooms.[15,60,61]

Individuals with good knowledge of FP tend to lead healthier lifestyles and are able to plan pregnancies more wisely.[62]. Adequate knowledge of FP provides prospective brides and grooms with the ability to space births and pay special attention to nutritional aspects during the pre-pregnancy period.

Nutritional epidemiology research emphasizes the importance of understanding nutritional factors that affect public health. In the context of FP knowledge, this study reflects that understanding contraception can be considered a nutritional factor in controlling individuals' nutrient intake.[63]

Good knowledge of FP can encourage prospective brides and grooms to use appropriate contraception, allowing them to plan pregnancies at the right time and consider optimal nutritional conditions.[64] This can reduce the risk of unplanned pregnancies and provide an opportunity to enhance nutrient intake before and during pregnancy. Additionally, FP knowledge can also influence the dietary patterns and nutrient intake of prospective brides and grooms.[65] Those with good knowledge may be more inclined to prepare themselves optimally, both physically and nutritionally, before entering the pregnancy phase.

Strengths and limitation

The study's strengths include its use of a large sample size and a well-defined research model to explore the relationship between pre-marital education and stunting prevention. However, limitations involve the cross-sectional design, which restricts the ability to establish causality, and the potential bias due to self-reported data from respondents. Additionally, the exclusion of variables such as hemoglobin levels, which are known to influence stunting, may limit the study's comprehensiveness.

Conclusion

Pre-Marriage Services significantly influence prospective spouses' knowledge of nutrition and family planning (FP), though they negatively affect stunting knowledge. To improve effectiveness, it is recommended to enhance the quality and quantity of stunting-related content and incorporate Social Cognitive Theory and the Theory of Planned Behavior into counseling. Health education should be more relevant to future parenting roles, with a holistic approach integrating health and nutrition. Emphasizing tailored nutrition and FP education, involving families, communities, and professionals, is essential. Special attention should be given to increasing stunting knowledge and promoting behavior change for optimal outcomes.

Acknowledgments

The authors gratefully acknowledge the support of the Ministry of Education, Culture, Research, and Technology, the Indonesian Rector's Forum, and the National Population and Family Planning Board (BKKBN) in advancing this research on stunting reduction in North Sumatera. We also thank the respondents for their participation and valuable contributions.

Conflict of interest

None

Funding

This study acknowledges the financial assistance provided by the Matching Fund Program – Kedaireka, Ministry of Education, Culture, Research, and Technology, through the Rector of the University of North Sumatera, as delineated in Cooperation Agreement Numbers: 270/E1/KS.06.02/2022 and 9765.1/UN5.1.R/KPM/2022.

Authors contribution

LSA: Conceptualization, formal analysis, and writing – original draft. JH: Supervision, methodology, and supervision. RA, NDA, DKS, LR, DA, and ZL: Visualization, and data collection. All authors subsequently revised the document for important intellectual content and read and approved the final article.

References

1. Helmiyati S. Stunting Problems and How to Handle Them. Yogyakarta: UGM Press; 2019.
2. Anwar S, Winarti E and Sunardi S. Systematic Review of Risk Factors, Causes and Impacts of Stunting in Children. J Ilmu Kesehat [Internet]. 2022 Dec 7;11(1):88. Available from: https://ejurnaladhkdr.com/index.php/jik/article/view/445

3. Sarinastiti W, Murdaningtyas CD and Harvani Y. Designing an Explainer Video for Stunting Prevention in Toddlers with Skill Level Animation. ANDHARUPA J Desain Komun Vis Multimed [Internet]. 2023 Jan 27;8(3):385–98. Available from: http://publikasi.dinus.ac.id/index.php/andharupa/article/view/5768
4. Ministry of Health Republic of Indonesia. Pocket Book of Results of the Indonesian Nutritional Status Study (SSGI) 2021. Jakarta; 2022.
5. Ministry of Health Republic of Indonesia. Stunting Prevalence in Indonesia Drops to 21.6% from 24.4% [Internet]. Ministry of Health Republic of Indonesia. 2023 [cited 2023 Nov 17]. Available from: https://sehatnegeriku.kemkes.go.id/baca/rilis-media/20230125/3142280/prevalensi-stunting-di-indonesia-turun-ke-216-dari-244/
6. Ministry of Health Republic of Indonesia. Two Focuses of Stunting Reduction Interventions to Achieve the 14% Target in 2024 [Internet]. Kemenkes RI. 2023 [cited 2023 Jun 26]. Available from: https://www.badankebijakan.kemkes.go.id/dua-fokus-intervensi-penurunan-stunting-untuk-capai-target-14-di-tahun-2024/
7. World Health Organization. Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group joint child malnutrition estimates: key findings of the 2023 edition. WHO. Geneva: WHO; 2023.
8. Sari GM. Early Stunting Detection Education as an Effort to Increase Mother's Knowledge about Stunting Prevention. Folia Medica Indones. 2021;57(1):70–5.
9. Mtongwa RH, Festo C and Elisaria E. A comparative analysis of determinants of low birth weight and stunting among under five children of adolescent and non-adolescent mothers using 2015/16 Tanzania Demographic and Health Survey (TDHS). BMC Nutr. 2021;7:1–10.
10. Falefi R, Susanti N, Susilawati S and Almubaraq HZ. Estimation Of Low Birth Weight Risk In Indonesia: What Is The Most Appropriate Intervention? J Kebidanan dan Kesehat Tradis. 2022;127–39.
11. Aryanto M. The Relationship between Hemoglobin Levels of Pregnant Women in the First Trimester and the Incidence of Stunting in Toddlers in Conggeang District, Sumedang Regency in 2018. 2020;
12. Fujiana F, Asroruddin M, Nurmainah N, Arundina A, Wahyudi T and Windarti W. Prevent Stunting through Pre-Marital Education. J Kreat Pengabdi Kpd Masy [Internet]. 2023 Feb 1;6(2):517–25. Available from: http://ejurnalmalahayati.ac.id/index.php/kreativitas/article/view/8295
13. Sahira N and Assariah K. Education and mentoring for the Stunting Prevention Program. J Bina Desa. 2023;5(1):33–8.
14. Nawiza RA, Yunita L and Irawan A. Implementation of Catin Assistance to Prevent Stunting with Nutritional Status and Body Mass Index Screening (Tagindas). J Ilmu Kedokt dan Kesehat Indones. 2023;3(3):81–95.
15. Rahmah N and Kurniawati W. Relationship between marriage readiness and pregnancy planning among prospective brides. J Public health Res. 2021;10(1_suppl):jphr-2021.
16. Manik FA, Windayanti H, Septianasari R, Seftiyani IB, Shintiya D and Sintama D. Literature Review: Attitudes and Knowledge of Catin Towards Hepatitis B and HIV Testing in Premarital Screening. In: Prosiding Seminar Nasional dan CFP Kebidanan Universitas Ngudi Waluyo. 2023. p. 266–78.
17. Hasanah WK, Pratomo H, Latipatul Ashor F, Mulyana E, Jumhati S and Maya Lova S. Analysis of the Implementation of Premarital Education Related to Reproductive Health for Muslim Prospective Couples (Literature Review). HEARTY [Internet]. 2022 Jul 1;10(2):53. Available from: http://ejournal.uika-bogor.ac.id/index.php/Hearty/article/view/6284
18. Atmaka DR, Haryana NR, Rachmah Q, Setyaningtyas SW, Fitria AL and Pratiwi AA. Comparison of Online and Offline Methods in Increasing Awareness of Prospective Brides and Grooms Regarding Preconception Nutrition as an Effort to Prevent Stunting in Wedding Preparation Courses. Media Gizi Indones. 2022;17(1SP):1–5.
19. Secretariat of the Vice President of the Republic of Indonesia. Child Marriage and Adolescent Health Factors Driving High Stunting Rates [Internet]. Secretariat of the Vice President of the Republic of Indonesia. 2020 [cited 2023 Nov 17]. Available from: https://stunting.go.id/perkawinan-anak-dan-kesehatan-remaja-jadi-faktor-pendongkrak-tingginya-angka-stunting/#:~:text=Dalam paparannya%2C Kepala BKKBN Hasto Wardoyo mengatakan bahwa,dilahirkan oleh wanita yang menikah di usia muda.
20. Alifariki LO. Child Nutrition and Stunting. Penerbit LeutikaPrio; 2020.
21. Champion VL and Skinner CS. The health belief model. In: Health behavior and health education: Theory, research, and practice. 4th ed. USA: Jossey-Bass; 2008. p. 45–65.
22. Bandura A. Social Foundations of Thought and Action: A Social Cognitive Theory [Internet]. Prentice-Hall; 1986. (Prentice-Hall series in social learning theory). Available from: https://books.google.co.id/books?id=HJhqAAAAMAAJ
23. Noviansyah N, Romli K, Mukmin H and Wijayanto R. Strategy for accelerating stunting prevention through religious approach to generate qualified generation. Int J Public Heal Sci. 2022;11:1058.
24. Sari MP and Anggraeni E. Reproductive Health Education for Prospective Brides Regarding Knowledge and Participation in Premarital Check Ups. Oksitosin J Ilm Kebidanan. 2023;10(2):89–97.
25. Taufikurrahman T, Zulfi AN, Irmawati EFF, Setiawan WP, Azizah PN and Soeliyono FF. Socialization of Early Marriage and Adolescent Reproductive Health Education as an Effort to Prevent Stunting in Pabean Village, Probolinggo Regency. Sci J Has Penelit.

2023;8(1):73–88.
26. Atmaka DR, Haryana NR, Rachmah Q, Setyaningtyas SW, Fitria AL and Pratiwi AA. Comparison of Online and Offline Methods in Increasing Awareness of Prospective Brides and Grooms Regarding Preconception Nutrition as an Effort to Prevent Stunting in Wedding Preparation Courses. Media Gizi Indones. 2022;17(1):1–5.
27. Suhardiningsih AVS, Astutik D, Priyantini D and Candra KSA. Determining Knowledge of Stunting among Prospective Brides in East Java, Indonesia. Int J Adv Life Sci Res [Internet]. 2023;06(04):25–30. Available from: https://ijalsr.org/index.php/journal/article/view/197
28. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process [Internet]. 1991 Dec;50(2):179–211. Available from: https://linkinghub.elsevier.com/retrieve/pii/074959789190020T
29. Patimah S. Stunting Mengancam Human Capital. Deepublish; 2021.
30. Hisanuddin LOSI, Andriani R and Hisanuddin LOFA. Konvergensi Kebijakan Penanggulangan Stunting. Deepublish; 2023.
31. Rosyada DF, Salim MF and Syairaji M. Perception of Prevention Stunting Through Healthy Lifestyle in Adolescent Girls: Case Study of Adolescents in Bantul, Yogyakarta. J Ilmu dan Teknol Kesehat [Internet]. 2020 Mar 31;7(2):185–94. Available from: http://ejurnal.poltekkesjakarta3.ac.id/index.php/jitek/article/view/324
32. Kristiningrum W, Sofiyanti I and Widayati W. Level of adolescent knowledge about early marriage as a risk of stunting. SENTRI J Ris Ilm. 2023;2(11):4997–5006.
33. Sumardilah DS, Astuti RP and Aprina A. The Influence of Pre-Marriage Class on Knowledge of Bride and Groom in Prevention of Stunting Toddlers. J Aisyah J Ilmu Kesehat [Internet]. 2022 Mar 15;7(1):309–16. Available from: https://aisyah.journalpress.id/index.php/jika/article/view/7138
34. Scalvedi ML, Gennaro L, Saba A and Rossi L. Relationship Between Nutrition Knowledge and Dietary Intake: An Assessment Among a Sample of Italian Adults. Front Nutr [Internet]. 2021 Sep 13;8. Available from: https://www.frontiersin.org/articles/10.3389/fnut.2021.714493/full
35. Weerasekara PC, Withanachchi CR, Ginigaddara GAS and Ploeger A. Food and nutrition-related knowledge, attitudes, and practices among reproductive-age women in marginalized areas in Sri Lanka. Int J Environ Res Public Health. 2020;17(11):3985.
36. Santosa A, Novanda Arif E and Abdul GD. Effect of maternal and child factors on stunting: partial least squares structural equation modeling. Clin Exp Pediatr [Internet]. 2022 Feb 15;65(2):90–7. Available from: http://e-cep.org/journal/view.php?doi=10.3345/cep.2021.00094
37. McKenzie JF, Neiger BL and Thackeray R. Planning, implementing and evaluating health promotion programs. Jones & Bartlett Learning; 2022.
38. Lailiyah K. The Role of the National Population and Family Planning Agency (BKKBN) in Accelerating the Reduction of Stunting Perspective of Presidential Decree Number 72 of 2021. Mendapo J Adm Law. 2023;4(1):16–33.
39. Melandia M, Dedi S and Lendrawati L. Implementation of Premarital Marriage Guidance for Preventing Household Problems in Married Couples at the Kua, Selupu Rejang District in 2020-2022. Institut Agama Islam Negeri Curup; 2023.
40. Kassim M and Ndumbaro F. Factors affecting family planning literacy among women of childbearing age in the rural Lake zone, Tanzania. BMC Public Health [Internet]. 2022 Dec 4;22(1):646. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-022-13103-1
41. Putri, Asfeni and Dian RA. Factors Influence the Interest of Couples of Childbearing Age in Choosing IUD Contraception. Healthc Nurs J [Internet]. 2024 Jan 28;6(1):114–24. Available from: https://journal.umtas.ac.id/index.php/healtcare/article/view/4129
42. Sari P, Febriani CA and Farich A. Analysis of Determinants Related to Male Participation in Accepting Family Planning Programs in Indonesia (2017 SDKI Data Analysis). J Kesehat Komunitas. 2023;9(1):138–48.
43. Starbird E, Norton M and Marcus R. Investing in Family Planning: Key to Achieving the Sustainable Development Goals. Glob Heal Sci Pract [Internet]. 2016 Jun 20;4(2):191–210. Available from: http://www.ghspjournal.org/lookup/doi/10.9745/GHSP-D-15-00374
44. Karra M, Maggio D, Guo M, Ngwira B and Canning D. The causal effect of a family planning intervention on women's contraceptive use and birth spacing. Proc Natl Acad Sci [Internet]. 2022 May 31;119(22). Available from: https://pnas.org/doi/full/10.1073/pnas.2200279119
45. Nugraheni SA, Mawarni A, Purnami CT, Winarni S, Asna AF, Kartini A and Arso SP. Implementation of Premarital Counseling Description in Grobogan District, Central Java, Indonesia. Amerta Nutr. 2023;7(1):70–8.
46. Yunitasari E, Nadhifah WH and Pradanie R. The effects of health education on increasing knowledge, attitudes, and stunting prevention in pre-marriage couples in bangkalan madura. Eurasian J Biosci. 2020;14(1).
47. Ningsih T and Husna A. The effectiveness of nutrition education on increasing knowledge of the prospective bride. Morfai J. 2022;2(2):223–8.

48. Fauziah J, Trisnawati KD, Rini KPS and Putri SU. Stunting: Causes, Symptoms, and Prevention. J Parent dan Anak. 2024;1(2):11.
49. Riska N. The effect of training on choosing healthy food to prevent stunting through nutritional education on increasing the knowledge of adolescent girls. JKKP (Jurnal Kesejaht Kel dan Pendidikan). 2021;8(02):175–85.
50. Ginting SB, Simamora ACR and Siregar NSN. Health Counseling Increases Mothers' Knowledge in Preventing Stunting. Penerbit NEM; 2022.
51. Nara Lintan Mega Puspita, Meirna Eka Fitriasnani, Huda Rohmawati, Kurnia Novitasari, Dwi Ayu Lestari, Ihrom Fatma Saputri. The Influence Of Health Education Counseling Methods On Knowledge Of Preconceptional Nutrition On Future Bride. J Glob Res Public Heal [Internet]. 2023 Jun 28;8(1):37–40. Available from: https://jgrph.org/index.php/JGRPH/article/view/431
52. Qian Y and Mao Y. Coping with cultural differences in healthcare: Chinese immigrant mothers' health information sharing via WeChat. Int J Intercult Relations. 2021;84:315–24.
53. Mendoza-Herrera K, Valero-Morales I, Ocampo-Granados ME, Reyes-Morales H, Arce-Amaré F and Barquera S. Peer reviewed: an overview of social media use in the field of public health nutrition: benefits, scope, limitations, and a latin american experience. Prev Chronic Dis. 2020;17.
54. Muhammad M. Community Empowerment Through the "Stunting Free" Program in Bandung City. Universitas Komputer Indonesia; 2023.
55. Winarni AT. Breaking the Chain of Stunting: Transformation of Family Assistance by the Stunting Team of Kunduran District, Blora. Public Serv Gov J. 2024;5(1):291–309.
56. Sukmayenti and Sholihat A. Overview of the Level of Knowledge, Attitude, and Readiness of Prospective Brides in Efforts to Prevent Stunting at the Kuranji KUA, Padang City. Sci J [Internet]. 2022 Sep 30;1(5):376–82. Available from: https://journal.scientic.id/index.php/sciena/article/view/70
57. Kholyfah MN, Nurjanah N, Aliah N and Suminar ER. The Relationship Between Premarital Nutrition Knowledge and Nutritional Status and Attitudes of Catin in Efforts to Prevent Stunting in Kua Kesambi, Cirebon City in 2023. Midwife's Res. 2023;12(1).
58. Wulandari R and Syafiq A. The effect of nutrition education to prospective bride in pregnancy nutrition preparation to prevent the risk of stunting: study literature review. Muhammadiyah Int Public Heal Med Proceeding. 2023;3(1):79–93.
59. Saleh A, Syahrul S, Hadju V, Andriani I and Restika I. Role of maternal in preventing stunting: a systematic review. Gac Sanit. 2021;35:S576–82.
60. Siregar MH. Nutritional Knowledge of Prospective Brides in Indonesia: A Systematic Review. J Al-Azhar Indones Seri Sains dan Teknol. 2023;8(1).
61. Simanjuntak BY and Wahyudi A. Education about the first 1000 days of life to improve the knowledge and attitudes of prospective grooms. AcTion Aceh Nutr J. 2021;6(1):100.
62. Sahoo B, Sonam KM and Sharma D. Making Decisions Together When Choosing a Family Planning Method. 2022;
63. Willett W. Nutritional epidemiology. Oxford university press; 2012.
64. Ajong AB, Njotang PN, Kenfack B, Yakum MN and Mbu ER. Knowledge of women in family planning and future desire to use contraception: a cross sectional survey in Urban Cameroon. BMC Res Notes [Internet]. 2016 Dec 18;9(1):347. Available from: http://bmcresnotes.biomedcentral.com/articles/10.1186/s13104-016-2155-7
65. Rana MJ and Goli S. Family planning and its association with nutritional status of women: investigation in select South Asian countries. Indian J Hum Dev. 2017;11(1):56–75.