

Preconception Health of Prospective Brides and Grooms in Malang Regency, Indonesia

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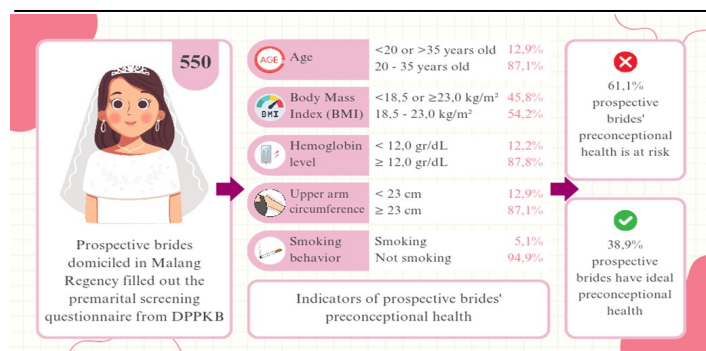
ABSTRACT

Preconception health is a significant contributor to pregnancy outcomes. However, the majority of women only improve their health status after receiving counseling at the first antenatal visit or during pregnancy. This shows the need to identify preconception health through premarital screening. Therefore, this study aimed to assess the characteristics of preconception health of prospective brides in Malang Regency using "Elsimil Application". The assessment was carried out using a quantitative descriptive method with a secondary data analysis. The total sampling method was used for sample collection and data used were obtained from prospective brides who completed the premarital screening questionnaire on Elsimil Application. The variables assessed were prospective brides' preconception health with several sub-variables. These included age, BMI, Hb levels, upper arm circumference, and smoking behavior, which were collected using an instrument in the form of a checklist table. The results of the descriptive statistical analysis, which included the frequency and percentage, showed that a significant proportion of prospective brides had preconception health state at risk (61.1%). Consequently, this study recommended the importance of strengthening preconception health services by providing education, which comprised accurate information, accessibility, and required improvement, particularly for prospective brides and grooms in rural areas.

ABSTRAK

Kesehatan prakonsepsi mempunyai pengaruh yang signifikan terhadap hasil kehamilan. Namun, sebagian besar wanita baru akan berusaha meningkatkan status kesehatannya setelah mendapat konseling pada kunjungan antenatal pertama atau setelah kehamilan. Tujuan penelitian ini adalah untuk menilai karakteristik kesehatan prakonsepsi calon pengantin di Kabupaten Malang dengan menggunakan "aplikasi Elsimil". Penelitian ini menggunakan metodologi deskriptif kuantitatif dengan pendekatan analisis data sekunder. Data penelitian diperoleh dari calon pengantin yang mengisi kuesioner screening pranikah di Aplikasi Elsimil. Teknik pengambilan sampel yang digunakan adalah teknik total sampling. Variabel yang diteliti adalah kesehatan prakonsepsi calon pengantin dengan sub-variabel umur, BMI, kadar Hb, lingkar lengan atas, dan perilaku merokok yang dikumpulkan dengan menggunakan instrumen berupa tabel checklist. Temuan analisis statistik deskriptif yang mencakup frekuensi dan persentase menunjukkan bahwa sebagian besar calon pengantin di Kabupaten Malang yang mengikuti kuisisioner skrining pranikah "Elsimil" menunjukkan kondisi kesehatan prakonsepsi yang dianggap berisiko (61,1%). Penelitian ini merekomendasikan pentingnya penguatan pelayanan kesehatan prakonsepsi dengan memberikan edukasi yang mencakup informasi yang akurat tentang pentingnya kesehatan prakonsepsi, cara mengakses layanan kesehatan prakonsepsi, dan apa yang harus dilakukan untuk meningkatkan kesehatan prakonsepsi khususnya bagi calon pengantin di pedesaan.

GRAPHICAL ABSTRACT



Keyword

nutritional status
preconception care
preconception health
pregnancy
prospective brides

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INTRODUCTION

Women of childbearing age are individuals who fall between a population range of 15 to 49 years (Forty et al., 2021; Mog & Ghosh, 2021). Generally, the onset of reproductive maturity in women is characterized by the occurrence of menstrual episodes, showing the appropriate development of the reproductive organs. This makes women of childbearing age potentially pregnant when conception or fertilization occurs, resulting in relative closeness to the pre-pregnancy or pre-conception period. During preconception period, health status requires significant consideration to prepare for healthy pregnancy. Adolescence is the most optimal period for women to start preparing for preconception health. According to Sainafat et al. (2020), the stage of adolescence is a phase of physical, psychological, social, and intellectual maturation. This shows that there is a need to engage in well-rounded reproductive well-being and embrace personal accountability, including physical, psychological, and social readiness, in anticipation of entering into matrimony and imagining parental roles during adulthood. In Indonesia, there are still many young women who face problems related to reproductive health, such as a high rate of early marriage, Chronic Energy Deficiency (CED), anemia, and smoking behavior or exposure to secondhand smoke.

The importance of preconception health in developing communities should be emphasized, as various individuals typically give less consideration. This can be shown by the low use of preconception health care by individuals in developing countries (Amaje et al., 2022). The use of preconception services is impacted by several factors such as job, level of understanding, previous experience of unwanted pregnancy, history of using birth control before conception, previous bad pregnancy outcomes, and pre-existing medical conditions (Girma et al., 2023).

In the past ten years, over 1 in 5 (21%) young women have been married as children. South Asia continues to have the highest con-

centration of children brides, accounting for 44% of all cases (UNICEF, 2022). In Indonesia, the occurrence of marriage at the age of 19 or younger is approximately 21.5%. Throughout 2022, the Malang Regency Religious Court has granted 1,393 requests for marriage dispensation. This figure makes the regency ranked as the region with the highest early marriage rate in East Java Province in 2022. Based on a preliminary study conducted at Population Control and Family Planning Service Malang Regency, there are 5 sub-districts with early marriage rates, namely Jabung, Tumpang, Poncokusumo, Singosari, and Dampit Districts. Additionally, the Ministry of Health RI (2023) report shows that in 2018, the incidence of CED among non-pregnant late adolescent women was 23.3%. The prevalence of anemia in the same population has shown an upward trend, increasing from 37.1% in 2013 to 48.9% in 2018.

Late adolescent women experience problems related to lifestyle, namely smoking, and exposure to secondhand smoke. According to the results of World Health Organization (2022), the number of adult smokers has increased to 8.8 million in the last ten years, reaching 60.3 million in 2011 and 69.1 million in 2021. Although the majority of smokers are men, late adolescent women are still at risk of being exposed to cigarette smoke at home which is in second place with the highest percentage of exposure at 59.3%.

Problems related to reproductive health experienced by young women can continue to the stage of pregnancy when not handled properly. Therefore, the identification of preconception health is crucial before the occurrence of pregnancy, particularly for women in the childbearing age group who are on the doorstep of committing to marriage. This is because one of the objectives of marriage is to have healthy and intelligent children. The state of women before pregnancy will have a significant role in determining the well-being of the children. Barker et al. (2018) and Stephenson et al. (2018) stated that women with good nutritional

status and lifestyle before pregnancy had an increased likelihood of experiencing a favorable pregnancy outcome and delivering a newborn with optimal health compared to those focused on improving nutritional status and lifestyle after pregnancy.

The need for nutrients in pregnant women is essential to produce the placenta, fetal tissue, and the volume of blood provided for the progression and maturation of the fetus. Recent studies have established that exposure to cigarettes which are teratogenic will interfere with the process of organogenesis in the fetus. Consequently, when preconception health is not properly prepared, the growth and development of the fetus will also be disrupted. This shows that the fetus in the womb is at risk of experiencing abortion, stillbirth, birth defects, and low birth weight (LBW) (Toivonen et al., 2017). The impact of health problems experienced continuously in the womb will be permanent and cannot be corrected in the future. According to Kim et al. (2024), Mathewson et al. (2021), and Schüssler et al. (2022), the long-term impact of LBW on newborns is a low level of intelligence, neurological disorders, as well as growth and development disorders. This is supported by the report of Abbas et al. (2021) in the province of Sindh, Pakistan, where LBW increases the risk of stunting in children.

Among the efforts to identify preconception health in women of childbearing age is by conducting premarital screening according to the National Population and Family Planning Agency through the "Elsimil Application". The purpose of conducting premarital screening is to provide women the opportunity to enhance their health condition in anticipation of pregnancy through preventive measures, medical treatment, and healthy lifestyle adjustments. Therefore, this study aimed to assess prospective brides' preconception health of prospective brides in Malang Regency using Elsimil Application.

METHODS

A quantitative descriptive study using a secondary data analysis strategy was conducted among 550 prospective brides in Malang Regency. In 2022, this regency ranked first in the region with the highest rate of early marriage in East Java Province. Based on a preliminary study conducted at the Population Control and Family Planning Service Malang Regency, the prevalence of early marriage was observed across all sub-districts, including Jabung, Tumpang, Poncokusumo, Singosari and Dampit. Therefore, this regency was selected as a study location to provide an appropriate response to problems in reproductive health for prospective brides, particularly women planning healthy pregnancy. At a very young age (< 20 years), pregnancy is considered risky because the women reproductive organs have not yet reached perfection. Adolescent women also have a greater percentage of experiencing anemia and CED (Indonesian Basic Health Research Report).

This study was conducted from January to May 2022 using secondary data to represent the population from filling out the premarital screening questionnaire on the Elsimil Application for prospective brides. The respondents consisted of 550 prospective brides from Population Control and Family Planning Service who were domiciled in 32 subdistricts in Malang Regency. Total sampling method was used to describe preconception health of the general population. To maintain relevance and specificity to the target group, the study included prospective brides domiciled in Malang Regency and filled in the questionnaire completely. Other inclusion criteria were pictures of the results of official examinations carried out at health facilities. Exclusion criteria were data consisting of images other than evidence of examination from health facility to maintain the validity of the answers included by respondents in Elsimil Application.

Elsimil Application is generally used to identify preconception health through premari-

tal screening conducted three months before marriage. The use of Elsimil Application has been implemented on a national scale. By identifying preconception health in prospective brides, the application is expected to facilitate the reduction in the incidence of stunting caused by excessively young/old age, maternal nutritional deficiency/excess, and exposure to cigarette smoke. Three months before marriage, prospective brides and grooms will submit a marriage application at the local Religious Affairs Office. Subsequently, prospective brides and grooms will be given a blank containing 6 questions, namely age, weight, height, Hb level, LILA, and smoking behavior/cigarette exposure along with recommendations for health check at the Community Health Center.

The results of the examination carried out by prospective brides are entered into the Elsimil Application premarital screening questionnaire independently, with the assistance of local health cadres. The validity of the data entered is ensured by including a photo in the form of a blank form of the Religious Affairs Office which has been filled in by the Community Health Center after the examination. This is often accompanied by the signature of health worker and the stamp of the Community Health Center where the examination was carried out. Data from the premarital screening questionnaire on the Elsimil Application will be stored on the Elsimil administrator website, managed by government agencies, namely Population Control and Family Planning Service Malang Regency.

The data collection tool for preconception health of prospective brides in this study was a checklist table for raw data. The study examined only one variable, namely preconception health of brides, which was determined by the accumulated scores, consisting of age, BMI, Hb levels, upper arm circumference, and smoking behavior. These five criteria were grouped into two categories, including ideal or risky according to the standards that apply to each criterion. When all the criteria are in the ideal cate-

gory, preconception health status is declared ideal. However, when there are one or more criteria that are in the risk category, it is classified as risk. The data obtained was processed using the descriptive statistics method, including frequencies and percentages to address the study questions.

Regarding ethical considerations, a detailed study protocol was submitted to the Ethics Review Committee and authorized by Health Research Ethics Committee of Poltekkes Kemenkes Malang, through the letter Number 536/VI/KEPK POLKESMA/2023. The protocols submitted included details on the informed consent process, explaining how respondents would be informed about the study, their rights, and data management. Therefore, the ethical clearance attained showed that the study observed rigorous ethical standards, considered prospective brides' welfare, and maintained the ethics of study integrity during the entire process.

RESULTS

Table 1 shows the characteristics of prospective brides in Malang Regency who filled out the premarital screening questionnaire on the Elsimil Application from January to May 2022. The results showed distinctive characteristics based on each indicator that determined their preconception health. In the age column, a significant proportion of prospective brides entered into marriage between the ages of 20 and 35 years. However, 12.9% (71 respondents), engaged in marriage either before the age of 20 or 35. In the BMI column, a significant proportion of prospective brides possessed a BMI within the normal range (18.5 – 22.9 kg/m²), while 45.8% (252 respondents) had a BMI < 18.5 or ≥ 23.0 kg/m². In the Hb level column, the majority of prospective brides had Hb levels ≥ 12 gr/dL, while 12.2% had <12 gr/dL, which was considered anemic. Furthermore, in the upper arm circumference column, the majority of prospective brides had a size of ≥ 23 cm and only 12.9% were < 23.5 cm or experienced

Table 1
The indicators of prospective brides' preconception health

Criteria	n	%
Age		
< 20 or > 35 years old	71	12.9
20 – 35 years old	479	87.1
Body Mass Index		
< 18,5 or \geq 23,0 kg/m ²	252	45.8
18,5 – 22,9 kg/m ²	298	54.2
Hemoglobin level		
< 12 gr/dL	67	12.2
\geq 12 gr/dL	483	87.8
Upper arm circumference size		
< 23,5 cm	71	12.9
\geq 23,5 cm	479	87.1
Smoking behavior		
Smoking	28	5.1
Not smoking	522	94.9

Note: n= total number of respondents; %= proportion of respondents based on criteria

CED. In the smoking habits column, the majority of prospective brides do not smoke, although there are 5.1% of prospective brides who smoke/are exposed to cigarette smoke.

Table 2 shows that the majority of prospective brides have preconceived health status which is at risk. Based on these five criteria, namely age of marriage, BMI, Hb level, upper arm circumference, and smoking behavior, the results showed that prospective brides were identified as having risky preconception health status (61.1%).

DISCUSSION

Premarital screening in Indonesia has been recommended for prospective brides and grooms to anticipate the potential occurrence of health problems that can affect the quality of the children, such as stunting. The screening carried out at the Community Health Center includes checking the age, BMI, Hb level, upper arm circumference, and smoking habits. Subsequently, the results of the examination are entered into a pre-marital screening questionnaire independently, with the assistance of health cadres using the Elsimil Application. These data are processed to obtain conclusions regarding preconception health characteristics of prospective brides.

Age of Prospective Brides

This study showed that the majority of respondents married at the ideal age (87.1%). Although the number is small, respondents who married at a risky age (12.9%) needed to be in the spotlight. This is because conception at the age of less than 20 years increases the chance of abortion, hypertension, premature delivery, developmental issues, low birth weight, congenital abnormalities, infection, anemia after childbirth, postpartum hemorrhage, and maternal death (Moradinaza et al., 2020, Seshadri et al., 2021). Additionally, early pregnancy increases miscarriage and fetal mortality (Centers for Disease Control and Prevention, 2017). Conception beyond the age of 35 reduces fertility and egg production, making women susceptible. This age of pregnancy increases the risk of genetic abnormalities, miscarriage, and delivery complications (Shan et al., 2018), early delivery, low birth weight (LBW), congenital abnormalities due to diminished uterine vascularization, eclampsia, and anemia (Frick, 2021).

Body Mass Index of Prospective Brides

This study shows that the majority of respondents have an ideal BMI (54.2%). Although the number is small, respondents who have a risky BMI (45.8%) need to be identified. A BMI under 18.5 kg/m² categorizes

Table 2*Preconception health of prospective brides*

Category	n	%
Risky	336	61.1
Ideal	214	38.9

Note: n= total number of respondents; %= proportion of respondents based on categories

pregnant women at risk for marriage due to the potential of starvation to develop health problems. Generally, malnutrition disrupts reproductive function as well as growth and organ function. According to Boutari et al. (2020), being underweight shows low calorie intake, body weight, and fat, which interferes with secretion, pulsatile, gonadotropin, and pituitary to produce reproductive hormones, increasing menstrual disorders. Fetal growth and development are also affected by maternal underweight throughout pregnancy. This phenomenon can be explained by the limited nutrition uptake of the fetus during the first 1000 days of life. Underweight pregnant women are at risk of anemia, difficult labor, and bleeding during delivery, while the fetus is at risk of anemia, low birth weight, and sick babies. Li et al. (2018) found that underweight maternal pre-pregnancy affected cognitive scores such as verbal comprehension and the prevalence of malnourished children.

Excess nutrition is another significant contributor to the reproductive health of women. Dow and Szymanski (2020) found that obese women showed a greater tendency to become infertile. Additionally, obese women showed higher susceptibility to spontaneous abortions, birth abnormalities, hypertension, gestational diabetes mellitus, macrosomia, IUGR, and stillbirths. D'Souza et al. (2019) stated that obesity in pregnant women increased the risk of cesarean delivery, perineal tears of degrees 3 and 4, postpartum infections, premature birth, small for gestational age, neonatal asphyxia, trauma at birth, respiratory distress, and hypoglycemia. Therefore, determining BMI before marriage, planning healthy pregnancy, adjusting food portions, physical activity, and maintaining ideal body weight will be more ef-

fective than ANC management.

Hemoglobin Level of Prospective Brides

This study shows that the majority of respondents have ideal Hb levels (87.8%). Although the number is small, respondents who married at a risky age (12.2%) need to be in the spotlight. Anemia can hinder productivity in women due to its tendency to induce nonspecific symptoms such as weakness, exhaustion, lethargy, shortness of breath (during physical activity), palpitations, and headaches. These symptoms occur due to insufficient levels of hemoglobin, which is responsible for carrying oxygen to all tissues (Abuaisha et al., 2020). However, when women with anemia become pregnant, there will be obstacles to the transfer of nutrients to the fetus, impacting growth and development. Means (2020) stated that iron deficiency could cause placental hypertrophy, increasing the chances of preterm labor, low birth weight (LBW), stillbirth, and maternal hemorrhage during labor.

Anemia status should be determined before the initiation of pregnancy, specifically by premarital screening. According to the Population Control and Family Planning Service of Malang Regency, all prospective brides, regardless of anemic status should be provided with iron supplements in the form of 20 Fe tablets to be taken once a week and daily during menstruation. Preconception management of anemia followed the guidelines proposed by da Silva Lopes et al. (2021), suggesting that iron therapy effectively raised hemoglobin levels and prevented deficiency in non-pregnant women of reproductive age. Li et al. (2020) and Basrowi & Dilantika (2021) showed that regular intake of iron, particularly in combination with vitamin C found in orange juice, a local commodity in

Malang Regency was recommended to increase Hb levels. Prospective brides were also motivated to adhere to the "Fill My Plate" guidelines provided by the [Ministry of Health RI \(2018\)](#) to maintain a balanced diet. Additionally, the recommendation was made to consume foods rich in iron, such as liver, eggs, fish, and chicken, to prevent the occurrence of anemia before getting pregnant.

Upper Arm Circumference's Size of Prospective Brides

This study shows that the majority of respondents have ideal upper arm circumference (87.1%). Although the number is small, respondents who have a risky upper arm circumference (12.9%) need to be identified. Typically, CED hinders women's productivity due to the ability to diminish their energy levels, resulting in feebleness and incapacitation in engaging in routine tasks. Pregnant women with CED status are also susceptible to limited nutrient availability for the fetus compared to others, leading to inadequate nutrition for optimal fetal growth and development. This observation is in line with the results of [Gul et al. \(2020\)](#), where pre-pregnancy CED in women is considered a predictive factor for the occurrence of low birth weight (LBW) in newborns. Furthermore, it can contribute to significant perinatal complications such as stillbirth, preterm birth, and being small for gestational age. This shows the need to measure CED status of prospective brides before marriage to implement preventive measures, such as ensuring sufficient nutritional intake. The measurement is carried out to ensure that prospective brides are free from CED before planning to conceive.

Smoking behavior of prospective brides

This study shows that the majority of respondents do not have a smoking habit (94.9%). Although the number is small, respondents who have a smoking habit (5.1%) need to be in the spotlight. Smoking harms reproductive health and well-being, thereby po-

tential brides and grooms should be checked before marriage. The carbon monoxide contained in cigarettes blocks oxygen from reaching important organs in the bloodstream. Subsequently, oxidants in cigarettes interact with cholesterol to deposit fatty compounds on artery walls. This phenomenon leads to the occurrence of heart disease, stroke, and vascular problems ([Benowitz & Liakoni, 2022](#); [Parmar et al., 2023](#)).

In pregnancy, smoking cigarettes may affect children throughout development. This is because cigarettes contain chemicals that can disturb organogenesis, causing miscarriage, ectopic pregnancy, birth defects, as well as intellectual disabilities such as SIDS, asthma, and stillbirth. [Hamadneh and Hamadneh \(2021\)](#) found that pregnant women who smoke are more susceptible to having premature birth, low birth weights, and APGAR ratings. Some studies have correlated maternal smoking during pregnancy to congenital abnormalities including labioschizis and labiopalatoschizis. Moreover, both passive and active smoking have the same health risks. [Avşar et al. \(2021\)](#) found that passive smokers during pregnancy harm the pregnant women and the fetus. Due to the serious health risks of cigarette chemicals, prospective brides should be screened for smoking before marriage.

Preconception health of prospective brides

Each indicator that determines preconception health, namely age, BMI, Hb levels, upper arm circumference size, and smoking habits in this study showed small numbers. However, the analysis showed that the majority of respondents have preconception health at risk (61.1%). This is because when one indicator is at risk, prospective brides would be considered at risk.

Young women's reproductive health issues might persist throughout pregnancy when not properly addressed. Preconception health is important because childbirth is generally a major goal, as health before pregnancy

will affect the quality of life of children. [Barker et al. \(2018\)](#) and [Stephenson et al. \(2018\)](#) found that women maintaining optimal nutritional status and healthy lifestyle were more likely to have a successful pregnancy and deliver healthy newborns. Therefore, preconception health should be assessed three months before marriage for prospective brides to develop supporting habits and improve their health status.

The study shows the need to prioritize and enhance preconception health of prospective brides, which serves as a predictor of pregnancy outcomes. Therefore, preconception period is the most appropriate moment to improve health status, particularly nutritional status and healthy lifestyle ([Barker et al., 2018](#); [Stephenson et al., 2018](#)). The majority of women only try to improve health status after receiving counseling at the first antenatal visit or during pregnancy. This often leads to an inability to achieve the expected nutritional status and healthy lifestyle during the first 1000 days of life. Therefore, good health status will not be maintained when women do not prepare well before pregnancy, resulting in CED, anemia, and exposure to cigarette smoke in pregnant women. This study is hindered by the lack of active engagement from the population in the district regarding the use of premarital screening programs such as *Elsimil* Application. To address this issue, there is a need to engage with the community and ensure that respondents comprehend the objectives, advantages, and proper use of health services.

CONCLUSIONS

In conclusion, this study found that preconception health status of the majority of prospective brides was at risk. Therefore, recommendation was made to strengthen preconception health services by providing education on the importance of preparing for healthy pregnancy before birth. This education should include accurate information about the importance of preconception health, service accessibility, and required improvement. It was also im-

portant to implement prospective brides' workshops, training sessions, and educational campaigns to provide adequate empowerment. Additionally, health cadres and village youth communities should be engaged in community-based awareness campaigns to improve preconception health of prospective brides. The government should also strengthen assistance programs for prospective brides and grooms. Additional studies were recommended to evaluate health actions taken by prospective brides and grooms to improve preconception health. By implementing these recommendations, stakeholders could provide empowerment with knowledge and awareness contributing to improved preconception health and pregnancy outcomes in women of childbearing age.

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AUTHORS' CONTRIBUTIONS

Nadya D. Tazkiyah designed the study, formulated the concept, wrote the manuscript, enrolled participants, collected and analyzed the data, performed the field work. Suprapti Suprapti. designed the study, formulated the concept, and reviewed the manuscript. Lisa P. Wulandari. designed the study, formulated the concept, wrote the manuscript, enrolled participants, collected and analyzed the data, and revised manuscript. Sunaeni Sunaeni and Herawati Mansur reviewed manuscript and analyzed the data.

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COMPETING INTERESTS

The authors confirm that all of the text, figures, and tables in the submitted manuscript work are original work created by the authors and that there are no competing professional, financial, or personal interests from other parties.

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