THE EFFECT OF CHRONIC ENERGY DEFICIENCY EDUCATION THROUGH BOOKLETS ON KNOWLEDGE IN PREGNANT WOMEN IN THE THIRTY-TRIMESTER

Dian Soekmawaty Riezqy Ariendha[1]*, Hardaniyati[2], Irni Setyawati[3], Kusniyati Utami[4]

[1,2,3,]Program Studi Kebidanan Program Sarjana, Program Studi Keperawatan Jenjang Diploma III
INKES Yarsi Mataram
*Email Corespondensi: diansoekmawaty.ra@gmail.com

ABSTRAK: PENGARUH EDUKASI KEKURANGAN ENERGI KRONIK MELALUI BOOKLET TERHADAP PENGETAHUAN PADA IBU HAMIL

Latar Belakang: Kekurangan Energi Kronik (KEK) pada ibu hamil merupakan keadaan dimana ibu menderita kurangan makanan yang berlangsung menahun (kronis) sehingga menimbulkan gangguan kesehatan pada ibu hamil. Kondisi ini ditandai dengan Lingkar Lengan Atas (LILA) <23,5 cm. Berdasarkan data jumlah ibu hamil yang mengalami KEK di provinsi Nusa Tenggara Barat (NTB) sebanyak 12,9%. KEK pada ibu hamil perlu mendapatkan perhatian khusus karena dapat menyebabkan kematian ibu dan bayi.

Tujuan: Penelitian ini bertujuan untuk mengetahui pengaruh edukasi anemia menggunakan booklet terhadap pengetahuan pada ibu hamil di Puskesmas Gunung Sari. Metode: Jenis penelitian yang digunakan adalah kuantitatif dengan desain penelitian *quasi-eksperimen* dengan rancangan *pretest-posttest group design*. Populasi dalam penelitian ini adalah semua ibu hamil yang mengalami anemia di Puskesmas Gunungsari Lombok Barat yang berjumlah 64 orang dan sebanyak 30 orang sebagai sampel yang ditarik menggunakan purposive sampling kemudian di uji statistik *McNemar*. Hasil: Hasil penelitian ini menggunakan uji *McNemar* yang menunjukkan bahwa terdapat pengaruh edukasi KEK melalui booklet terhadap pengetahuan pada ibu hamil trimester III di Puskesmas Gunungsari memiliki p value <0.05. Kesimpulan: Didapatkan sebelum diberikan penyuluhan sebagian ibu hamil memiliki tingkat pengetahuan yang baik 60% dan terdapat 40.0% ibu hamil memiliki tingkat pengetahuan yang buruk. Setelah diberikan penyuluhan pengetahuan ibu mengalami peningkatan menjadi 93.3% sedangkan presentase pengetahuan yang buruk sebanyak 6.7%. Didapatkan nilai *p value* = 0,002 atau p<0,05 yang berarti terdapat pengaruh edukasi KEK melalui *Booklet* terhadap pengetahuan pada ibu hamil trimester III di Puskesmas Gunungsari Tahun 2024. Diperlukan edukasi intervensi terkait pola makan dan kepatuhan mengkonsumsi makanan bergizi, terutama bagi ibu hamil yang berusia <20 tahun dan >35 tahun dan ibu yang tidak bekerja. .

Saran : Diharapkan dapat menambah pengetahuin dengan menambah literasi tentang keurangan energi kronik agar dapat mempersiapkan kehamilan dengan baik agar terhindar dari KEK.

Kata kunci: Booklet; ibu hamil; KEK; Pengetahuan; trimester III

ABSTRACT

Background: Chronic Energy Deficiency (CED) in pregnant women is a condition in which the mother suffers from chronic nutritional deficiencies, leading to health problems. This condition is characterized by a Mid-Upper Arm Circumference (MUAC) <23.5 cm. Data shows that 12.9% of pregnant women in West Nusa Tenggara (NTB) experience CED. CED in pregnant women requires special attention because it can lead to maternal and infant mortality.

Objective: This study aimed to determine the effect of anemia education using booklets on the knowledge of pregnant women at the Gunung Sari Community Health Center. Method: This study used a quantitative quasi-experimental design with a pretest-posttest group design. The population in this study was all 64 pregnant women with anemia at the Gunung Sari Community Health Center, West Lombok, and a sample of 30 people was drawn using purposive sampling and then subjected to the McNemar statistical test. Results: The results of this study using the McNemar test showed that there was an effect of CED education through booklets on knowledge among pregnant women in the third trimester at the Gunungsari Community Health Center with a p-value <0.05. Conclusion: It was found that before the counseling was given, some pregnant women had a good level of knowledge (60%), and there were 40.0% of pregnant women with a poor level of knowledge. After the counseling was given, the mothers' knowledge increased to 93.3%, while the percentage of poor knowledge was 6.7%. The obtained p-value = 0.002 or p <0.05, which means there was an effect of CED education through booklets on

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

knowledge among pregnant women in the third trimester at the Gunungsari Community Health Center in 2024. Educational interventions related to dietary patterns and adherence to consuming nutritious foods are needed, especially for pregnant women aged <20 years and >35 years and unemployed mothers. .

Suggestion: It is hoped that this can increase knowledge by increasing literacy about chronic energy deficiency so that they can prepare for pregnancy properly and avoid KEK.

Keywords: Booklet; pregnant mother; third trimester; CED; knowledge

INTRODUCTION

Chronic Energy Deficiency (CED) in pregnant women is a condition in which the mother suffers from chronic nutritional deficiencies, leading to health problems (Putri, 2023). Chronic Energy Deficiency (CED) is a contributing factor to the high maternal and infant mortality rates The World Health Organization (WHO) reports that 40% of maternal deaths in developing countries are related to CED . The WHO and international literature cite a wide range of CED prevalence in pregnant women (around 35–75% in some global summaries), indicating a significant disease burden, especially in developing countries.(Musaddik, Putri, L. A. R., & M 2022)

At the national level, recent survey results and analyses indicate that Indonesia still faces a significant CED prevalence. National health survey data ((França et al. 2013)) reported a prevalence of chronic energy deficiency (CED) among pregnant women of approximately 16.9% in 2023—meaning nearly 2 in 10 pregnant women experienced chronic energy deficiency, far above the expected national target. This condition also highlights regional disparities and challenges in achieving maternal nutrition targets.(Lowe et al. 2022)

West Nusa Tenggara (NTB) Province is one of the provinces in Indonesia that has shown variation and an increasing trend in CED cases in recent years. Health Office reports and local studies indicate an increase in CED prevalence in NTB (e.g., from approximately 11–13% in some provincial/regional records), making targeted nutritional interventions for pregnant women a provincial priority. Socioeconomic factors, food access, and local cultural practices influence the distribution of this nutritional burden.(Dinas Kesehatan Lombok Barat 2023)

At the district/sub-district level, more detailed data demonstrates hotspots of CED incidence that require local management. West Lombok Regency reported alarming figures for chronic energy deficiency (CED) in pregnant women at several community health centers (Puskesmas Sesela) — for example, data from the Sesela Community Health Center recorded 84 pregnant women with absolute CED (prevalence of ~18.09%) in 2024, according to local academic reports and district sectoral reports.

According to data from the West Lombok Health Office in 2022, approximately 1,866 pregnant women suffered from Chronic Energy Deficiency (Dinas Kesehatan Lombok Barat 2023) This figure increased compared to the 2021 data from the Lobar Health Office, which recorded 1,785 pregnant women suffering from CED. Five sub-districts in West Lombok have the highest percentage of pregnant women experiencing chronic energy deficiency (CED): Gunungsari Sub-district (273 pregnant women), Gerung Sub-district (236 pregnant women), Narmada Sub-district (228 pregnant women), Sekotong Sub-district (213 pregnant women), and Lembar Sub-district (205 pregnant women) (Lobar Health Office, 2022). Gunungsari Sub-district has the highest incidence of chronic energy deficiency (CED) in pregnant women in West Lombok, with 273 pregnant women. In 2023, according to data obtained from the Gunungsari Community Health Center, there were 75 cases of CED in pregnant women from January to October 2023. This figure also represents a significant decrease from the previous year's 198 cases (Gunungsari Community Health Center, 2023).

Chronic energy deficiency is characterized by an upper arm circumference (MUAC) of <23.5 cm. Upper Arm Circumference (UMC) is measured using a LILA tape on the left arm or an inactive arm. The UMC measurement is taken midway between the base of the upper arm and the tip of the elbow, measured in centimeters (Noor, M. S. 2021).

Chronic Energy Deficiency (CHD) in pregnant women can be influenced by several direct and indirect factors (Mahirawati Vita Kartika, 2014). Direct factors causing CED include nutritional intake and disease/infection. Indirect factors include age, parity, pregnancy spacing, education, family occupation, and others (Marjan, A. Q., Aprilia, A. H., & Fatmawati 2021) .

Age influences the incidence of CED in pregnant women, with pregnant women aged 35 years having a 3.134 times greater risk of

developing CED (Fitri, N. L., Sari, S. A., Dewi, N. R., Ludiana, L., & Nurhayati 2022)

According to research, pregnancy spacing and parity also influence the incidence of CED in pregnant women. Pregnant women with a pregnancy spacing of <2 years have a 5.357 times greater risk of CED compared to pregnant women with a pregnancy spacing of ≥2 years (Antarsih, N. R., & Suwarni 2023)(Maharrani, T., & Nugrahini 2017)

Based on research conducted by Rahmi (2017), it was stated that mothers with many children and low economic status will have difficulty caring for themselves. The mother's occupation can also affect CED in pregnant women.(Marjan, A. Q., Aprilia, A. H., & Fatmawati 2021) Educational level influences the incidence of CED in pregnant women because education influences a pregnant woman's diet. The higher the mother's education, the better she is at receiving information about nutritional needs, thus ensuring adequate nutritional intake (Molama, R., Rofiah, K., Pribadi, H. A., Dianingtyas Ariyanti, E., Nikmatul, A., Saidah 2022).

According to Adilla's (2021) research, knowledge is another factor that can influence nutritional deficiencies. Pregnant women with good knowledge about chronic energy deficiency tend to have a lower risk of developing CED. Meanwhile, pregnant women with less knowledge about CED tend to have a higher risk of anemia. This indicates a relationship between knowledge and the risk of CED in pregnant women. According to Sukmawati (2019), efforts to prevent and manage CED in pregnant women include increasing knowledge and changing attitudes to be positive through education about nutritional needs during pregnancy, having at least four prenatal checkups during pregnancy, providing 90 iron tablets, checking hemoglobin levels in the first and third trimesters, seeking immediate medical attention if any unusual symptoms occur(Sari, I. P. 2020) providing food that meets the needs of pregnant women, improving the knowledge and behavior of pregnant women and their families in selecting, preparing, and serving food, and improving the quality of health and nutrition services .Improving the knowledge of pregnant women in preventing CED is crucial. An effective way to increase knowledge is through the use of media for health education (Kusumastuti, T., Putri, D. P., Eliza, C. P., & Hanifah 2023). One such medium is booklets. KEK booklets are a type of media with flip-flops containing a wealth of health information that can be used to assist with health counseling (Rahmi 2017). Research (2016) demonstrated the effect of counseling using flip-flops and leaflets on pregnant women's adherence to high-protein diets.(Mentang et al. 2022)

According to Kemm and Close, booklets have two advantages over other media: they can be studied at any time, are designed similarly to books, and can contain relatively more information than posters. Rahayu's (2023) research showed an increase in maternal knowledge after receiving health education using booklets.(Molama, R., Rofiah, K., Pribadi, H. A., Dianingtyas Ariyanti, E., Nikmatul, A., Saidah 2022)

Nutritional needs increase during pregnancy because both the mother and the fetus require nutrients, so a balanced diet that meets these needs and makes appropriate food choices is crucial. (Molama, R., Rofiah, K., Pribadi, H. A., Dianingtyas Ariyanti, E., Nikmatul, A., Saidah 2022). Imbalances in nutrient intake, types of food consumed, frequency and portion sizes, beliefs and acceptance of food, such as dietary restrictions and likes and dislikes, and daily eating patterns. A balanced diet (according to needs) and consumption of appropriate food ingredients can help maintain good nutritional status. (Muliawati 2013)Food intake that exceeds the body's needs will lead to excess weight and other diseases caused by excess nutrients. Conversely, food intake that falls short of the body's needs will lead to thinness and susceptibility to disease. Both situations have negative effects on health (Palavecino et al. 2016)

Furthermore, the Ministry of Health has launched a new service called the Ayosehat Chatbot, which is the Ministry's official health education information channel accessible through WhatsApp. This chatbot is the result of a digital collaboration between UNICEF and Meta Indonesia. (Ministry of Health, Republic of Indonesia, 2023)(Kemenkes RI 2023)

Based on the above background, the researcher is interested in conducting a study entitled "From the above background, the author is interested in conducting research on the effect of anemia education using booklets on the knowledge of pregnant women at the Gunung Sari Community Health Center."

RESEARCH METHODS

The research used was quantitative. The research design was a quasi-experimental study with a pretest-posttest group design (Notoadmojo 2018). Knowledge was measured before and after education, using the following design:

The population in this study was all 64 pregnant women with anemia at the Gunung Sari

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

Community Health Center in West Lombok. The sample size was small, representative of the entire population. The sample size for experimental research is a minimum of 15-30 samples (Suhariyati 2021). The respondents for this study were 30 pregnant women at the Gunung Sari Community Health Center. The sampling technique used purposive sampling, with the sample size being 30 individuals, according to the inclusion and exclusion criteria. The sample size was 30 pregnant women with CED, meeting the following criteria: a. Inclusion Criteria: Inclusion criteria are the general characteristics of research subjects from a target and accessible population to be studied (Susanti 2018)The inclusion criteria for this study were: third-trimester pregnant women actively participating in health services at the Gunungsari Community Health Center; third-trimester pregnant women who were willing and able to participate in the study; and third-trimester pregnant women with anemia.

Exclusion Criteria: Exclusion criteria excluded subjects who met the inclusion criteria (Hazairin, A. M., Arsy, A. N., Indra, R. A., & Susanti 2021). The exclusion criteria for this study were: pregnant women without a history of anemia; pregnant women with serious or chronic health conditions that could interfere with participation or affect the results of the study; pregnant women who were unwilling to participate; pregnant women in their first and second trimesters; pregnant women who requested permission or were absent from data collection, either during the pre-test or post-test. This study was conducted from April to June 2024. The study was located at the Gunungsari Community Health Center, West Lombok Regency.

RESEARCH RESULTS

Univariate analysis

was performed on each research variable. This analysis yielded a frequency distribution and percentage of each variable influencing the incidence of CED in pregnant women in the third trimester at the Gunungsari Community Health Center.

Characteristics of Pregnant Women in the Third Trimester with Anemia at the Gunungsari Community Health Center.

Based on table 1 the frequency distribution with the characteristics of the age of pregnant women shows that most of the mothers are aged 20-35 years (93.3%), in terms of the educational characteristics of pregnant women, most of the mothers completed their education at junior high school (46.6%), and in terms of the occupational characteristics of pregnant women, most of the mothers are housewives (73.3%).

Table 1
Frequency Distribution of Pregnant Women in the Third Trimester with Anemia at the Gunungsari Community Health Center. in pregnant women at the Gunungsari Health Center,

Variables	Value	%
Age		
<19	0	0
20-35	28	93,3
>35	2	6,7
Education		
Elementary School	5	16
Middle School	14	46,6
High School	2	6,7
University	9	30
Work		
Trade	1	3,3
Lecturer	1	3,3
Teacher	1	3,3
Housewife	22	73,3
Midwife	1	3,3
Private Sector	4	13,3

Knowledge of pregnant women in the third trimester who experienced KEK before being given health education using booklets at the Gunungsari Community Health Center

Table 2
Frequency distribution of knowledge of pregnant women in the third trimester before being given
health education using booklets at the Gunungsari Community Health Center

Variables	F	%
Good	18	60%
Less	12	40%

Based on table 2, it can be seen that the frequency distribution of good knowledge of pregnant women is 60.0%, and there is 40.0% of poor knowledge of pregnant women.

Knowledge of pregnant women in the third trimester who experience KEK after being given health education using booklets at the Gunungsari Community Health Center

Table 3
Frequency distribution of knowledge of pregnant women in the third trimester after being given health education using booklets at the Gunungsari Community Health Center

Variables	F	%
Good	28	93,3
Less	2	7

Based on table 3, it can be seen that the frequency distribution of some pregnant women has good knowledge as much as 93.3%, and there are 6.7% of pregnant women who have poor knowledge.

Bivariate Analysis

Bivariate analysis was used to determine the effect of anemia education through booklets on the knowledge of pregnant women in the third trimester at the Gunungsari Community Health Center. This study used a nominal scale, making it categorical data, a requirement for non-parametric testing. Therefore, the bivariate analysis used the McNemar test.

Table 4
Shows the effect of booklets on the knowledge of pregnant women with anemia in the third trimester at the Gunungsari Community Health Center in 2024

Variables	Before	%	After	%	*P Value*
Good	18	60,0	28	93,3	0,002
Less	12	40,0	2	6,7	

Based on table 4, the p value is 0.002 or p<0.05, which means that there is an influence of anemia education through booklets on knowledge in KEK mothers in the third trimester at the Gunungsari Community Health Center in 2024..

DISCUSSION

Univariat

Age is the length of time a person has lived from birth to the present. According to (Bayuana et.al., 2023), high-risk ages in pregnancy include young primigravidas (<20 years) and old primigravidas (>35 years).

Research conducted at the Gunungsari Community Health Center (Puskesmas) on the relationship between age and the incidence of anemia in pregnant women showed that the most common age for pregnant women was 58.28 respondents (93.5%) were in the 20-35 age category, while 2 respondents (6.7%) were in the <35 age category. The World Health Organization (WHO, 2021) states that the safest age for pregnancy and childbirth is 20 to 30 years.

A healthy and safe reproductive age is 20-35 years. Pregnancy under 20 and over 35 can lead to anemia because pregnancies under 20 are too young or not yet ready to meet the environmental needs necessary for fetal growth. Furthermore, there will be competition for food between the fetus and the mother, who is still growing, and hormonal changes that occur during pregnancy. Meanwhile, being over 35 years old is associated with decline and decreased immunity, as well as various diseases that often occur at this age (Fakolade, O. A & Atanda 2015)

Pregnant women under 20 years of age can be detrimental to the mother's health and the growth and development of the fetus due to the immaturity of the reproductive organs for pregnancy. Complications in adolescent pregnancy (<20 years) are higher than in the healthy reproductive age group of 20-30 years. This situation is further complicated by psychological, social, and economic stress, which can increase the risk of anemia, miscarriage, fetal growth retardation, low birth weight (LBW), labor complications, preeclampsia, and antepartum hemorrhage (Ernawati 2018a)

Health problems that may occur and impact pregnancies over 35 years of age include the emergence of chronic health problems. Women over 35 are twice as likely as women aged 20 to develop high blood pressure, anemia, and diabetes during their first pregnancy. Women who have their first pregnancy over 40 are 60% more likely to develop high blood pressure and four times more likely to develop diabetes during pregnancy than women aged 20 (Ernawati 2018c)

Pregnancy over 35 is associated with the development of 59 chronic health problems. Women over 35 are twice as likely as women aged 20 to develop high blood pressure, anemia, and diabetes during their first pregnancy. Women who have their first pregnancy over 40 are 60% more likely to develop high blood pressure and four times more likely to develop diabetes during pregnancy than women aged 20 ((Hazairin, A. M., Arsy, A. N., Indra, R. A., & Susanti 2021)

The results of this study are inconsistent with research conducted by Auliana et al. (2019), which found no relationship between education and the nutritional status of pregnant women, with a β-value of 0.272. Nutritional problems arise from ignorance or a lack of information about nutrition. A person with a low level of education is not necessarily

 DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan

incapable of preparing a balanced nutritional menu compared to someone with a higher level of education.(Nuraini, Ariestiningsih, and Sholikhah 2022). Even with a low level of education, frequent exposure to nutrition information will lead to greater knowledge. (Nurhayati, T. 2019)Education is not only obtained through formal education but can also come from non-formal sources, such as through the media, such as reading books on maternal and child health (MCH) (Setyaningrum, D., Netty, & Handayani 2020)

Based on Table 1, in the occupational category, 8 respondents (26.7%) were employed and 22 respondents (73.3%) were unemployed.

Work is an activity that must be carried out primarily to support one's life and that of their family. Employment can influence knowledge; employed individuals will have better knowledge than unemployed individuals.(Palavecino et al. 2016) This may be because people who work outside the home (in the formal sector) have better access to a variety of information, including information about pregnancy, childbirth, and postpartum (Fakolade, O. A & Atanda 2015)

According to research by Ernawati (2019), working women have greater knowledge due to their broader social circle. This change in knowledge leads to changes in attitudes, behavior, income, and eating patterns, enabling working mothers to have a broader understanding of nutrition for pregnant women and to adequately meet their nutritional needs.

Bivariat

The Influence of Booklets on the Knowledge of Pregnant Women with Third-Trimmer Anemia at the Gunungsari Community Health Center in 2024

The higher the level of education, the higher the level of knowledge about pregnancy risks. Education can influence a person's mindset and ability to digest information. If a pregnant woman has greater knowledge about high-risk pregnancies, she is more likely to engage in behaviors that prevent, avoid, and address these pregnancy risks (Ernawati 2018b)(Pan, Köberle, and Ghashghaeinia 2024)

According to the theory, working women have greater knowledge due to their broader social circle. Changes in knowledge will lead to changes in attitudes, behaviors, income, and eating patterns. These changes will influence the types and amounts of food consumed.(Puti Sari, Hapsari, D., Dharmayanti, I., & Kusumawardani 2015) Furthermore, working mothers can improve their family's socioeconomic status. They also have their own income, so they are not dependent on their husbands to meet their nutritional needs (Ernawati 2018c)

Booklets are a form of mass media used as a visual aid for a wide audience, both for the general public and for individuals, with irregular delivery times (Hazairin, A. M., Arsy, A. N., Indra, R. A., & Susanti 2021)According to Mardikanto (1993 in Adilla 2021), a booklet is a printed medium containing images or text (predominantly) in the form of a small book, usually 10-25 pages thick, with a maximum of 50 pages. The use of this booklet will be an alternative medium capable of engaging pregnant women actively in providing education. Besides being an attractive form of health education, this medium is also very appealing with its pictorial content (Kusumastuti, T., Putri, D. P., Eliza, C. P., & Hanifah 2023)

CONCLUSION

It was found that 60.0% of pregnant women had a good level of knowledge, while 40.0% had a poor level of knowledge before the counseling session. 93.3% of pregnant women had a good level of knowledge after the counseling session.

The p-value was 0.002 ($p<0.05$), indicating that anemia education through the booklet significantly impacted knowledge among pregnant women in their third trimester at the Gunungsari Community Health Center in 2024.

SUGESTION

Recommendations for pregnant women to check their nutritional status, to find out the status of CED or not. For pregnant women who experience CED, they can improve their nutritional quality by eating nutritious food, paying attention to the main causative factors that can cause CED..

REFERENCES

Antarsih, N. R., & Suwarni, S. 2023. “Faktor Risiko Kurang Energi Kronik Pada Ibu Hamil Di Wilayah Kecamatan Bumi Agung Way Kanan Lampung.” *Journal of Midwifery, 4* 4(1): 26.

Dinas Kesehatan Lombok Barat. 2023. “PROFIL KESEHATAN PROVENSI NUSA TENGGARA BARAT TAHUN 2022.” https://drive.google.com/file/d/1rFIHqjNEZdQ7NvLH.

Ernawati, A. 2018a. “Hubungan Usia Dan Status Pekerjaan Ibu Dengan Kejadian Kurang Energi Kronis Pada Ibu Hamil.” *Jurnal Litbang: Media Informasi Penelitian …. http://ejurnal-*

litbang.patikab.go.id/index.php/jl/article/view/106.

———. 2018b. "Hubungan Usia Dan Status Pekerjaan Ibu Dengan Kejadian Kurang Energi Kronis Pada Ibu Hamil." *Jurnal Litbang: Media Informasi Penelitian*. http://ejurnal-litbang.patikab.go.id/index.php/jl/article/view/106.

Ernawati, A. 2018c. "Hubungan Usia Dan Status Pekerjaan Ibu Dengan Kejadian Kurang Energi Kronis Pada Ibu Hamil Relationship Age and Occupational Status With Chronic Energy Deficiency in Pregnant Woman." *Jurnal Litbang,* XIV(I): 27–37.

Fakolade, O. A & Atanda, A. I. 2015. "Dampak Konsumsi Tempe Terhadap Modulasi Sistem Imun Dalam Meningkatkan IgA, Menurunkan IgE, Dan IL-6." *Literature review* (November): 33–37.

Fitri, N. L., Sari, S. A., Dewi, N. R., Ludiana, L., & Nurhayati, S. 2022. "Hubungan Usia Ibu Dengan Kejadian Kek Pada Ibu Hamil Di Wilayah Kerja Puskesmas Ganjar Agung Kecamatan Metro Barat Kota Metro. Jurnal Wacana Kesehatan, 7(1), 26." 7(1). https://doi.org/10.52822/jwk.v7i1.406.

França, Eduardo Luzía, Veridiana Assêncio Silva, Rosa Maria Jacinto Volpato, Priscila Assêncio Silva, Maria Fernanda Spegiorini Salla Brune, and Adenilda Cristina Honorio-França. 2013. "Maternal Anemia Induces Changes in Immunological and Nutritional Components of Breast Milk." *Journal of Maternal-Fetal and Neonatal Medicine* 26(12): 1223–27.

Hazairin, A. M., Arsy, A. N., Indra, R. A., & Susanti, A. I. 2021. "Gambaran Kejadian Risiko 4T Pada Ibu Hamil Di Puskesmas Jatinangor. S,." *Jurnal Bidan 125 Cerda* 3(1): 10–17. https://doi.org/10.33860/jbc.v3i1.358.

Kemenkes RI. 2023. "Petunjuk Teknis Pemberian Makanan Tambahan (PMT) Berbahan Pangan Lokal Untuk Balita Dan Ibu Hamil."

Kusumastuti, T., Putri, D. P., Eliza, C. P., & Hanifah, A. N. 2023. "Kek Pada Ibu Hamil : Faktor Risiko Dan Dampa." *Journal.Universitaspahlawan.Ac.Id* 9.

Lowe, Callum, Haribondhu Sarma, Matthew Kelly, Johanna Kurscheid, Budi Laksono, Salvador Amaral, Donald Stewart, and Darren Gray. 2022. "Association of Soybean-Based Food with the Prevalence of Anaemia among Reproductive-Aged Men and Women in Rural Central Java, Indonesia." *Public Health Nutrition* 25(12): 3401–9.

Maharrani, T., & Nugrahini, E. Y. 2017. "Premature Rupture of the Fetal. Hubungan Usia, Paritas Dengan Ketuban Pecah Dini Di Puskesmas Jagir Surabaya,." 338(10): 663–70.

Marjan, A. Q., Aprilia, A. H., & Fatmawati, I. 2021. "Analisis Determinan Faktor Yang Berhubungan Dengan Kejadian Kurang Energi Kronik (KEK) Pada Ibu Hamil Di Wilayah Gunung Sindur, Bogor." *Jurnal Kesehatan Terpadu (Integrated Health Journal)* 12(12): 39–47.

Mentang, Feny, Nurmeilita Taher, Fahrul Nurkolis, William Ben Gunawan, Vincentius Mario Yusuf, Nindy Sabrina, Faqrizal Ria Qhabibi, Nelly Mayulu, Nurpudji Astuti Taslim, and Happy Kurnia Permatasari. 2022. "Effect of Eel and Tempe Composite Flour Supplementation on the Nutritional Status Biomarkers of Rats with a Restricted Protein Diet: Data from a Preclinical Trial." *F1000Research* 11: 1–10.

Molama, R., Rofiah, K., Pribadi, H. A., Dianingtyas Ariyanti, E., Nikmatul, A., Saidah, H. 2022. "Article Information Hubungan Antara Usia Dan Pendidikan Dengan Kejadian Kurang Energi Kronik Pada Ibu Hamil Trimester I The Relationship Between Age And Education With The Incidence Of Chronic Energy Deficiency In First Trimester Pregnant Women." *83–91.*

Muliawati, S. 2013. "Faktor Penyebab Ibu Hamil Kurang Energi Kronis Di Puskesmas Sambi Kecamatan Sambi Kabupaten Boyolali Tahun." *Jurnal Iifokes Apikes Citra Medika Semarang* 3(13): 40–50.

Musaddik, Putri, L. A. R., & M, H. I. 2022. "Hubungan Sosial Ekonomi Dan Pola Makan Dengan Kejadian Kekurangan Energi Kronis (KEK) Pada Ibu Hamil Di Wilayah Kerja Puskesmas Nambo Kota Kendari." *Jurnal Gizi Ilmiah,* 9(2).

Noor, M. S., et al. 2021. *Buku Ajar Kekurangan Energi Kronik (KEK)*. 57th ed.

Notoadmojo, Soekidjo. 2018. *Metodologi Penelitian Kesehatan.* Jakarta: Rineka Cipta.

Nuraini, Rahma Fidania Dwik, Eka Srirahayu Ariestiningsih, and Desty Muzarofatus Sholikhah. 2022. "Hubungan Antara Intake Zat Gizi Makro, Zat Besi, Dan Vitamin C Dengan Kadar Hemoglobin Siswi Sma Di Kecamatan Kebomas." *Ghidza Media Jurnal* 4(1): 15.

Nurhayati, T., et al. 2019. "The Effect of Tempeh Supplementation on Hemoglobin Levels in

Pregnant Women." *Journal of Reproductive Health* 10(2): 45–52.

Palavecino et al. 2016. "Research Article Research Article." *Archives of Anesthesiology and Critical Care* 68(11): 1055–64.

Pan, Xia, Martin Köberle, and Mehrdad Ghashghaeinia. 2024. "Vitamin C-Dependent Uptake of Non-Heme Iron by Enterocytes, Its Impact on Erythropoiesis and Redox Capacity of Human Erythrocytes." *Antioxidants* 13(8).

Puti Sari, Hapsari, D., Dharmayanti, I., & Kusumawardani, N. 2015. "Faktor-Faktor Yang Berpengaruh Terhadap Risiko Kehamilan '4 Terlalu (4-T)' Pada Wanita Usia 10-59 Tahun (Analisis Riskesdas 2010)." *Media Penelitian Dan Pengembangan Kesehatan* 24(3): 143–52. https://doi.org/10.22435/mpk.v24i3.3649.143-152.

Rahmi, L. 2017. "Faktor-Faktor Yang Berhubungan Dengan Kekurangan Energi Kronik (Kek) Pada Ibu Hamil Di Puskesmas Belimbing Padang Factors Related To Chronic Energy Deficiency (Ced) To Pregnant Woman in Belimbing Health Centre Padang." *Jurnal Kesehatan Medika Saintika* 8(1): 35–46.

Sari, I. P., et al. 2020. "Pengaruh Asupan Zat Besi Terhadap Kadar Hemoglobin Ibu Hamil. Jurnal Gizi Dan Kesehatan." 12(1): 14–20.

Setyaningrum, D., Netty, & Handayani, E. 2020. "Hubungan Pengetahuan, Status Pekerjaan Dan Pendapatan Keluarga Dengan Kejadian Kurang Energi Kronik (KEK) Pada Ibu Hamil Di Wilayah Kerja Puskesmas Pelaihari Kabupaten Tanah Laut Tahun 2020." *Jurnal Kesehatan*.

Suhariyati. 2021. "WhatsApp Sebagai Media Peningkatan Fungsi Perawatan Kesehatan Keluarga Untuk Pencegahan COVID-19." 12(3): 411–14.

Susanti, T. 2018. "Hubungan Usia Dan Jarak Kehamilan Dengan Kejadian Plasenta Previa Di RSUD Dr. H.Abdul Moeloek Provinsi Lampung Tahun 2018." *Jurnal Kesehatan "Akbid Wira Buana,"* 4(2): 1–12.