



Factors associated with preconception nutritional readiness in prospective brides in Bantul District, Indonesia

Faktor-faktor yang mempengaruhi kesiapan gizi prakonsepsi pada calon pengantin wanita di Kabupaten Bantul

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Abstract

Nutritional support was required at a higher concentration in the preconception period than in the earlier period. However, awareness about preconception nutrition remains low. Sociodemographic factors are thought to be related to preconception nutritional readiness. Objective, to identify the factors that influence preconception nutritional readiness in prospective brides. Method, this cross-sectional study was conducted from August to December 2023 and involved 111 prospective brides in Bantul Regency. Data collected included socio-demographic data and preconception nutritional readiness, measured by 10 indicators, including nutritional status, hemoglobin (Hb) level, nutrients intake, preconception nutrition knowledge, and iron and/or folate supplement consumption. Hemoglobin level were determined by Hb examination at the Community Health Center, whereas dietary and supplement intake were measured using a semi-quantitative food frequency questionnaire (SQ-FFQ). Data were analyzed using the chi-square test with statistical significance set at p-value <0,05. Results, the majority of subjects could only fulfill the five indicators of preconception nutrition readiness. Knowledge, calcium and folate intake were the lowest 3 indicators that could be met (<40%). There was no significant relationship between socio-demographic factors, educational history, and preconception nutritional readiness (p>0,05). In conclusion, socio-demographic factors, and education had no association with preconception nutritional readiness in prospective brides.

Keywords: Dietary intake, knowledge, preconception, nutritional status, women of reproductive age

Abstrak

Dukungan gizi pada masa prakonsepsi dibutuhkan dengan konsentrasi yang lebih tinggi dibanding dengan masa sebelumnya. Namun kesadaran tentang gizi prakonsepsi masih rendah. Faktor sosiodemografi diduga berhubungan dengan kesiapan gizi prakonsepsi. Penelitian bertujuan untuk mengetahui faktor-faktor yang mempengaruhi kesiapan gizi prakonsepsi pada calon pengantin wanita. Metode penelitian dengan desain *cross-sectional* ini dilaksanakan pada bulan Agustus-Desember 2024, yang melibatkan 111 wanita pranikah di Kabupaten Bantul, Yogyakarta, Indonesia. Data yang diambil adalah data sosiodemografi dan kesiapan gizi prakonsepsi yang dinilai dari 10 indikator meliputi: status gizi, kadar hemoglobin (Hb), asupan zat gizi, serta konsumsi suplemen zat besi dan/atau folat. Indikator kadar Hb diperoleh dari hasil pemeriksaan Hb di Puskesmas, sementara data asupan makan dan konsumsi suplemen diperoleh dari Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ). Data dianalisis menggunakan uji Chi-square dengan signifikansi pada $\alpha=0,05$. Hasil, mayoritas subjek hanya bisa memenuhi 5 indikator kesiapan gizi prakonsepsi. Pengetahuan, asupan kalsium, dan asupan folat merupakan 3 indikator paling rendah yang dapat dipenuhi (<40%). Tidak terdapat hubungan yang signifikan antara status sosiodemografi dan

riwayat edukasi dengan kesiapan gizi prakonsepsi ($p > 0,05$). Kesimpulan, faktor sosio-demografi, dan pendidikan tidak memiliki hubungan dengan kesiapan gizi prakonsepsi pada calon pengantin wanita.

Kata Kunci: Asupan makan, pengetahuan, prakonsepsi, status gizi, wanita usia subur

Introduction

The mother's nutritional status plays an important role in the fetal growth process and the child's future (Black et al., 2013). Intergenerational malnutrition can also be caused by the mother's nutritional status during the pre-conception period (Martorell & Zongrone, 2012; Ramakrishnan, 2020). Therefore, optimal women's health during the Preconception period is recognized as an important strategy for improving maternal and child health (Lassi et al., 2019).

Nutritional problems that often occur during the preconception period include Chronic Energy Deficiency (CED) and anemia. In our previous study, 40,5% of the prospective brides were at risk of CED and 23,1% were anemic (Paratmanitya et al., 2020). Based on data from the Global Nutrition Report in 2021, it was reported that 571 million women of reproductive age experienced anemia, or an equivalent of 29,9%, and this is still far from the target achieved by 2025, which aims to reduce the prevalence to 14,3% (Cesare et al., 2021). Meanwhile in Indonesia, based on Basic Health Research (RISKESDAS) in 2018, it shows that the prevalence of anemia in women of childbearing age who are not pregnant is 27,2% and in pregnant women it reaches 48,9%. Meanwhile, the prevalence of CED in women of childbearing age who were not pregnant was 14,5% and in pregnant women the prevalence is 17,3%. (Kementerian Kesehatan RI, 2019).

A woman who enters pregnancy and experiences CED and anemia affects the health of the mother and child. The impact that occurs in pregnant women with CED and anemia affects fetal growth, bleeding, abnormal weight gain, infectious diseases, and miscarriage. Meanwhile, the impact that occurs in children who are born if their mother has CED and anemia has a higher risk to have anemia in children, congenital defects, increases the rate of low birth babies, increases the rate of premature births, increases the infant mortality rate (IMR), and is the cause of 20% of maternal mortality rate (MMR) (Dean et al., 2014; Vasundhara et al., 2020). Several

studies also show that maternal health factors can influence the risk of stunting in their children (Dhaded et al., 2020; Nasriyah & Ediyono, 2023; Yani et al., 2023; Saleh et al., 2021; Santosa et al., 2022).

Nutritional readiness during the preconception period needs to be considered to improve the health status of mothers and children in Indonesia. However, in reality, most expectant mothers do not have good awareness of this. Previous research on prospective brides who planned to become pregnant immediately after marriage showed that 10 indicators of preconception nutritional readiness included: (1) Body Mass Index, (2) Upper Arm Circumference, (3) hemoglobin levels, (4) energy intake, (5) protein intake, (6) calcium intake, (7) iron intake, (8) folate intake, (9) knowledge about preconception nutrition, and (10) consumption of iron and/or folic acid supplements; not a single respondent could meet the ten indicators with good/normal criteria. The majority of respondents (80,3%) could only fulfill less than 5 indicators of preconception nutritional readiness. The indicator with the lowest fulfillment was related to adequate intake of micronutrients (Paratmanitya et al., 2020). This results shows that awareness of prospective mothers in preparing for pregnancy was still low.

The factors that influence this preconception nutritional readiness need to be known so that intervention programs can be developed to increase the readiness of pregnant women. One of the factors that was thought to influence the readiness were socio-demographic factors. This study was conducted in three sub-districts, which are the areas with the highest number of poor people and highest prevalence of stunting in Bantul District. The three sub-districts are the Dlingo Subdistrict, Pajangan Subdistrict, and Imogiri Subdistrict. Bantul District has had the highest number of poor people in the last 5 years compared to the other districts/cities in Yogyakarta Province. The objective of this study was to identify the relationship between sociodemographic factors and preconception nutritional readiness in prospective brides in Bantul District.

Methods

This cross-sectional study was conducted from August to December 2023 in Dlingo District, Pajangan District, and Imogiri District, the three districts with the highest prevalence of stunting in Bantul District in 2022. The sample in this study was prospective brides who met the following inclusion criteria: (1) not pregnant at the time of data collection, and (2) willing to participate in the research by signing an informed consent form. The sample used in this study was 111 prospective brides selected using purposive sampling. The ethical permission for This research was approved by the Research Ethics Committee of Alma Ata University, Indonesia (KE/AA/VIII/10111187/EC/2023).

The independent variables in this study included the socio-demographic characteristics of respondents (age, highest level of education, working status, type of work, income level) and history of education or counseling related to preconception nutrition. The dependent variable in this research was the preconception nutritional readiness of the prospective bride, which was measured using 10 indicators: (1) BMI, (2) MUAC, (3) hemoglobin levels, (4) energy intake, (5) protein intake, (6) calcium intake, (7) iron intake, (8) folate intake, (9) knowledge about preconception nutrition, and (10) consuming iron and/or folic acid supplements (World Health Organization, 2013).

The sociodemographic status and history of preconception nutritional education or counseling were obtained using a questionnaire, and the level of knowledge was measured using a validated questionnaire consisting of 25 questions ($r > 0,2816$; Cronbach's $\alpha = 0,703$). Knowledge was categorized into two categories, namely low if $< 75\%$ and high if $\geq 75\%$). BMI indicators are determined by measuring body height and weight using a microtoise and digital scale. Subjects with a BMI $< 18,5 \text{ kg/m}^2$ and BMI $> 25,0 \text{ kg/m}^2$ were categorized as not normal, subjects with a BMI of $18,5 - 25,0 \text{ kg/m}^2$ were categorized as normal. Meanwhile, the MUAC indicator, measured using a measuring tape, with a result $< 23,5 \text{ cm}$ was categorized as being at risk of CED and a result $\geq 23,5 \text{ cm}$ was categorized as not being at risk of CED. Hemoglobin level indicators were determined based on the results of hemoglobin examination at the Community Health Center, with results $< 12 \text{ mg/dl}$

categorized as anemia and $\geq 12 \text{ mg/dl}$ as non-anemic. Food intake indicators were measured using the Semi Quantitative-Food Frequency Questionnaire (SQ-FFQ) by looking at the average food intake in the last three months and then analyzed using the NutriSurvey application. Food intake was categorized as $< 80\%$ RDA or $\geq 80\%$ RDA. Meanwhile, variable consumption of iron and/or folic acid supplements was observed based on the supplements consumed in the last three months. Each of these indicators is then given a value of 1 if it is met and 0 if it is not, as shown in Table 1 as we used in our previous study (Paratmanitya et al., 2020). Then, the total score of the 10 indicators was categorized into two based on the median value.

Univariate analysis was performed to describe the subject characteristics. Then, bivariate analysis was carried out to determine the risk factors for CED using the chi-square test with statistical significance accepted at $p < 0,05$.

Table 1. Preconception nutritional readiness score

Indicators	Categories	Score
Body Mass Index	BMI $< 18,5 \text{ kg/m}^2$	0
	BMI $18,5 - 25,0 \text{ kg/m}^2$	1
Mid-upper Arm Circumference	BMI $> 25,0 \text{ kg/m}^2$	0
	MUAC $< 23,5 \text{ cm}$	1
Hemoglobin Level	MUAC $\geq 23,5 \text{ cm}$	0
	Hb $< 12 \text{ g/dL}$	1
Energy intake	Hb $\geq 12 \text{ g/dL}$	0
	$< 80\%$ RDA	1
Protein intake	$\geq 80\%$ RDA	0
	$< 80\%$ RDA	1
Calcium intake	$\geq 80\%$ RDA	0
	$< 80\%$ RDA	1
Iron intake	$\geq 80\%$ RDA	0
	$< 80\%$ RDA	1
Folate intake	$\geq 80\%$ RDA	0
	$< 80\%$ RDA	1
Level of knowledge about preconception nutrition	Poor ($< 75\%$ of the questions answered correctly)	0
	Good ($\geq 75\%$ of the questions answered correctly)	1
Folic acid and/or Iron supplement use	No	0
	Yes	1

Result and Discussion

A total of 111 subjects in Bantul District met the requirements for participation in the research. Table 2 presents the sociodemographic characteristics of the study participants. Subjects were predominantly aged ≤ 25 years (60,4%), and most had a secondary education level (58,6%). More than half (79,3%) of the subjects worked, and most worked as private employees (64,8%). Of the subjects who work, the majority have incomes below the regional minimum wage for the Bantul District in 2023.

Based on ten indicators of preconception nutritional readiness, it was found that the most frequently met indicator was the Hb level. This can be seen from the fact that the majority (80,2%) of subjects did not experience anemia. The least fulfilled indicator was level of knowledge. Of all subjects, only 9% had a good knowledge level about preconception nutrition (Table 2).

Another indicator of nutritional status showed that 51,4% of subjects had normal BMI and 75,7% of subjects were not at risk of CED. Meanwhile, in terms of nutritional intake, it is known that more than half of the subjects had energy and protein intake $\geq 80\%$ of the RDA, most of the calcium, iron, and folate intakes were still dominated by deficit intakes ($< 80\%$ of the RDA), amounting to 57,7% of subjects had consumed iron/folate supplements. The minimum score obtained by the participants in this study was 0, and the maximum score was 9 (median = 5). There were the subjects who could fulfill all ten indicators of preconception nutritional readiness, and only 0,9% of the subjects could fulfill all nine indicators. The highest scores obtained by the subjects were 4, 5, and 6 (Figure 1).

Table 2. Baseline characteristics (n = 111)

Variable	n	%
Age		
≤ 25 years old	67	60,4
> 25 years old	44	39,6
Education		
Low (≤ 9 years)	14	12,6
Middle (10-12 years)	65	58,6
High (> 12 years)	32	28,8

Working Status		
Not Working	23	20,7
Working	88	79,3
Occupation		
Farmer	1	1,1
Entrepreneur	23	26,1
Private employer	57	64,8
Government employer	5	5,7
Health workers	2	2,3
Income Level		
\leq District minimum monthly wage	59	67,0
$>$ District minimum monthly wage	29	33,0
Counselling History		
Have never received counselling	50	45
Have received counselling	61	55
Body Mass Index		
Underweight ($< 18,5$ kg/m ²)	18	16,2
Normal ($< 18,5 - 25,0$ kg/m ²)	57	51,4
Overweight ($> 25,0$ kg/m ²)	36	32,4
Risk of CED		
Yes (MUAC $< 23,5$ cm)	27	24,3
No (MUAC $\geq 23,5$ cm)	84	75,7
Hemoglobin Level		
Anemic (Hb level < 12 g/dl)	22	19,8
Not Anemic (Hb level ≥ 12 g/dl)	89	80,2
Energy Intake		
$< 80\%$ of the RDA	53	47,7
$\geq 80\%$ of the RDA	58	52,3
Protein Intake		
$< 80\%$ of the RDA	34	30,6
$\geq 80\%$ of the RDA	77	69,4
Calcium Intake		
$< 80\%$ of the RDA	97	87,4
$\geq 80\%$ of the RDA	14	12,6
Iron Intake		
$< 80\%$ of the RDA	59	53,2
$\geq 80\%$ of the RDA	52	46,8
Folic Acid Intake		
$< 80\%$ of the RDA	83	74,8
$\geq 80\%$ of the RDA	28	25,2
Iron and/or Folic Acid Supplement Use		
No	47	42,3
Yes	64	57,7
Knowledge		
Poor ($< 75\%$ of the answered correctly)	101	91,0
Good ($\geq 75\%$ of the answered correctly)	10	9,0

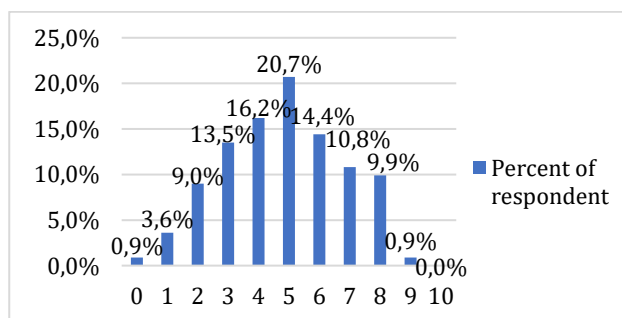


Figure 1. Preconception Nutrition Readiness Score Achievement

Table 3 shows that sociodemographic characteristics including age, education level, working status, income level, and history of preconception nutrition education were not significantly associated with preconception nutritional readiness in prospective brides in Bantul District ($p > 0,05$).

Of the 111 subjects involved in the research, not a single subject met all ten indicators of preconception nutritional readiness. This was similar to our previous study in Bantul (Paratmanitya, et al., 2020), and a survey in England that showed that there are still many women of childbearing age who are not nutritionally ready for pregnancy (Stephenson et al., 2018). In this study, the lowest indicator was the knowledge level. It is known that only 9% of subjects have good knowledge (can answer correctly $\geq 75\%$ of the questions), and the remaining 91% are still in the low category ($< 75\%$). This must be a matter of concern because, in the domain of human behavior, knowledge plays the most basic role before giving birth to positive practices to support health status (Wisdayanti et al., 2022).

Table 3. Factors associated with preconception nutrition readiness

Variable	Nutrition Preconception Readiness			p-value ²	OR (CI)
	< median n (%)	\geq median n (%)	mean		
Age					
≤ 25 years old	30 (44,8)	37 (55,2)	4,70	0,687	1,171 (0,542-2,530)
> 25 years old	18 (40,9)	26 (59,1)	4,95		
Education					
≤ 12 years	35 (44,3)	44 (55,7)	4,78	0,723	1,163 (0,505-2,676)
> 12 years	13 (40,6)	19 (59,4)	4,84		
Working Status					
Not working	13 (56,5)	10 (43,5)	4,43	0,149	1,969 (0,778-4,981)
Working	35 (39,8)	53 (60,2)	4,90		
Income Level					
≤ District minimum monthly wage	22 (37,3)	37 (62,7)	5,08	0,497	0,732 (0,297-1,804)
> District minimum monthly wage	13 (44,8)	16 (55,2)	4,52		
Counselling History					
Have never received counselling	21 (42,0)	29 (58,0)	4,68	0,811	0,912 (0,428-1,941)
Have received counselling	27 (44,3)	34 (55,7)	4,90		

A low knowledge level is one of the factors that create negative human attitudes and practices, including nutritional practices. In this study, apart from knowledge, intake of micronutrients in the form of calcium, iron, and folate was also still in the low category ($< 50\%$). There were still 53,2% of subjects with iron intake $< 80\%$ of the RDA, 74,8% of subjects with folate intake of $< 80\%$ of the RDA, and 87,4% of subjects with calcium intake $< 80\%$ of the RDA. Nutritional factors including micronutrients before pregnancy can affect maternal and child outcomes. During the preconception period, iron

facilitates ovulation, folate supports fetal development in the embryonic process, and calcium plays a role in prevents osteoporosis. (Susilowati and Kuspriyanto, 2016; Anggraeny and Ariestningsih, 2017; Hasanah et al., 2017). Therefore, micronutrient deficiencies should also be a concern for prospective brands. Nutritional intake in the deficit category can cause 3,1 million child deaths per year worldwide (Black et al., 2013).

The adequacy of these micronutrients cannot only be met through intake alone but must also be met through supplementation as an

effective alternative measure. Preventive efforts have been made by providing iron/folate supplementation to every prospective bride by the Community Health Center. However, there were still 42,3% of subjects who did not consume iron/folate supplementation. This can illustrate the low compliance with consuming supplements. Supplementation given at least three months before pregnancy can reduce the negative impact of deficiency (Lestari et al., 2023; Stephenson et al., 2018). Adequate iron intake can reduce the risk of iron deficiency anemia in pregnant women, which is harmful to the mother and her womb (Ballestín et al., 2021; Susilowati & Kuspriyanto, 2016; Zhang et al., 2021). Meanwhile, adequate folate reduces the risk of babies with neural tube defects (NTD), prevents the occurrence of macrocytic anemia, is beneficial for heart health, and supports cognitive function (Anggraeny & Ariestiningsih, 2017; Ballestín et al., 2021; Mao et al., 2020).

Regarding energy and protein intake, more than 50% of subjects had energy and protein intakes $\geq 80\%$ of the RDA. Energy and protein intake before pregnancy can also change maternal and infant outcomes by affecting the nutritional status (Stephenson et al., 2018). Thus, the energy and protein intake of subjects who are already in the category $\geq 80\%$ of the RDA is in line with the nutritional status of the majority of subjects who are in the normal category (indicators met $> 50\%$). Even Although the majority were dominated by subjects in the normal nutritional status category, there were still 32.4% of subjects in the obese category. Overweight or obesity can increase the risk of adverse effects for the mother and baby, including the inability to get pregnant and pregnancy complications such as preeclampsia, gestational diabetes, and childbirth (macrosomia) (Al-Hakmani et al., 2016; Melchor et al., 2019; Stephenson et al., 2018). It can also affect infant mortality, LBW, failure to breastfeed, and maternal death (Stephenson et al., 2018).

This study aimed to further examine the nutritional readiness of prospective brides and the factors that influence it. These factors are based on sociodemographic status, which includes age, education level, work status, income, and educational history. After conducting a bivariate analysis between nutritional readiness and the subject's

sociodemographic condition, the results showed that of the five characteristics, there were no statistically significant characteristics with preconception nutritional readiness ($p > 0,05$).

Further analysis regarding the mean preconception nutritional readiness score found that in the age group, better readiness was found in the >25 years category. This is in line with previous research, which also revealed that, in women of childbearing age, unpreparedness for pregnancy tends to occur in younger women (Stephenson et al., 2018). As age increases, knowledge increases as a basis for behavioral changes in a more positive direction to support nutritional status (Patata et al., 2021).

In addition, in terms of education level criteria, the group of subjects whose last education was at university or > 12 years had a higher average readiness than the average subject in the group who received education for ≤ 12 years. Education can influence subject knowledge (Dewi & Sudarti, 2017; Hanifah & Fauziah, 2019; Shapu et al., 2020). Working status criteria showed that working subjects had a higher average readiness score. This is because working makes it easier for subjects to access information through interactions with colleagues, so that information exchange occurs. Different knowledge backgrounds between workers mean that the exchange of information can increase subject knowledge. Meanwhile, according to the educational history criteria, subjects with a history of education related to preconception nutrition had a higher average readiness score than subjects who did not have a history of education related to preconception nutrition. This is because subjects who receive education will increase their knowledge so that they can have a positive attitude towards better nutritional practices (Hidayati et al., 2022; Wisdayanti et al., 2022).

Women are more likely to pay attention to their health during pregnancy. They were not prepared for their health during the preconception period. There is a need to increase preconception nutritional readiness in prospective brides because there are still no prospective brides who can meet all the indicators. This increase can be achieved by building awareness for each prospective bride to be more aware of the importance of quality nutrition during the preconception period to support the quality of the pregnancy and the child.

This present study has limitation. Hb level data was taken from examination results at the Community Health Center, not measured by the research team directly. There was 3 community health center which involved in this study. So there was the possibility of differences between Community Health Center in methods or tools for checking Hb levels which can cause variations in measurement results. Therefore, further research is need to equalize the measurement methods.

Conclusion

The ten of indicators, anemia status was the indicator with the highest percentage fulfillment, and the level of knowledge was the indicator with the lowest percentage fulfillment. There was no relationship between sociodemographic characteristics, including age, education level, work status, income, and educational history, and preconception nutritional readiness in prospective brides in Bantul Regency.

However, the results showed that prospective brides aged > 25 years, highly educated, employed, and had received education related to preconception nutrition had a better average nutritional readiness score than prospective brides aged < 25 years, primary and secondary education, and had never received preconception nutrition education.

So that intervention programs to increase preconception nutritional readiness in prospective mothers are recommended by developing educational programs that are attractive to prospective brides and grooms, for example by creating health educational and monitoring applications on cellphones that can be accessed easily. From the government, including the Religious Affairs Office, can minimize the age of marriage that is too young.

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