JOURNAL LA MEDIHEALTICO

VOL. 06, ISSUE 03 (753-765), 2025
DOI: 10.37899/journallamedihealtico.v6i3.2241

Analysis of Factors Associated with Preconception Nutritional Readiness Among Women of Reproductive Age in Kerinci Regency

Ela Sintia[1], Desmawati[2], Siti Nurhajjah[3]

[1]*Master of Midwifery Program, Faculty of Medicine, Universitas Andalas, Indonesia*
[2]*Department of Nutrition Science, Faculty of Medicine, Universitas Andalas, Indonesia*
[3]*Department of Anatomy, Faculty of Medicine, Universitas Andalas, Indonesia*

**Corresponding Author: Desmawati*
E-mail: desmawati@med.unand.ac.id

Article Info

Article history:
Received 24 May 2025
Received in revised form 10 June 2025
Accepted 01 July 2025

Keywords:
Preconception
Nutritional Readiness
Women
Childbearing Age

Abstract

Women of Reproductive Age (WRA) as prospective mothers are a vulnerable group whose health status, particularly nutritional status, requires attention. The quality of future generations is determined by the mother's condition before pregnancy, as malnutrition during the preconception period can lead to both maternal and fetal malnutrition. This study aims to analyze the factors associated with preconceptions of nutritional readiness among WRA in Kerinci Regency. The study uses an analytical design with a cross-sectional approach. It was conducted at 5 Religious Affairs Offices in Kerinci Regency (The Office of Religious Affairs of East Air Hangat, Depati Tujuh, Sitinjau Laut, Danau Kerinci, and Keliling Danau) from 1 November to 30 November 2023. The sample consisted of 80 pre-marriage WRA registrants. Data were collected using questionnaires and analyzed using Chi-Square tests and Multiple Logistic Regression. The results showed significant associations between age (p-value 0.645), attitudes (p-value 0.005), occupation (p-value 0.006), physical activity (p-value 0.449), lifestyle (p-value 0.001), income (p-value 0.002), culture (p-value 0.018), food access (p-value 0.004), and the role of health workers (p-value 0.015) with preconceptional nutritional readiness. Multivariate analysis indicated that the most dominant factor was lifestyle, with an odds ratio (OR) of 17.75. In conclusion, the study found significant associations between various factors and preconceptions of nutritional readiness, with lifestyle being the most influential. Cross-sectoral cooperation and education are needed to intervene during the preconception period to prepare women for a healthy pregnancy and a positive pregnancy outcome.

Introduction

Women of childbearing age as prospective mothers are a vulnerable group whose health status must be considered, especially nutritional status. The mother's condition will determine the quality of the next generation before and during pregnancy (Nurlinda & Wahyuni, 2021). Malnutrition during the preconception period will affect pregnancy and cause the mother and fetus to experience malnutrition (Reski et al., 2020; Susilowati and Kuspriyanto, 2016; Fall, 2013; Young & Ramakrishnan, 2021; Ahmad et al., 2021).

The problem of malnutrition in women of childbearing age is seen in the high number of Chronic Energy Deficiency (CED) (Ministry of Health, 2019; Wantini et al., 2023; Wati et al., 2024). The number of women with Chronic Energy Deficiency (CED) globally, around 170 million women (9.1%), are underweight (BMI <18.5 kg/m2) (UNICEF, 2023). The prevalence

of pregnant women at risk of experiencing KEK in Indonesia is around 17.3%. In non-pregnant women, it is 14.4%, the proportion of KEK in non-pregnant WUS aged 15-19 years is 36.3%, aged 20-24 years is 23.3%, aged 25-29 years is 13.5%, and aged 30-34 years is 8% (Ministry of Health, 2019).

Jambi Province is one of the provinces still experiencing an increase in pregnant women experiencing KEK, as seen from the prevalence of KEK in pregnant women in Jambi Province in 2017, which was 19.92%. In 2018, throughout Jambi Province, it had reached 26.71%, and 12% KEK in non-pregnant women (Ministry of Health, 2019). Women of childbearing age with low body weight and KEK, during the preconception period are associated with poor maternal outcomes, namely the risk of postpartum hemorrhage, hypertension in pregnancy, and cesarean delivery (Yee et al., 2020), in the fetus, namely babies born with LBW, so they are more susceptible to infectious diseases, premature babies, and stunting (Jap et al., 2019).

Based on data from the Indonesian Nutritional Status Study (SSGI) (2022), Kerinci Regency is one of the areas in Jambi Province with a stunting rate above the national average of 21.6% and the province's average of 18%. The stunting rate 2022 in Kerinci Regency was 24.2% (Ministry of Health, 2023). Data from the Kerinci Regency Health Office obtained the results of data entry from the Community-Based Nutrition Recording and Reporting (E-PPGBM) application in 2022, as many as 750 infants/toddlers suffered from stunting from 17 Health Centers in Kerinci Regency. The determining factors of stunting incidence are 80.2% of toddlers with family members who smoke, 75.9% do not have JKN/BPJS, and 12.5% of toddlers with mothers who have a history of KEK (Kerinci Regency Health Office, 2023). Then, the Kerinci Regent's decision was issued regarding determining villages for handling stunting loci in 2023, namely 49 villages with 37 old loci and 12 new loci (Kerinci Regency Health Office, 2023).

Women experiencing KEK increase the risk of LBW (Ekowati et al., 2017). According to Data from the Jambi Provincial Health Office in 2022, the most common cause of neonatal death was Low Birth Weight (LBW), which was 38.57%. Kerinci Regency is the Regency with the highest prevalence of LBW in Jambi Province, which is 21.26%, Merangin Regency is 10.61%, and Sarolangun Regency is 10.24%. Based on data from the Kerinci Regency Office, there was an increase. The prevalence of LBW in 2021 was 126 cases out of 586 live births (21.5%), and in 2022 it was 118 cases out of 495 live births (23.8%) (Kerinci Regency Health Office, 2023).

Stuntingcan be caused by a lack of nutrition in pre-conception women, making them an important target group for stunting prevention (Hanifah, Djais, and Fatimah, 2020), in line with WHO's statement, stunting occurs due to long-term malnutrition starting from the preconception period to the First 1000 Days of Life (WHO, 2019). The impact of stunting is associated with poor cognitive development and can affect a child's future life prospects (WHO, 2022). Dhaded et al. (2020) stated that comprehensive nutritional supplementation in the preconception period, starting three months before conception, is associated with a 44% reduction in stunting and a 24% reduction in wasting.

Internal and external factors influence nutritional status and its problems (Dieny et al., 2019). Age, education, and nutritional intake can affect a woman's preconception nutritional status (Doloksaribu et al, 2019; Swain et al., 2021; Misgina et al., 2021). Factors include access to healthy food choices and dietary supplements, income, environment, and lifestyle habits such as smoking and physical activity (Akande et al., 2021; Agustina et al., 2022). Cultural factors will also cause nutritional problems due to beliefs about food taboos (Rafsanjani, 2018; de Diego-Cordero et al., 2021). Health service providers are a determining factor in more effective preconception health (Juan & Yang, 2022), as many women enter pregnancy with conditions that were not treated before conception (Paratmanitya et al., 2021).

The number of marriages in Kerinci Regency in 2022 was 1763 prospective brides and grooms who applied for marriage (Kemenag Kab. Kerinci, 2022). Prospective brides and grooms are WUS who will become mothers and face pregnancy (Wirenviona et al., 2021; Rahmah & Kurniawati, 2021). During this time, prospective mothers must prepare themselves so that the baby is born healthy during pregnancy, childbirth, and birth (Kemenkes, 2018). In this context, preconception nutritional readiness is measured using 10 indicators, including Body Mass Index (BMI), upper arm circumference (MUAC), Hb levels, average daily intake for energy, protein, calcium, iron, folic acid, and/or folic acid and iron supplements. These indicators are selected based on nutrition-related health problems that have been identified as causes of maternal and child mortality and morbidity by the WHO (WHO, 2012).

Paratmanitya et al. (2021) research shows that the number of women of childbearing age who are nutritionally ready to enter pregnancy is very low. No respondents met the 10 indicators of preconception nutritional readiness. Preconception nutritional readiness by providing an integrated nutritional package before conception can significantly reduce low birth weight (LBW) and stunting at 24 months of age (Taneja et al., 2022). Interventions to improve maternal nutritional status during the periconception period are particularly important in settings with a high prevalence of stunting (Harper et al., 2022).

The high number of maternal problems during pregnancy shows the importance of preconception nutritional readiness and the need for nutritional education and health promotion to increase knowledge and healthy behavior in planning pregnancy (Putri et al., 2018). Nutritional readiness in WUS is rarely assessed, especially in Indonesia, and previous studies only measured the adequacy of food intake and nutritional status, knowledge about preconception nutrition, or consumption of folic acid supplements as separate measures that were not studied together (Paratmanitya et al., 2021). Based on the background above, the researcher is interested in analyzing factors related to preconception nutritional readiness in women of childbearing age in Kerinci Regency.

Methods

This study uses an analytical research type with a cross-sectional research design. The research location will be carried out at 5 Religious Affairs Offices (KUA) of Kerinci Regency (KUA Kec. Air Hangat Timur, Kec. Depati Tujuh, Kec. Sitinjau Laut, Kec. Danau Kerinci, Kec. Keliling Danau). The research period starts from 1 November to 30 November 2023. The population in this study is WUS, which registered their marriages at 5 KUA Kerinci Regency, which is 286. Based on the calculation, the minimum sample required is 72 people. Anticipating dropout samples, a 10% sample is added, so the total sample in this study is 80 respondents. The instrument used for data collection in this study was a questionnaire sheet. Data processing was carried out so that the research analysis produced proper and correct information. The stages of data processing are editing, coding, entry, and cleaning. In this study, data analysis was conducted using the chi-square test at a 95% confidence level to see whether there was a relationship between the two variables. It used the logistic regression test with the adjusted prevalence ratio, Adjusted Odds Ratio (OR), and association measure.

Result and Discussion

Univariate Analysis

Table 1. Frequency Distribution of Internal Factors

Variables	f	%
Attitude		
Negative	39	48.8
Positive	41	51.2
Total	**80**	**100**

Physical Activity		
Low	45	56.3
Currently	35	43.2
Total	**80**	**100**
Lifestyle		
Bad	39	48.8
Good	41	51.2
Total	**80**	**100**

In Table 1, it can be seen that most respondents have a positive attitude, low physical activity, and a good lifestyle.

Table 2. Frequency Distribution of External Factors

Variables	f	%
Income		
<UMR	46	57.5
>UMR	34	42.5
Total	**80**	**100**
Work		
Doesn't work	30	37.5
Work	50	62.5
Total	**80**	**100**
Culture		
Affected	20	25
Not affected	60	75
Total	**80**	**100**
Food Access		
Unable	31	38.8
Capable	49	61.2
Total	**80**	**100**
Role of Health Workers		
Not good	42	52.5
Good	38	47.5
Total	**80**	**100**

Table 2 shows that most respondents have incomes less than the minimum wage, have jobs, are not influenced by culture, can access food, and receive poor health worker roles.

Table 3. Frequency Distribution of 10 Preconception Nutrition Readiness Indicators

Indicator	f	%
Body Mass Index		
Thin	25	31.3
Normal	50	62.5
Fat	5	6.3
Total	**80**	**100**
Hemoglobin		
Anemia	36	45
No Anemia	44	55
Total	**80**	**100**
Upper Arm Circumference		
KEK	25	31.3

No KEK	55	68.8
Total	**80**	**100**
Energy Intake		
Not as recommended	40	50
As per the recommendation	40	50
Total	**80**	**100**
Protein Intake		
Not as recommended	38	47.5
As per the recommendation	42	52.5
Total	**80**	**100**
Calcium Intake		
Not as recommended	39	48.8
As per the recommendation	41	51.2
Total	**80**	**100**
Iron Intake		
Not as recommended	21	26.3
As per the recommendation	59	73.8
Total	**80**	**100**
Folic Acid Intake		
Not as recommended	42	52.5
As per the recommendation	38	47.5
Total	**80**	**100**
Consumption of Folic Acid and/or Iron		
Not yet	44	55
Already	36	45
Total	**80**	**100**
Preconception Nutrition Knowledge		
Bad	49	61.2
Good	31	38.8
Total	**80**	**100**

In table 3, it can be seen that most respondents have normal BMI, are not anemic, are not KEK, and have energy intake, protein intake, calcium intake, iron intake, folic acid intake according to recommendations, have not consumed folic acid and/or iron, and have poor preconception nutritional knowledge.

Table 4. Frequency Distribution of Preconception Nutrition Readiness

Preconception Nutrition Readiness	f	%
Not Ready	50	62.5
Ready	30	37.5
Total	**80**	**100**

Table 4 shows that most respondents do not have preconception nutritional readiness.

Bivariate Analysis

The Relationship between Internal Factors and Preconception Nutrition Readiness

The relationship between age and preconception nutritional readiness

Table 5. Relationship between Age and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Age	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	F	%	
20-30 Years	46	61.3	29	38.7	75	100	0.645
31-35 Years	4	80	1	20	5	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 5 shows that the percentage of unprepared preconception nutrition is greater in respondents aged 31-35 (80%) than those aged 20-30 (61.3%). The results of statistical tests using Fisher's exact test obtained a p-value of 0.645> α (0.05), so it can be concluded that there is no significant relationship between age and preconception nutrition readiness in women of childbearing age.

The relationship between education and preconception nutritional readiness

Table 6. Relationship between Education and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Education	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	F	%	
Low	23	100	0	0	23	100	-
Tall	27	47.4	30	52.6	57	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 6 shows that all respondents with low education (100%) are not ready for preconception nutrition compared to those with high education (47.4%). The results of statistical tests using the chi-square test cannot be carried out because there is a cell value of 0 in the table, indicating no respondents in a particular category. This causes the chi-square test not to be applied to this data.

Relationship between attitudes and preconception nutritional readiness

Table 7. Relationship between Attitudes and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Attitude	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
Negative	31	79.5	8	20.5	39	100	0.005
Positive	19	46.3	22	53.7	41	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 7 shows that the percentage of not being ready for preconception nutrition is greater in respondents who have a negative attitude (79.5%), who are not prepared for preconception nutrition, compared to a positive attitude (46.3%), who are not ready for preconception nutrition. The statistical test results obtained a p-value of 0.005 <α (0.05), so it can be concluded that there is a significant relationship between attitudes and preconception nutrition readiness in women of childbearing age.

The relationship between physical activity and preconception nutritional readiness

Table 8. Relationship between Physical Activity and Preconception Nutritional Readiness in Women of Childbearing Age in Kerinci Regency

Physical Activity	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
Low	26	57.8	19	42.2	45	100	0.449
Currently	24	68.6	11	31.4	35	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 8 shows that the percentage of unprepared preconception nutrition is greater in respondents with moderate physical activity (68.6%) than in those with low physical activity (57.8%). The statistical test results obtained a p-value of 0.449> α (0.05), so it can be concluded that there is no significant relationship between activity and preconception nutrition readiness in women of childbearing age.

The relationship between lifestyle and preconception nutritional readiness

Table 9. Relationship between Lifestyle and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Lifestyle	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
Bad	32	82.1	7	17.9	39	100	0.001
Good	18	43.9	23	56.1	41	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 9 shows that the percentage of preconception nutritional unpreparedness is greater in respondents who have a bad lifestyle (82.1%) compared to those who have a good lifestyle (43.9%). The statistical test results obtained a p-value of 0.001 <α (0.05), so it can be concluded that there is a significant relationship between lifestyle and preconception nutritional readiness in women of childbearing age.

The Relationship between External Factors and Preconception Nutrition Readiness

Relationship between work and preconception nutritional readiness

Table 10. Relationship between Work and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Work	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
Doesn't work	25	83.3	5	16.7	30	100	0.006
Work	25	50	25	50	50	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 10 shows that the percentage of preconception nutritional unpreparedness is greater in respondents who do not work (83.3%) compared to those who work for as many as 25 people (50%). The statistical test results obtained a p-value of 0.006 <α (0.05), so it can be concluded that there is a significant relationship between work and preconception nutritional readiness in women of childbearing age.

The relationship between income and preconception nutritional readiness

Table 11. Relationship between Income and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Income	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
<UMR	36	78.3	10	21.7	46	100	0.002
>UMR	14	41.2	20	58.8	34	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 11 shows that the percentage of preconception nutritional unpreparedness is greater in respondents who have income <UMR (78.3%) compared to those who have income>UMR (41.2%). The statistical test results obtained a p-value of 0.021 <α (0.05), so it can be concluded that there is a significant relationship between income and preconception nutritional readiness in women of childbearing age.

The relationship between culture and preconception nutritional readiness

Table 12. Relationship between Culture and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Culture	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
Affected	17	85	3	15	20	100	0.018
Not Affected	33	55	27	45	60	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 12 shows that the percentage of unprepared preconception nutrition is greater in respondents who are influenced by culture (85%) compared to those who are not influenced by culture (55%). The statistical test results obtained a p-value of 0.018 <α (0.05), so it can be concluded that there is a significant relationship between income and preconception nutrition readiness in women of childbearing age.

The relationship between food access and preconception nutritional readiness

Table 13. Relationship between Food Access and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Food Access	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
Unable	26	83.9	5	16.1	31	100	0.004
Capable	24	49	25	51	49	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 13 shows that the percentage of preconception nutritional unpreparedness is greater in respondents who are unable to access food (83.9%) are not preconception nutritional unpreparedness compared to those who can access food (49%). The statistical test results obtained a p-value of 0.004 <α (0.05), so it can be concluded that there is a significant relationship between food access and preconception nutritional readiness in women of childbearing age.

The relationship between the role of health workers and preconception nutritional readiness

Table 14. Relationship between the Role of Health Workers and Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

Role of Health Workers	Preconception Nutrition Readiness				Total		*p-value*
	Not Ready		Ready				
	f	%	f	%	f	%	
Not good	32	76.2	10	23.8	42	100	0.015
Good	18	47.4	20	52.6	38	100	
Total	**50**	**62.5**	**30**	**37.5**	**80**	**100**	

Table 14 shows that the percentage of unprepared preconception nutrition is greater in respondents who received poor health worker roles (76.2%) than those who received good health worker roles (47.4%). The statistical test results obtained a p-value of 0.015 <α (0.05), so it can be concluded that there is a significant relationship between the role of health workers and preconception nutrition readiness in women of childbearing age.

Multivariate Analysis

Candidate Variable Selection

The most dominant independent variables in preconception nutritional readiness were identified through multivariate analysis. Before starting the multivariate test, the first stage was screening. The variables selected for inclusion in the multivariate modeling will be chosen through the bivariate analysis results between the independent and dependent variables, which produces a p-value <0.25. The results can be seen in the following table:

Table 15. Candidate Variables of Internal Factors

No	Candidate Variables	P value	Information
1	Age	0.645	Not a candidate
2	Attitude	0.005	Enter candidate
2	Physical Activity	0.449	Not a candidate
3	Lifestyle	0.001	Enter candidate

Table 16. Candidate Variables of External Factors

No	Candidate Variables	P value	Information
1	Income	0.002	Enter candidate
2	Work	0.006	Enter candidate
3	Culture	0.018	Enter candidate
4	Food Access	0.004	Enter candidate
5	Role of Health Workers	0.015	Enter candidate

The table shows that in the initial stage, the independent variables that meet the requirements for multivariate analysis are internal factors (attitudes and lifestyle) and external factors (income, employment, culture, food access, and the role of health workers).

A. Multivariate Modeling

Multivariate modeling was performed using multiple logistic regression tests. Qualified variables were then analyzed using the Backward LR method, with a significance limit of p-value <0.05. Variables with a p-value >0.05 will be automatically removed for the next stage. The results of multivariate modeling using the Backward LR method can be seen in Table 17.

Table 17. Multivariate Modeling of Factors Related to Preconception Nutrition Readiness in Women of Childbearing Age in Kerinci Regency

		p-value	Exp (B)	95% CI for Exp (B)	
				Lower	Upper
Step 1a	Work	0.882	1.124	0.24	5.272
	Income	0.005	14.14	2.188	91,398
	Lifestyle	0.003	15.6	2,545	95,624
	Attitude	0.118	2,909	0.763	11,094
	Culture	0.127	0.22	0.031	1,536
	Role_of_Health_Officers	0.14	2,736	0.72	10,403
	Food_Access	0.058	4,679	0.947	23.106
Step 2a	Income	0.002	15,006	2,735	82,326
	Lifestyle	0.002	16,033	2,704	95,047
	Attitude	0.116	2.923	0.766	11.154
	Culture	0.129	0.223	0.032	1,545
	Role_of_Health_Officers	0.136	2,755	0.726	10,452
	Food_Access	0.053	4,767	0.981	23.166
Step 3a	Income	0.001	13,354	2,697	66.122
	Lifestyle	0	19,759	3,754	103,991
	Attitude	0.088	3.15	0.842	11,785
	Culture	0.141	0.244	0.037	1,599
	Food_Access	0.068	4.386	0.895	21,489
Step 4a	Income	0.001	13,073	2,701	63,261
	Lifestyle	0.001	17,756	3,509	89,852
	Attitude	0.051	3,594	0.994	12,994
	Food_Access	0.031	5.374	1.163	24,826

Based on table 17 after conducting a multivariate analysis test, four models were found on factors related to preconception nutritional readiness, where in the last model, the variable related to preconception nutritional readiness was obtained, namely the lifestyle variable which had the most considerable β coefficient value, namely 17.75 with a p value of 0.001, meaning that a positive lifestyle has a better chance of 17.75 times in preconception nutritional readiness in WUS in Kerinci Regency.

Conclusion

Based on the results of the study, it can be concluded that: 1) Most respondents are not ready for preconception nutrition, aged 20-30 years, high education level, positive attitude, have a job, low physical activity, good lifestyle, income less than UMR, not influenced by culture, can access food and the role of health workers is not good. 2) A significant relationship exists between internal factors (attitude and lifestyle) and preconception nutrition readiness in Women of Childbearing Age in Kerinci Regency. 3) There is no significant relationship between internal factors (age, education, physical activity) with preconception nutrition readiness in Women of Childbearing Age in Kerinci Regency. 4) There is a significant relationship between external factors (income, job, culture, food access, and the role of health workers) with preconception nutrition readiness in Women of Childbearing Age in Kerinci Regency. 5) Lifestyle is the most dominant variable related to preconception nutrition readiness in Women of Childbearing Age in Kerinci Regency.

References

Agustina, R., Rianda, D., & Setiawan, E. A. (2022). Relationships of child-, parents-, and environment-associated determinants with diet quality, physical activity, and smoking habits among Indonesian urban adolescents. *Food and Nutrition Bulletin*, *43*(1), 44-55. https://doi.org/10.1177/03795721211046145

Ahmad, A., Wagustina, S., & Estuti, W. (2021). Maternal malnutrition before pregnancy determines factors for chronic energy deficiency in pregnancy: a cross-sectional survey in Aceh Besar District, Aceh, Indonesia. *Prof Khor Geok Lin, PhD and Helda Khusun, PhD*, *52*, 116.

Akande, V. O., Fawehinmi, T. O., Ruiter, R. A., & Kremers, S. P. (2021). Healthy dietary choices and physical activity participation in the Canadian Arctic: understanding Nunavut Inuit perspectives on the barriers and enablers. *International journal of environmental research and public health*, *18*(3), 940. https://doi.org/10.3390/ijerph18030940

de Diego-Cordero, R., Rivilla-Garcia, E., Diaz-Jimenez, D., Lucchetti, G., & Badanta, B. (2021). The role of cultural beliefs on eating patterns and food practices among pregnant women: a systematic review. *Nutrition reviews*, *79*(9), 945-963. https://doi.org/10.1093/nutrit/nuaa119

Dhaded, S. M., Hambidge, K. M., Ali, S. A., Somannavar, M., Saleem, S., Pasha, O., et al. (2020). Preconception nutrition intervention improved birth length and reduced stunting and wasting in newborns in South Asia: The Women First randomized controlled trial. *PLOS ONE, 15*(1), 1–15. https://doi.org/10.1371/journal.pone.0227830

Dieny, F., Widyastuti, N., Deny, Y., & Nissa, C. (2019). Iron deficiency in obese premarital women of childbearing age. *Indonesian Micro Nutrition Media, 11*(1), 101–110.

Doloksaribu, L. G., & Simatupang, A. M. (2019). Pengaruh konseling gizi prakonsepsi terhadap pengetahuan dan sikap wanita pranikah di Kecamatan Batang Kuis. *Wahana Inov*, *8*(2089-8592), 63-73.

Ekowati, D., Seri Ani, L., & Trisna Windiani, I. G. A. (2017). High parity and chronic energy deficiency increase risk for low birth weight in Situbondo District. *Public Health and Preventive Medicine Archives, 5*(1), 35. https://doi.org/10.53638/phpma.2017.v5.i1.p07

Fall, C. H. (2013, July). Fetal malnutrition and long-term outcomes. In *Nestlé nutrition institute workshop series* (Vol. 74, p. 11).

Hanifah, R. N., Djais, J., & Fatimah, S. N. (2020). Prevalensi Underweight, Stunting, Dan Wasting Prevalensi Underweight, Stunting, Dan Wasting Pada Anak Usia 12-18 Bulan Di Kecamatan Jatinangor. *Jurnal Sistem Kesehatan*, *5*(3). https://doi.org/10.24198/jsk.v5i3.28768

Harper, A., Rothberg, A., Chirwa, E., Sambu, W., & Mall, S. (2022). Household food insecurity and demographic factors, low birth weight and stunting in early childhood: Findings from a longitudinal study in South Africa. *Maternal and Child Health Journal, 27*, 56–69. https://doi.org/10.1007/s10995-022-03485-7

Jap, J., Sumarmi, S., & Damayanti, N. A. (2019). Importance of collaborative intervention of preconception nutrition in suppressing the stunting case in East Nusa Tenggara, Indonesia. *Indian Journal of Public Health Research & Development, 10*(9), 175–179.

Juan, J., & Yang, H. (2022). Early life 1000 days: Opportunities for preventing adult diseases. *Chinese Medical Journal, 135*(5), 516–518. https://doi.org/10.1097/CM9.0000000000001861

Kerinci District Health Office. (2023). *Data on coverage of neonatal complications handling in 2022*. Kerinci: Kerinci District Health Office.

Kerinci District Health Office. (2023). *Publication of stunted data measurement results for Kerinci District 2022*. Kerinci: Kerinci District Health Office.

Ministry of Health. (2018). *Pocket book of reproductive health for prospective brides*. Jakarta: Ministry of Health.

Ministry of Health. (2019). *Results of Basic Health Research 2018*. Jakarta: Ministry of Health.

Ministry of Religion of Kerinci Regency. (2023). *Number of marriage events in Kerinci Regency in 2022*. Kerinci: Ministry of Religion of Kerinci Regency.

Misgina, K. H., van der Beek, E. M., Boezen, H. M., Bezabih, A. M., & Groen, H. (2021). Pre-conception and prenatal factors influencing gestational weight gain: a prospective study in Tigray region, northern Ethiopia. *BMC Pregnancy and Childbirth*, *21*, 1-13. https://doi.org/10.1186/s12884-021-04171-z

Nurlinda, N., & Sari, R. W. (2021). Pengaruh penyuluhan dengan media animasi pencegahan stunting terhadap pengetahuan dan sikap calon pengantin. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, *4*(3), 372-376. https://doi.org/10.56338/mppki.v4i3.1606

Paratmanitya, Y., Helmyati, S., Nurdiati, D. S., Lewis, E. C., & Hadi, H. (2021). Assessing preconception nutrition readiness among women of reproductive age in Bantul, Indonesia: Findings from baseline data analysis of a cluster randomized trial. *Indonesian Journal of Nutrition and Dietetics, 8*(2), 68–79. http://dx.doi.org/10.21927/ijnd.2020.8(2).68-79

Putri, P. H., Ainani, F. N. N., Yuliani, K., Sunaryo, M., & Puspitasari, P. (2021). Edukasi Dengan Media Booklet Terhadap Pengetahuan Gizi Prakonsepsi, Sikap dan Asupan Zat Gizi Makro Wanita Pranikah. *Preventia: Indonesian Journal of Public Health*, *6*(2), 88-96.

Rafsanjani, T. M. (2018). Pengaruh individu, dukungan keluarga dan sosial budaya terhadap konsumsi makanan ibu muda menyusui (Studi kasus di Desa Sofyan Kecamatan Simeulue Timur Kabupaten Simeulue). *AcTion: Aceh Nutrition Journal*, *3*(2), 124-131. http://dx.doi.org/10.30867/action.v3i2.112

Rahmah, N., & Kurniawati, W. (2021). Relationship between marriage readiness and pregnancy planning among prospective brides. *Journal of public health research*, *10*(1_suppl), jphr-2021. https://doi.org/10.4081/jphr.2021.2405

Reski, R. N., Hadju, V., Indriasari, R., & Muis, M. (2020). Anemia, chronic energy deficiency, and their relationship in preconception women. *Enfermería Clínica, 30*, 76–80. https://doi.org/10.1016/j.enfcli.2019.11.021

Susilowati, & Kuspriyanto. (2016). *Nutrition in the life cycle* (1st ed.). Refika Aditama.

Swain, D., Begum, J., & Parida, S. P. (2021). Effect of preconception care intervention on maternal nutritional status and birth outcome in a low-resource setting: Proposal for a nonrandomized controlled trial. *JMIR Research Protocols*, *10*(8), e28148. https://doi.org/10.2196/28148

Taneja, S., Chowdhury, R., Dhabhai, N., Upadhyay, R. P., Mazumder, S., Sharma, S., et al.

(2022). Impact of a package of health, nutrition, psychosocial support, and WaSH interventions delivered during preconception, pregnancy, and early childhood periods on birth outcomes and on linear growth at 24 months of age: Factorial, individually randomized controlled trial. *The BMJ, 379*, 1–7. https://doi.org/10.1136/bmj-2022-072124

UNICEF. (2023). *Women's nutrition – UNICEF DATA*. Retrieved July 19, 2023, from https://data.unicef.org/topic/nutrition/womens-nutrition/

Wantini, N. A., Maydianasari, L., & Agni, A. S. (2023). The Description of Future Bride Nutritional Status Included Incidence of Anemia, Chronic Energy Deficiency (CED), and Nutritional Status Based on Body Mass Index. *Jurnal Ners dan Kebidanan (Journal of Ners and Midwifery)*, *10*(2), 239-246. https://doi.org/10.26699/jnk.v10i2.ART.p239-246

Wati, E. K., Murwani, R., Kartasurya, M. I., & Sulistiyani, S. (2024). Determinants of chronic energy deficiency (CED) incidence in pregnant women: A cross-sectional study in Banyumas, Indonesia. *Narra J*, *4*(1), e742. https://doi.org/10.52225/narra.v4i1.742

Wirenviona, R., & Cinthya, R. (2021). *Reproductive health and fetal growth and development to elderly in women*. Surabaya: Airlangga University Press.

World Health Organization. (2012). *Nutrition of women in the preconception period, during pregnancy, and the breastfeeding period: Report by the Secretariat*. Retrieved January 3, 2023, from https://apps.who.int/iris/handle/10665/78900

World Health Organization. (2019a). *Nutrition landscape information system (NLIS) country profile indicators* (2nd ed.). Switzerland: WHO Press.

World Health Organization. (2019b). *Anaemia*. Retrieved March 21, 2023, from https://www.who.int/health-topics/anaemia#tab=

World Health Organization. (2022). *Stunting prevalence among children under 5 years of age*. Retrieved April 26, 2023, from https://www.who.int/data/gho/data/indicator-details/GHO/gho-jme-stunting-prevalence

Yee, L. M., Silver, R. M., Haas, D. M., Parry, S., Mercer, B. M., Iams, J., et al. (2020). Quality of periconceptional dietary intake and maternal and neonatal outcomes. *American Journal of Obstetrics and Gynecology, 223*(1), 121–128. https://doi.org/10.1016/j.ajog.2020.01.045

Young, M. F., & Ramakrishnan, U. (2021). Maternal undernutrition before and during pregnancy and offspring health and development. *Annals of nutrition & metabolism*, *76*(Suppl 3), 41-53. https://doi.org/10.1159/000510595