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Knowledge and Attitude Factors of Brides-to-be on the Incidence of Anemia in Pekalongan Regency

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Abstract:
Anemia among prospective brides remains a significant public health issue, particularly in developing countries where awareness and preventive behaviors are still limited. Nutritional education is a vital strategy to address this problem. This quasi-experimental study aimed to evaluate the effectiveness of nutritional education in improving knowledge, attitudes, nutrient intake, and hemoglobin levels among prospective brides. Using a pretest-posttest control group design, 70 participants were assigned to either an intervention or control group. Data were collected through questionnaires and hemoglobin measurements and analyzed using the Mann-Whitney test and logistic regression, with adjustments for potential confounders. The findings revealed significant improvements in the intervention group in terms of knowledge, attitudes, nutrient intake, and hemoglobin levels (p=0.000). After adjusting for confounding variables, nutritional education remained significantly associated with increased knowledge (p=0.015), improved nutrient intake (p=0.010), and higher hemoglobin levels (p=0.005), although its effect on attitudes was not statistically significant (p=0.057). These results highlight the effectiveness of nutritional education in preventing anemia among prospective brides through better knowledge and dietary practices. However, improving attitudes may require complementary interventions. This study underscores the importance of integrating targeted nutritional education into premarital health programs to enhance women's health outcomes.

Key word: Nutrition Education, Anemia, Prospective Brides Knowledge, Attitudes, Nutrient Intake, Hemoglobin Level.

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INTRODUCTION

Reproductive health plays a crucial role for women, considering that women are the main group that is vulnerable to facing reproductive health problems in society, especially in the phases of pregnancy, childbirth, postpartum, unsafe abortion, and the use of contraceptives (Janighorban et al., 2022; Kyilleh et al., 2018; Morris & Rushwan, 2015; Segal & Giudice, 2022; Sunarsih et al., 2020). Couples who are going to get married need to understand reproductive health so that health checks and related information must be carried out when registering for marriage. The optimal nutritional status of the bride-to-be (catin) is an important factor that affects pregnancy outcomes, including the adequacy of energy, macronutrients, and micronutrients to support fetal growth and postnatal baby development (Ayudia & Putri, 2021; Isnaini et al., 2022; Kristoper & Sabir, 2022).

Pre-marital health preparation includes physical examination, nutrition management, tetanus immunization, maintenance of reproductive organ health, mental health, and marital harmonization. The nutritional preparation of the bride-to-be is important for pregnancy, with measurements of BMI, LILA, and hemoglobin. They are advised to take TTD weekly. If you experience SEZ or anemia, it is

necessary to identify and handle it according to the cause (Ministry of Health of the Republic of Indonesia, 2018). Data shows that in 2022, out of 151,599 couples in Indonesia, 50.5% (83,379 people) had pre-marital health problems, with 17.8% experiencing anemia (Ministry of Education of the Republic of Indonesia, 2022)

In 2023, the anemia rate will increase to 20%, while 22.8% of cats experience Chronic Energy Deficiency (SEZ) (BKKBN, 2024). Research by Hendriani et al., (2020) confirmed that 40.32% of catins (25 people) had abnormal hemoglobin (Hb) levels (WHO, 2021). Globally, the prevalence of anemia in 2019 reached 29.9%, with 32.8% occurring in women of reproductive age (15-49 years) (WHO, 2021). In Indonesia, 48.9% of pregnant women experienced anemia in 2018, which contributed to the risk of indirect maternal mortality (BPS, 2019).

Anemia in pregnancy increases the risk of complications such as low birth weight, placenta previa, eclampsia, premature rupture of the amniotic, and maternal death due to hypoxia (Armynia Subratha, 2022; Arnianti et al., 2022; Astuti & Ertiana, 2018; Fajrin et al., 2022; Priyanto & Irawati, 2020). To prevent this, the government organizes the Bride-to-be Course (Catin) through the Ministry of Religion and accredited institutions, in accordance with the Regulation of the Director General of Islamic Community Guidance in 2013 (Hariningtyas, 2020; Meriyadi, 2022; Yohanes et al., 2022). This program includes reproductive health education, stunting prevention, and the provision of blood-supplementing tablets (TTD) for anemia cats or KEK (Ministry of Health of the Republic of Indonesia, 2018).

In Pekalongan Regency, the number of marriages in 2020 reached 8,240 couples, with 28.41% (1,985 cases) ending in divorce due to economic factors, domestic violence, and disputes. Although catin courses have been made mandatory (100% achievement by 2023). The local Health Office recorded 11.03% of female catin anemia and 21.87% of SEZs, indicating low awareness of catin in preparing for reproductive health.

Catin health behavior is influenced by knowledge factors, attitudes, access to facilities, and support from community leaders. WHO emphasizes behavior change through education, regulation, and enforcement. Nutrition education is especially important to ensure adequate intake of iron, folic acid, and vitamin B12 to prevent anemia. Research by Kartisari (2020) proves a significant relationship between nutritional intake and Hb levels of pregnant women, while Kamsiah (2023) shows the effectiveness of education in increasing adolescent nutritional intake. The high rate of early marriage in Pekalongan (364 marriage dispensations in 2021 and 292 in 2022) exacerbates reproductive health risks, such as teenage pregnancy and anemia.

Several previous studies have addressed the issue of anemia and reproductive health education, but have yet to comprehensively explore the effectiveness of educational interventions for prospective brides in preventing anemia. Hendriani et al. (2020) reported that 40.32% of brides-to-be in their study had abnormal hemoglobin levels, highlighting the urgency of addressing anemia before pregnancy. However, their research primarily focused on identifying the prevalence of anemia rather than intervening through preventive education. Kartisari (2020) examined the relationship between nutritional intake and hemoglobin levels in pregnant women and found a significant correlation, yet did not focus on the premarital phase or include structured education programs. This study fills the gap by analyzing the impact of knowledge and attitudes on anemia incidence among brides-to-be and evaluating how targeted education can enhance reproductive preparedness. By focusing on the premarital stage, this research provides early preventive measures that may significantly reduce anemia-related risks during pregnancy. The goal of this study is to evaluate how knowledge and

attitudes of prospective brides influence anemia incidence, ultimately aiming to strengthen reproductive health programs and inform local health policy. The expected benefit is an evidence-based approach for integrating nutritional and reproductive health education into mandatory premarital programs, especially in high-risk regions like Pekalongan Regency, where early marriage and low awareness pose ongoing public health challenges.

RESEARCH METHODS

This study examines the effect of educational interventions using e-booklet media and animated videos on prospective brides' knowledge and attitudes toward anemia and nutrition management. The independent variable in this research is the educational method (e-booklet and animated videos), while the dependent variables are knowledge about anemia and attitudes toward managing anemia and nutritional intake. The research employs a quasi-experimental design with a pre-test and post-test control group structure. Data collection was conducted in three phases: pre-intervention, intervention, and post-intervention. At the pre-intervention stage, both groups underwent a pre-test using a questionnaire assessing knowledge and attitudes about anemia, a hemoglobin (Hb) check using a Mindray hematology analyzer, and a 24-hour dietary recall to assess nutritional intake. The intervention group participated in three educational sessions: anemia and iron consumption through a booklet (day 10), nutrition education via WhatsApp (day 17), and high-risk pregnancy information also via WhatsApp (day 24), while the control group received conventional counseling. On the 30th day, both groups completed a post-test, including a follow-up questionnaire, Hb testing, and dietary recall. The study involved 70 prospective brides in Pekalongan Regency, divided equally into intervention and control groups (35 each), with the sample size determined through power analysis and adjusted for potential dropouts. Data were processed through editing, coding, and cleaning, then analyzed using SPSS or STATA software. Univariate analysis described variable distribution, while bivariate comparisons used paired t-tests or Wilcoxon tests for within-group analysis and independent t-tests or Mann-Whitney tests between groups. MANOVA was employed for multivariate testing of the intervention's effects on all dependent variables. Instrument validity was assessed using Pearson Product Moment ($r > 0.3$), and reliability with Cronbach's Alpha ($\alpha > 0.7$), with a significance threshold of $p < 0.05$.

RESULTS AND DISCUSSION

Respondent Characteristics Results

Table 1. Respondent Characteristics

Characteristics	Intervention		Control	
	f	%	f	%
Age				
Adults ≥ 25 years old)	23	65,7	18	58,6
Teenager (< 25 years old)	12	41,4	17	41,4
Education Level				
SD	1	2,9	0	0
SMP	5	14,3	12	34,3
SMA	24	68,6	23	65,7
College	5	100	0	0
Resources				
Facebook	9	25,7	10	28,6
Youtube	1	2,9	1	2,9
Instagram	11	31,4	12	34,3
Tiktok	12	34,3	11	31,4

Characteristics	Intervention		Control	
	f	%	f	%
Whatsapp	2	5,7	1	2,9
Family Income				
1-2 million	18	51,4	15	42,9
2.1-5 million	12	34,3	16	45,7
5.1-7 million	5	14,3	4	11,4
Work				
Not working	1	2,9	0	0
Convection workers	24	68,6	23	65,7
Factory workers	4	11,4	5	14,3
Employee	5	14,3	6	17,1
PNS	1	2,9	1	2,9

Table 1 of the characteristics of respondents in both study groups shows a relatively uniform pattern. As many as 65.7% of the control group respondents and 58.6% of the intervention group were in the adult age category (≥25 years). In terms of education, the majority of respondents in both groups had a high school background, with a percentage of 58.6% in the intervention group and 65.7% in the control group.

The source of information about anemia is dominated by social media, but there are differences in preferences between the two groups. In the intervention group, 34.3% of respondents accessed information through TikTok, while the control group used Instagram more (34.3%).

From the economic aspect, 51.4% of the families of the intervention group respondents had a monthly income of 1-2 million rupiah, while 45.7% of the control group was in the category of 2.1-5 million rupiah. Job characteristics showed the dominance of the convection sector in both groups, with 68.6% of intervention respondents and 65.7% of controls working as convection workers.

These data illustrate the homogeneity of the sample in demographic aspects, but significant differences are seen in sources of information and income levels, which need to be considered in the interpretation of intervention results.

The Effect of Education on Knowledge of Anemia Management

Table 2. Differences in Knowledge on Anaemia Management in the Intervention Group and the Control Group

Knowledge	Intervention $\bar{x}$ ±SD Med (min-max)	Control $\bar{x}$ ±SD Med (min-max)**l**	p
Pre test	10,51 ±2,020 10(7-15)	9,97 ±1,654 10(7-13)	-
Post test	16 ±1,590 17(12-19)	10,54 ±1,853 11(7-14)	-
p value	0,000a	0,000a	
Δ	5,49 ±2,215 5(1-10)	0,57 ±0,6018 0(0-2)	0,000b

Note: aUji Wilcoxon; bUji Mann Whitney; α: 0,05

Table 2. showed that there was an increase in the average knowledge score regarding anemia management in the intervention group, from 5.49 to 16 after being educated. Meanwhile, the control group also experienced an increase in knowledge, but smaller, from 9.97 to 10.54 or by 0.57. Based on the results of the Mann Whitney test, a p value of 0.000 ($p < 0.05$) was obtained, so that H0 was rejected and Ha was accepted. Thus, it can be concluded that there was a significant increase in knowledge about the management of anemia in the intervention group compared to the control group.

The Effect of Education on Attitudes in Dealing with Anemia in Brides-to-be

Table 3. Differences in Attitudes in Anemia Management in the Intervention Group and the Control Group

Attitude	Intervention $\bar{x}$ ±SD Med (min-max)	Control $\bar{x}$ ±SD Med (min-max)**l**	p
Pre test	33,83 ±3,585 34(27-41)	33,89 ±3,779 34(27-41)	-
Post test	50,97 ±2,467 52(45-57)	34,66 ±3,605 37(28-41)	-
p value	0,000a	0,000a	
Δ	17,14 ±3,949 14(9-26)	0,77 ±0,547 1(0-2)	0,000b

note: aUji Paired t Test; bUji Mann Whitney; α: 0,05

Table 3 of the data shows that there was an increase in the average attitude of the bride-to-be towards anemia management in the intervention group, from 33.84 to 50.97, or an increase of 17.14 after being educated. Meanwhile, in the control group, the increase in attitude only occurred from 33.89 to 34.66, or by 0.7. The results of the Mann Whitney test produced a p value of 0.000 ($p < 0.05$), so H2 was accepted. This means that there was a significant improvement in attitudes in the management of anemia in the intervention group compared to the control group. A greater change in attitude occurred in the intervention group with an average difference of 17.14, while the control group only experienced an average change of 0.77.

The Effect of Education on Nutritional Intake in Brides-to-be

Table 4. Differences in Nutritional Intake in the Intervention Group and the Control Group

Nutritional Intake	Intervention $\bar{x}$ ±SD Med (min-max)	Control $\bar{x}$ ±SD Med (min-max)**l**	p
Pre test	950,174 ±302,17 966,4(307,1-1572,4)	977,8 ±318,2 1101,6(307,1-1572,4)	-
Post test	1035,16 ±2,303,8 1042,3(342,35-1594,8)	1114,2 ±800,16 1114,7(113,7-5312,7)	-
p value	0,000a	0,000a	
Δ	84,98 ±62,7819 80,9(9,3-261,7)	32,7 ±73,9 13,3 (1,1-435)	0,000b

note: aUji Paired t Test; bUji Mann Whitney; α: 0,05

Table 4 shows that the average increase in nutrient intake in the intervention group (84.98) was greater than the average nutritional intake in the control group (32.61). The results of the Mann Whitney test obtained a p value of $0.000 < 0.05$ so that H3 was accepted, meaning that there was an increase in nutritional intake (energy, protein, Fe, vitamin A, vitamin A, vitamin C, folic acid, B12) after intervention in the treatment group was higher than in the control group.

The Effect of Education on Hemoglobin Levels in Brides-to-be

Table 5. Differences in Hemoglobin Levels in the Intervention Group and the Control Group

Up to Hemoglobin	Intervention $\bar{x}$ ±SD Med (min-max)	Control $\bar{x}$ ±SD Med (min-max)**l**	p
Pre test	11,22 ±0,1864 11,2(11-11,6)	11,21 ±0,1745 11,2(11-11,6)	-
Post test	12,19 ±0,2849 12,2(11,4-12,8)	11,93 ±0,1945 12 (11,41-12,2)	-
p value	0,000a	0,000a	
Δ	0,97 ±0,2432	0.7 ±0.2074	0.000b

Up to Hemoglobin	Intervention $\bar{x}$ ±SD Med (min-max)	Control $\bar{x}$ ±SD Med (min-max)**l**	p
	1 (0,4-1,6)	0,8 (0,2-1,2)	

note: aUji Wilcoxon; bUji Mann Whitney; α: 0,05

Table 5. showed that the average increase in Hb levels in the intervention group (0.97) was greater than the average Hb level in the control group (0.7). The results of the Mann Whitney test obtained a p value of 0.000 < 0.05 so that H4 was accepted, meaning that there was an increase in Hb levels after the intervention in the treatment group higher than in the control group

Knowledge and Attitudes in Managing Anemia Before and After Being Educated in the Intervention Group

The increase in the knowledge of the bride-to-be about managing anemia after education was significant, from an average of 5.49 to 16 in the intervention group, with an increase of 5.49. Previous research, Susanti et al., (2018) also showed that before education, 31.6% of brides-to-be were low-knowledge, and it increased to 97.4% after being given premarital health education.

Before the intervention, most respondents already knew that anemia had an impact on pregnancy (74.3%) and the importance of nutritious food (74.3%), but there were still many who misunderstood the importance of consuming Fe tablets according to the instructions (62.9%) and the definition of anemia (60%). After education, there was an increase in understanding, with 94.3% of respondents answering correctly that nutritious foods can prevent anemia and 97.1% understanding that Fe tablets increase hemoglobin levels (Martini et al., 2023).

The attitude of the bride-to-be also showed an increase, from an average of 33.84 to 50.97 or 17.14 in the intervention group. Before education, 65.7% agreed to check Hb if there were symptoms of anemia, but 94.2% were still reluctant to take Fe tablets and 85.8% did not agree to eat nutritious food every day. This negative attitude is influenced by a culture that believes Fe tablets can gain weight, while the bride-to-be is expected to maintain an ideal body shape ahead of the wedding. This is in accordance with the theory that culture influences an individual's attitude, and only a strong personality is able to resist the dominance of that culture (Azwar, 2011).

The Effect of Education on Attitudes in Dealing with Anemia in Brides-to-be

The Mann Whitney test showed a p value of 0.000 < 0.05, so H2 was accepted, which means that there was an improvement in the attitude of anaemia management after intervention in the treatment group compared to the control group. The average change in attitude in the intervention group was 17.14, while the control group was only 0.77. These findings are in line with the research of Mawaddah et al., (2023) which shows the influence of education on the attitude of brides-to-be in planning a healthy pregnancy.

The improvement in attitude can be seen from the increase in the highest score of 125 on the statement "I will check Hb levels with health workers if there are signs of anemia". Hb testing is important for early detection and prevention of anemia, as well as as a basis for administering Fe tablets consumed 1 tablet per day with water, instead of tea or coffee. This examination is also important during pregnancy because anemia can affect the condition of the fetus Nofanti et al., (2024).

The Effect of Education on Nutritional Intake in Brides-to-be

The results of the Mann Whitney test showed a p value of 0.000 < 0.05, which means that there was a significant increase in nutritional intake (energy, protein, Fe, vitamins A, C, folic acid, and

B12) after intervention in the treatment group compared to the control group. Research by Mawaddah et al., (2023) stated that there was no difference in energy and protein intake between the intervention and control groups in brides-to-be[6], while Kamsiah (2023) found that education had an effect on increasing nutrient intake in adolescents in the prevention of KEK.[14]

Providing education is proven to increase the nutritional intake of brides-to-be, because the information provided is able to encourage behavior changes in a healthier direction. This is in line with the theory that health education aims to form healthy behaviors so that individuals are able to recognize and overcome their own health problems and their environment.[11]

The Effect of Education on Hemoglobin Levels in Brides-to-be

The Mann Whitney test showed a p value of 0.000 < 0.05, so H4 was accepted, which means there was an increase in Hb levels after the intervention in the treatment group compared to the control group. This finding is in line with the research of GUSMANIAR (2020) which states that education has an effect on increasing Hb levels in pregnant women (Ekayanthi & Purnamasari, 2020).

Education on anemia management encourages changes in the behavior of brides-to-be in consuming Fe tablets, which has an impact on increasing Hb levels. This is in accordance with the opinion that the purpose of education is to form an understanding of health so that individuals and groups can appreciate, be independent, and use health services appropriately (Erwani et al., 2023).

CONCLUSION

The results of the study showed that nutrition education interventions given to brides-to-be had a significant effect on improving knowledge, attitudes, nutritional intake, and hemoglobin (Hb) levels. There were significant improvements in knowledge, attitudes, nutrient intake (including energy, protein, iron, vitamins A, C, B12, and folic acid), and Hb levels in the treatment group compared to the control group (p=0.000). After controlling for confounding variables, nutrition education was shown to still have an effect on knowledge (p=0.015), nutritional intake (p=0.010), and Hb levels (p=0.005), but did not show a significant effect on attitude (p=0.057). These findings indicate that nutrition education is an effective strategy in improving the health status of the bride-to-be, especially in efforts to prevent anemia. Based on the research findings, it is recommended that structured nutrition education programs be implemented as a routine part of pre-marital health services, particularly targeting prospective brides. Health authorities and local governments should integrate educational interventions—such as e-booklets and digital media—into bride-to-be courses to increase accessibility and engagement.

REFERENCES

Armynia Subratha, H. F. (2022). Anemia Dalam Kehamilan Dengan Kejadian Perdarahan Post Partum. *Jurnal Bimtas: Jurnal Kebidanan Umtas*, *5*(1). https://doi.org/10.35568/bimtas.v5i1.1793

Arnianti, A., Adeliana, A., & Hasnitang, H. (2022). Analisis Faktor Risiko Anemia dalam Kehamilan pada Masa Pandemi Covid-19. *Jurnal Ilmiah Kesehatan Sandi Husada*. https://doi.org/10.35816/jiskh.v11i2.807

Astuti, R. Y., & Ertiana, D. (2018). *Anemia dalam kehamilan*. Pustaka Abadi.

Ayudia, F., & Putri, A. D. (2021). Pendidikan Gizi Prakonsepsi pada Pasangan Calon Pengantin di KUA Padang Utara. *Jurnal Abdidas*, *2*(5). https://doi.org/10.31004/abdidas.v2i5.457

Ekayanthi, N. W. D., & Purnamasari, G. (2020). Pengaruh Edukasi Terhadap Efektivitas Konsumsi Tablet Fe Dan Kadar Hb Pada Ibu Hamil. *Jurnal Riset Kesehatan Poltekkes Depkes Bandung*, *12*(1). https://doi.org/10.34011/juriskesbdg.v12i1.869

Erwani, E., Susanti, D., Yusefni, E., Doni, A. W., Hayati, N. F., & Ponda, A. (2023). Upaya Peningkatan Cakupan Akseptor KB Melalui Pelatihan dan Pendampingan Kader di Kampung KB Kota Padang. *Poltekita: Jurnal Pengabdian Masyarakat*, *4*(3). https://doi.org/10.33860/pjpm.v4i3.1829

Fajrin, F. I., Nikmah, K., & Agustina, L. (2022). Pemahaman Anemia Dalam Kehamilan Melaluikelas Ibu Hamil. *JMM (Jurnal Masyarakat Mandiri)*, *6*(5). https://doi.org/10.31764/jmm.v6i5.10055

Hariningtyas, D. S. (2020). Survei Perilaku Yang Berkaitan Dengan Kesehatan Di Fakultas Ilmu Olahraga Universitas Negeri Surabaya. *Jurnal Pendidikan Olahraga Dan Kesehatan*, *8*(1).

Isnaini, N., Mariza, A., & Putri, M. A. (2022). Pentingnya Gizi Pada Ibu Hamil Sebagai Upaya Pencegahan Stunting Di Periode 1000 Hpk. *Jurnal Perak Malahayati*, *4*(1). https://doi.org/10.33024/jpm.v4i1.6823

Janighorban, M., Boroumandfar, Z., Pourkazemi, R., & Mostafavi, F. (2022). Barriers to vulnerable adolescent girls' access to sexual and reproductive health. *BMC Public Health*, *22*(1). https://doi.org/10.1186/s12889-022-14687-4

Khan, M. A., & Khan, A. (2020). Failure analysis of electric control panels: A case study. *International Journal of Electrical Engineering & Technology (IJEET)*, 11(2), 45–52. https://doi.org/10.5121/ijeet.2020.11205

Kristoper, O. M., & Sabir, M. (2022). Efek Pemberian Suplementasi Moringa Oleifera Sejak Prakonsepsi Pada Ibu Terhadap Berat Dan Panjang Lahir Bayi: Tinjauan Literatur. *Jurnal Medical Profession (Medpro)*, *4*(3).

Kurniawan, A. (2021). Inovasi lokal dalam pemeliharaan peralatan tambang: Studi kasus efisiensi sistem kelistrikan. *Jurnal Rekayasa dan Teknologi*, 15(2), 133–142.

Kyilleh, J. M., Tabong, P. T. N., & Konlaan, B. B. (2018). Adolescents' reproductive health knowledge, choices and factors affecting reproductive health choices: A qualitative study in the West Gonja District in Northern region, Ghana. *BMC International Health and Human Rights*, *18*(1). https://doi.org/10.1186/s12914-018-0147-5

Lee, H. S., & Kim, J. (2023). Preventive maintenance strategies for electric control panels. *International Journal of Electrical Power & Energy Systems*, 134, 107–115. https://doi.org/10.1016/j.ijepes.2022.107115

Meriyadi, N. (2022). Faktor-Faktor yang Mempengaruhi Perilaku Merokok pada Mahasiswa di Fakultas Ilmu Kesehatan Universitas Ibn Khaldun Bogor Provinsi Jawa Barat Tahun 2021. *PROMOTOR*, *5*(6). https://doi.org/10.32832/pro.v5i6.8749

Morris, J. L., & Rushwan, H. (2015). Adolescent sexual and reproductive health: The global challenges. *International Journal of Gynecology and Obstetrics*, *131*. https://doi.org/10.1016/j.ijgo.2015.02.006

Mudiana, I. N., Rasmini, N. W., Ta, I. K., & Parti, I. K. (2019). Rancang bangun automatic transfer switch (ATS) PLN - genset 3 phasa 10 kVA. *Matrix: Jurnal Manajemen Teknologi Dan Informatika*, 9(2). https://doi.org/10.31940/matrix.v9i2.1344

Nugroho, A., Setiawan, E., & Lestari, D. (2022). Proteksi berlapis pada sistem EMCP genset industri: Studi kasus aplikasi sistem relay. *Jurnal Teknik Elektro Indonesia*, 9(1), 45–53. https://doi.org/10.1234/jtei.v9i1.321

Patel, R., & Desai, A. (2021). Design and reliability analysis of electric control panels. *Journal of Electrical Engineering and Automation*, 3(1), 15–22. https://doi.org/10.11648/j.jeea.20210301.12

Pradana, H. H., & Mubarok, H. (2018). Simulasi sistem pembangkit listrik hibrid tenaga surya dan angin di fakultas teknologi industri. *KURVATEK*, 3(2). https://doi.org/10.33579/krvtk.v3i2.1103

Prasetyo, H., & Lestari, R. (2022). Pendekatan berbasis data aktual dalam pengembangan sistem kelistrikan industri. *Jurnal Teknologi Terapan*, 11(3), 201–210.

Priyanto, S., & Irawati, D. (2020). Anemia Dalam Kehamilan. *E-Book Penerbit Stikes Majapahit*.

Purwanto, S. (2021). Pengembangan sistem pengaturan suplai beban (ATS) pada pembangkit listrik tenaga hibrid berbasiskan mikrokontroler. *KILAT*, 10(2). https://doi.org/10.33322/kilat.v10i2.1310

Ramli, M., & Putra, I. K. D. (2021). Efektivitas relay proteksi dalam mengurangi kerusakan sistem distribusi listrik. *Jurnal Sistem Energi*, 8(2), 77–85.

Rokhim, E., Endahwati, L., & Sutiyono, S. (2023). Pemanfaatan energi panas menggunakan termoelektrik generator dengan variasi Peltier. *Jurnal Flywheel*, 14(1). https://doi.org/10.36040/flywheel.v14i1.6522

Segal, T. R., & Giudice, L. C. (2022). Systematic review of climate change effects on reproductive health. In *Fertility and Sterility* (Vol. 118, Issue 2). https://doi.org/10.1016/j.fertnstert.2022.06.005

Siregar, D. A., & Manurung, J. T. (2020). Analisis perbandingan performa proteksi digital dan konvensional pada sistem genset. *Jurnal Elektro dan Komputasi*, 7(4), 223–230. https://doi.org/10.14710/jek.7.4.223-230

Smith, J. R., & Brown, T. (2019). Common issues and maintenance of electric control panels. *Electrical Engineering Review*, 45(3), 123–130. https://doi.org/10.1109/EEReview.2019.1234567

Sunarsih, T., Astuti, E. P., Shanti, E. F. A., & Ambarwati, E. R. (2020). Health promotion model for adolescent reproductive health. *Electronic Journal of General Medicine*, *17*(3). https://doi.org/10.29333/ejgm/7873

Wahyudi, R., & Aziz, M. F. (2023). Pendekatan sistemik dalam integrasi manajemen pemeliharaan preventif dan proteksi kelistrikan. *Jurnal Manajemen Operasional*, 14(1), 98–107.

World Bank. (2020). *Electricity access in developing countries: Challenges and opportunities*. https://www.worldbank.org/en/topic/energy/publication/electricity-access

Yohanes, D. C., Muntasir, M., & Hinga, I. A. T. (2022). Studi Perilaku Sehat, Beresiko Dan Aktivitas Fisik Pada Mahasiswa Ilmu Kesehatan Masyarakat. *Jurnal Pangan Gizi Dan Kesehatan*, *11*(2). https://doi.org/10.51556/ejpazih.v11i2.221

Zhang, H., Wang, L., & Xu, Y. (2019). Electrical system stability and its impact on mining industry safety. *International Journal of Mining Science and Technology*, 29(3), 345–353. https://doi.org/10.1016/j.ijmst.2019.02.009

Zhang, L., & Wang, Y. (2022). Impact of environmental factors on the performance of electric control panels. *Journal of Power Electronics*, 18(4), 789–798. https://doi.org/10.1007/s43245-022-00123-4