# INDONESIAN MIDWIFERY AND HEALTH SCIENCES JOURNAL

# THE INTRAUTERINE DEVICE (IUD) USE AND BACTERIAL VAGINOSIS INCIDENCE, INSIGHTS FORM 2023 STUDY IN A SURABAYA, INDONESIA

*Verna Biutifasari[1] ,Eka Fitriani Hafel[1], Frans O.H. Prasetyadi [1], Ronald Pratama Adiwinoto[1], Ellen Angelique Hardjono[1]*

[1]Faculty of Medicine, Hang Tuah University, Surabaya, Indonesia

Correspondence address:
Surabaya, Indonesia
Email : biutifasari.verna@hangtuah.ac.id

**Abstract**
**Background:** The Intrauterine device (IUD) is one of the most widely used and effective long-term contraceptive methods, with a success rate exceeding 99%. However, prolonged copper IUD use has been associated with an increased risk of bacterial vaginosis (BV), with users reportedly 1.28 times more likely to develop BV than users of other contraceptive methods.This study aims to assess the association between IUD usage and the incidence of BV. **Methods:** This cross-sectional analytic observational study included 50 participants using IUDs, recruited from three public health centers in Surabaya between May and December 2023. Vaginal swab samples from suspected BV cases were examined independently by two observers. Data were analyzed using the Chi-square test to assess associations and Cronbach's Alpha to evaluate inter-observer reliability, with significance set at p < 0.05. **Results:** Most BV cases were found among women aged 30–39 years (40%) and among users of non-hormonal IUDs (76%). Based on Nugent scoring, 26 participants (52%) were diagnosed with definitive BV. The association between IUD use and BV incidence was not statistically significant (p = 0.090). Inter-observer reliability was high, with a Cronbach's Alpha of 0.963. **Conclusion:** The study concludes that IUD use is not significantly associated with the occurrence of bacterial vaginosis, based on Nugent score evaluation.

**Keywords:** *intrauterine device, bacterial vaginosis, Nugent score, contraception*

## INTRODUCTION

The intrauterine device (IUD) is the most widely used method of Long-Acting Reversible Contraception (LARC) globally, with an estimated 159 million women of reproductive age (15–49 years) relying on IUDs as their primary form of contraception. It is also one of the most effective, with a success rate exceeding 99%. The World Health Organization (WHO) recommends two main types of IUDs: the levonorgestrel-releasing hormonal IUD (LNG-IUD) and the copper-based non-hormonal IUD (Cu-IUD). Proper IUD insertion requires trained healthcare professionals to ensure optimal placement and prevent complications

(Bowman & Thwaites, 2023).

Several studies have linked prolonged use of copper IUDs to an increased risk of bacterial vaginosis (BV). IUD users are reported to have a 1.28 times higher risk of BV compared to users of other contraceptive methods (Peebles *et al.*, 2021). Additional risk factors such as the number of sexual partners and IUD usage have also been identified as significant contributors to BV incidence (Salsabila *et al.*, 2024). The use of non-hormonal, copper-based IUDs may particularly increase BV risk, potentially due to their side effects such as prolonged or heavier menstrual bleeding (Peebles et al., 2021).

Bacterial vaginosis is the most common vaginal infection among women of reproductive age and has notable clinical implications. It has been associated with complications such as pelvic inflammatory disease, preterm birth, and an increased risk of acquiring or transmitting HIV and other sexually transmitted infections (Peebles *et al.*, 2021; Salsabila *et al.*, 2024). Non-sexual causes of BV, such as vaginal douching, recent antibiotic use, and IUD insertion, have also been documented (Abu *et al.*, 2021). A healthy vaginal microbiome is predominantly composed of hydrogen peroxide–producing *Lactobacillus* species, which help maintain low pH and inhibit the growth of anaerobic organisms such as *Gardnerella vaginalis*, *Mobiluncus* spp., *Bacteroides* spp., and *Mycoplasma hominis*. When Lactobacilli are depleted, this balance is disrupted in what is known as a "vaginal flora shift," often leading to BV, although the exact etiology remains unclear (Falconi-McCahill, 2019). BV is characterized by the formation of a polymicrobial biofilm primarily composed of Gardnerella vaginalis, which adheres to the vaginal epithelium and protects bacterial colonies from antimicrobial treatment. The shedding of biofilm-covered epithelial cells often presents as a fishy-smelling, moist discharge and contributes to recurrence (Muzny dan Sobel, 2023).

The Nugent scoring system remains the gold standard for diagnosing BV in clinical research. It involves Gram staining of vaginal swabs and evaluating the presence of bacterial morphotypes under a microscope (Falconi-McCahill, 2019).

This study aims to investigate the association between intrauterine device (IUD) use and the incidence of bacterial vaginosis (BV) in patients attending community health centers offering basic emergency obstetric and neonatal care services in

Surabaya—specifically Balongsari Health Centre, Simomulyo Health Centre, and Tanah Kali Kedinding Health Centre Surabaya Indonesia—during the period from September to December 2023.

## METHOD

This study employed an analytical observational design with a cross-sectional approach. The research was conducted at three community health centers in Surabaya—Balongsari Health Centre, Simomulyo Health Centre, and Tanah Kali Kedinding Health Centre—from September to December 2023.

The study population consisted of all women using intrauterine devices (IUDs) who presented with complaints of vaginal discharge. Purposive sampling was used to recruit participants who met the inclusion criteria. The inclusion criteria were: (1) using IUDs for more than 3 months, (2) experiencing abnormal vaginal discharge, and (3) providing informed consent to participate. Exclusion criteria included: (1) use of other contraceptive methods, (2) diagnosis of vaginal discharge due to fungal infections or sexually transmitted infections (e.g., gonorrhea, chlamydia), and (3) a history of prior treatment for vaginal infections. A total of 50 respondents were included in the final sample.

Eligible participants underwent vaginal swab collection performed by trained health personnel at each center. Two vaginal swab samples were obtained per participant using sterile technique. Swabs were immediately fixed on microscope slides, Gram-stained according to standard procedures, and assessed for bacterial vaginosis using the Nugent scoring method. Interpretation of results was conducted independently and blindly by two trained observers.

The Nugent score, considered the gold standard for diagnosing bacterial vaginosis, is based on microscopic identification of vaginal flora morphotypes. Scores range from 0–10, where 0–3 indicates normal flora, 4–6 intermediate flora, and 7–10 definitive bacterial vaginosis (Theiler et al., 2024; Watanabe et al., 2025).

The tools and materials used in this study included: a speculum, sterile cotton swabs, bacterial dye solution, 70% alcohol, glass slides and cover slips, pipettes, inoculating loops (ose needles), microscopes, and sterile gloves.

Primary data were obtained through physical examinations and laboratory analysis of vaginal swabs. Prior to examination, informed consent was obtained from all participants. After data collection, data processing was carried out in several stages: editing, coding, entry, cleaning, and scoring.

Statistical analysis was performed using SPSS version 23. Univariate analysis was conducted to describe the frequency distribution of study variables. Bivariate analysis was used to examine the association between IUD use and BV incidence using the Chi-Square test, with a significance level of $p < 0.05$. This study received ethical approval from the Surabaya City Health Office Ethics Committee with reference number: 000.9.2/27621/436.7.2/2023.

## RESULT AND DISCUSSION

Bacterial vaginosis (BV) is a condition involving multiple microorganisms that leads to a reduction in Lactobacilli and an increase in facultative and anaerobic bacteria in vaginal fluids. Lactobacilli are diminished, while facultative and anaerobic bacteria flourish in plenty, whether independently or together. Included are Gardnerella vaginalis, Bacteroides fragilis, species of Mobiluncus, and various other bacteria. (Regassa *et al.*, 2024) In new cases, BV has a low incidence and mostly affects women of reproductive age. It presents no symptoms. (Manuputty and Matodiharjo, 2020) The results of the study obtained from the Nugent score criteria examination data of patients using IUDs at the Balongsari Puskesmas, Simomulyo Puskesmas, and Tanah Kali Kedinding Surabaya Puskesmas in the September-December 2023 period, obtained a total sample of 50 patients consisting of 26 definitive bacterial vaginosis, 14 intermediate bacterial vaginosis, and 10 negative bacterial vaginosis.

Table 1 Distribution of Respondent Characteristics

| Variable | N | % |
|---|---|---|
| Age | | |
| **20-29 years** | 14 | 28 |
| **30-39 years** | 20 | 40 |
| **≥ 40 years** | 16 | 32 |

| | | |
|---|---|---|
| Total | 50 | 100 |
| Types od IUD use | | |
| **Hormonal IUD** | 12 | 24 |
| **Non hormonal IUD** | 38 | 76 |
| Total | 50 | 100 |
| **Incidence of Bacterial Vaginosis based on Nugent Score** | | |
| **BV Negative** | 10 | 20 |
| **BV Intermediate** | 14 | 28 |
| **BV Definitif** | 26 | 52 |
| Total | 50 | 100 |

Based on table 1 on the distribution of respondent characteristics, it was found that in the age group, the majority of respondents were in the age group 30-39 years, namely 20 people (40.0%), > 40 years as many as 16 people (32.0%) and the least were in the age group 20-29 years, namely 14 people (28.0%). The significant occurrence of BV in women of reproductive age is linked to multiple factors. (Adk dan H, 2024) Sexual intercourse, vaginal douching, contraception, and the use of antibiotics contribute to BV. (Abou Chacra *et al.*, 2023). Sexual behavior is closely linked to BV; alterations in vaginal microbiota in those with new or multiple sexual partners, absence of condom use, and female-to-female sexual contact are all factors contributing to BV. (Kairys N, Carlson K, 2023) Even though BV is not classified as a sexually transmitted infection, it raises a woman's likelihood of acquiring *Chlamydia trachomatis* and *Neisseria gonorrhoeae* by 3.4 to 4 times. (Abou Chacra *et al.*, 2023) These factors will reduce the effectiveness of the primary defense barrier against the invasion of harmful microbes. (Adk dan H, 2024) A significant presence of Lactobacillus helps maintain a healthy vaginal flora. BV will result in physiological changes. The production of antimicrobials by lactobacillus will decrease, accompanied by a reduction in lactic acid sourced from glycogen in the vaginal mucosa, causing a shift in vaginal pH from acidic (4.5 or lower) to alkaline. (Abou Chacra *et al.*, 2023) This imbalance will result in an increase of anaerobic bacteria in the BV, causing the formation of amine compounds that produce a fishy smell in the vaginal discharge. (Adk dan H, 2024) In the post-menopausal vagina, *Lactobacillus* shows low growth, which is affected by the amount of free glycogen used by Lactobacillus. During menopause, vaginal glycogen levels decline. (Gandhi *et al.*, 2022) This aligns with the low prevalence

of BV in individuals over 40 years in the research. Nonetheless, it requires additional focus, as menopause leads to dysregulation, reduced vaginal immune response, and alterations in vaginal microbiota, rendering a person susceptible to BV. (Gandhi *et al.*, 2022)

Based on the type of use of IUD used by respondents, this study shows that the type of IUD most widely used by respondents is non-hormonal IUD used by 38 people (76.0%). While hormonal IUD was used by 12 respondents (24.0%). Based on the Nugent score criteria, the majority of respondents experienced bacterial vaginosis or definitive BV, namely 26 people (52.0%). The results of the examination in 14 respondents (28.0%) showed intermediate BV results or intermediate flora. While 10 other respondents (28.0%) did not experience BVor only had normal flora based on the results of the examinations carried out in this study.

Table 2 Relationship between IUD Use and the Incidence of Bacterial Vaginosis

| | Nugent Score Criteria | | | | | | | P Value (<0,05) |
|---|---|---|---|---|---|---|---|---|
| | BV Negative | | BV intermediet | | Bacterial Vaginosis | | Total | |
| | n | % | n | % | n | % | N | % | |
| Hormonal IUD | 5 | 41,7 | 3 | 25,0 | 4 | 33,3 | 12 | 24 | |
| Non-hormonal IUD | 5 | 13,2 | 11 | 28,9 | 22 | 57,9 | 38 | 76 | 0,090 |
| **Total** | **10** | **20,0** | **14** | **28,0** | **26** | **52,0** | 50 | 100 | |

The relationship between IUD use and the incidence of bacterial vaginosis based on Nugent score criteria is shown in table 2. This study shows that based on the use of hormonal and non-hormonal IUDs, the majority of respondents experienced bacterial vaginosis, namely 26 people (52.0%), then intermediate BV as many as 14 people (28.0%) and only a few who had negative BV, namely only 10 people (20.0%). This study also showed that based on the type of use of IUD, respondents who used non-hormonal IUDs were the group that experienced the most bacterial vaginosis, namely 22 people (57.9%). Data analysis using the Chi square test obtained p = 0.090 which means the p value> 0.05 so that it can be said that there is no relationship between the use of IUDs and the incidence of bacterial vaginosis at the Balongsari Community Health Centre, Simomulyo Community Health Centre, and Tanah Kali Kedinding Community Health Centre Surabaya in

September-December 2023. IUDs are a contraceptive options for preventing pregnancy, particularly copper IUDs. The use of IUDs is said to elevate the risk of BV and BV linked with alterations in vaginal microbiota, in comparison to women using hormonal contraception. After over 6 months of use, there was a 5.5-fold rise in inflammation caused by anaerobic bacteria in users of copper-based IUDs. (Brown *et al.*, 2023) This process takes place when copper, as an external substance in the uterus and vagina, promotes the proliferation of facultative and anaerobic bacteria linked to BV. The menstrual cycle will lead to a relative increase in the morphotypes of Gardnerella vaginalis and a decrease in Lactobacillus species, with Gardnerella vaginalis becoming more abundant and Lactobacillus species less so. The copper in the IUD may lead to a decrease in Lactobacillus species and an increase in Gardnerella vaginalis, resulting in vaginal dysbiosis.(Peebles *et al.*, 2021) Differences in TNFα levels among various contraceptive methods and vaginal microbiomes indicate the existence of distinct regulatory mechanisms relative to other proinflammatory cytokines. TNFα production, affected by immune and epithelial cells, fluctuates with the local vaginal microbiome and systemic contraceptive influences. The copper IUD might trigger a distinct immune response, unlike hormonal contraceptives. Interactions between the vaginal microbiome and the immune system further influence TNFα in the promotion and inhibition of vaginal bacterial populations. (Serrano *et al.*, 2025)

Intrauterine devices (IUDs) have emerged as the preferred method for many women regarding long-term pregnancy prevention. (Golden *et al.*, 2025) Two types of IUDs available are copper-based options and levonorgestrel-releasing devices. (Ketvertis., 2025) In this study, copper-based IUDs were chosen by a majority of participants (76%), and they were associated with a higher occurrence of BV (57.9%). The oxidation of copper in the IUD has led to the release of cupric ions (Cu2+), resulting in a localized sterile inflammatory response. (Bunting *et al.*, 2024) IUDs additionally facilitate the movement of microorganisms from the lower tract to the upper genital tract. Copper in IUD viewed as a foreign entity, leads to the colonization of microorganisms. An increased volume and duration of menstruation elevate iron-containing metalloproteins, fostering an environment that promotes the growth of G. vaginalis as a pathogen in the vaginal microbiota.

(Bakus *et al.*, 2022) The hormonal IUD helps maintain the stability of the vaginal microbiota by releasing progestin, though it may still lead to changes in vaginal dysbiosis. (Bakus *et al.*, 2022; Serrano *et al.*, 2025) This was observed in this research with a BV occurrence of 76%. The relationship between IUD usage and the prevalence of bacterial vaginosis in this study showed p = 0.090, suggesting no notable difference in the rates of BV among IUD and non-IUD users. Moreover, users of hormonal IUDs reported a reduced occurrence of BV. The key aspect is to focus on which elements can influence alterations in vaginal microbiota in both IUD and non-IUD users.

Utilizing nucleic acid amplification to identify sequences from vaginal microbiota is a method that demonstrates high sensitivity and specificity. The technique can be applied to normalize the Nugent score. (Melo *et al.*, 2021) Nonetheless, the study's setting, which took place in primary health care, restricts the method's applicability. To lessen these constraints, we performed a reading agreement of vaginal swab slides and achieved a reading concordance of 92% between 2 observers. This reading agreement aims to enhance objectivity in assessing readings. The examination of reading alignment between two observers carried out in Chile showed a reduced agreement of 63.2%. (Melo *et al.*, 2021) While the agreement of findings in our research is greater, it is still noted that the Gram stain utilized in BV is significantly influenced by the observer, their expertise, and subjective interpretation. (Elvy *et al.*, 2025) Enhanced techniques are required to verify this. (Abou Chacra *et al.*, 2024)

This study has several limitations that should be considered when interpreting the findings. First, the relatively small sample size (n=50) may limit the generalizability of the results, and may not accurately reflect the true prevalence of bacterial vaginosis (BV) among IUD users in broader populations. Second, important confounding factors such as sexual behavior, frequency of intercourse, menstrual history and cycle regularity, genital hygiene practices, and other lifestyle or clinical variables were not assessed. These unmeasured variables may influence the risk of BV but were beyond the scope of this study.

Additionally, the study population was drawn exclusively from a single city in Indonesia, which may reduce the external validity of the findings and limit their

applicability to other regions or countries with different demographic and cultural contexts. Furthermore, the study did not stratify or control for known risk factors for BV such as recurrent antibiotic use, smoking, sexual activity, or vaginal douching. These were also not included as exclusion criteria, which may have introduced confounding bias.

Lastly, while the Nugent scoring system remains the gold standard for BV diagnosis, it relies on microscopic interpretation of Gram-stained vaginal swabs, which may be subject to inter-observer variability despite efforts to blind assessments. Future research should consider incorporating more objective or molecular-based diagnostic tools to enhance diagnostic accuracy.

Despite these limitations, this study provides important insights into the potential association between IUD use and bacterial vaginosis in a real-world primary care setting. It highlights the need for larger, multicenter studies with comprehensive risk factor assessments to better understand and manage reproductive tract infections among contraceptive users.

## CONCLUSION AND SUGGESTION

Based on the results of the study, it was found that there was no relationship between the use of IUD and the incidence of bacterial vaginosis at the Balongsari Health Centre, Simomulyo Health Centre, and Tanah Kali Kedinding Surabaya Health Centre in the September-December 2023 period, it can be concluded that the type of IUD used at the Balongsari Health Centre, Simomulyo Health Centre, and Tanah Kali Kedinding Surabaya Health Centre in September-December 2023 was copper non-hormonal IUD with a percentage of 76% and hormonal IUD with a percentage of 24%. The frequency or incidence of definitive BV in IUD users in Community Health Centre Balongsari, Simomulyo Community Health Centre, Tanah Kali Kedinding Community Health Centre Surabaya in September-December 2023 reached 52% of the total 50 patients.

## DECLARATION

**Acknowledge**

We acknowledge all participants and their parents for supporting and cooperating with this study. Due to the study's exclusive use of anonymised data, the Research Ethics Committee waived the subjects' written informed consent requirement. I certify that the relevant institutional forms have been archived and that all required patient/participant consent has been obtained. I also attest that any patient/participant/sample identifiers included were unknown to anyone outside the research group (such as hospital staff, patients, or participants themselves), so they cannot be used to identify specific individuals.

**Conflict of Interest**

no conflicts of interest arose during the study

**Author contributions:** All authors contributed to the study conception and design. VB, FEH, EAH and FOH: material preparation, data collection and analysis were performed. VB, FEH and RPA: the first draft of the manuscript was written. All authors have read and agreed to the published version of the manuscript.

**Ethics statement:** We obtained approval from health department of surabaya city government 000.9.2/27621/436.7.2/2023

Data avaibility

The data supporting the findings of this study are available upon reasonable request to the corresponding author

### Reference

Abou Chacra, L. *et al.* (2023) "Relationship between Bacterial Vaginosis and Sexually Transmitted Infections: Coincidence, Consequence or Co-Transmission?," *Microorganisms*, 11(10). doi: 10.3390/microorganisms11102470.

Abou Chacra, L. *et al.* (2024) "Evaluation of Various Diagnostic Strategies for Bacterial Vaginosis, Including a New Approach Based on MALDI-TOF Mass Spectrometry," *Microorganisms*, 12(1). doi: 10.3390/microorganisms12010111.

Abu, M. E. *et al.* (2021) "Epidemiology of fungal infection after hepatobiliary surgeries at National Liver Institute Hospital," 34(Md), hal. 1–16. doi: 10.4103/mmj.mmj.

Adk, G. dan H, A. G. (2024) "Bacterial Vaginosis during Reproductive Age Bacterial Vaginosis during Reproductive Age," (May).

Bakus, C. *et al.* (2022) "The impact of contraceptives on the vaginal microbiome in the non-pregnant state," *Frontiers in Microbiomes*, 1(January), hal. 1–9. doi: 10.3389/frmbi.2022.1055472.

Brown, B. P. *et al.* (2023) "Copper intrauterine device increases vaginal concentrations of inflammatory anaerobes and depletes lactobacilli compared to hormonal options in a randomized trial," *Nature Communications*, 14(1). doi: 10.1038/s41467-023-36002-4.

Bunting, J. J. M. *et al.* (2024) "Revolutionizing Women's health: the quest for materials for next-generation, non-hormonal intrauterine devices," *npj Women's Health*, 2(1), hal. 1–8. doi: 10.1038/s44294-024-00026-y.

Elvy, J. *et al.* (2025) "Clinical laboratory evaluation of the Hologic Panther Aptima BV and CV/TV assays for the diagnosis of vaginitis in Dunedin, Aotearoa New Zealand," *Microbiology Spectrum*, 13(1). doi: 10.1128/spectrum.01274-24.

Gandhi, K. *et al.* (2022) "Lactobacilli and Cytokine Modifications during Menopause and Their Relation to Vulvar and Vulvovaginal Disorders," hal. 52–59.

Golden, A. J. *et al.* (2025) "Correlation of Bacterial Infections in Women With Versus Without Intrauterine Devices [ID 1544]," *Obstetrics & Gynecology*, 145(6S), hal. 65S-66S. doi: 10.1097/aog.0000000000005918.026.

Kairys N, Carlson K, G. M. (2023) "Bacterial Vaginosis - StatPearls - NCBI Bookshelf," *StatPearls*.

Ketvertis., E. L. L. M. A. K. (2025) "Intrauterine Device Placement and Removal - StatPearls - NCBI Bookshelf." Tersedia pada: https://www.ncbi.nlm.nih.gov/books/NBK557403/.

Manuputty, A. G. dan Matodiharjo, S. (2020) "The Profile of Bacterial Vaginosis in Academic Hospital Surabaya : A Retrospective Study," *Berkala Ilmu Kesehatan Kulit dan Kelamin – Periodical of Dermatology and Venereology*, Vol. 32 /, hal. 141–148.

Melo, A. *et al.* (2021) "Concordance between Clinical and Laboratory Diagnosis

of Abnormal Vaginal Discharge in Chilean Women," *Revista Brasileira de Ginecologia e Obstetricia*, 43(8), hal. 600–607. doi: 10.1055/s-0041-1735299.

Muzny, C. A. dan Sobel, J. D. (2023) "Understanding and Preventing Recurring Bacterial Vaginosis: Important Considerations for Clinicians," *International Journal of Women's Health*, 15(August), hal. 1317–1325. doi: 10.2147/IJWH.S383333.

Peebles, K. *et al.* (2021) "Elevated Risk of Bacterial Vaginosis among Users of the Copper Intrauterine Device: A Prospective Longitudinal Cohort Study," *Clinical Infectious Diseases*, 73(3), hal. 513–520. doi: 10.1093/cid/ciaa703.

Regassa, B. T. *et al.* (2024) "Prevalence of bacterial vaginosis and its associated factors among pregnant women attending antenatal care clinics at public hospitals in West Shoa Zone ," hal. 1–13.

Salsabila, N. W. *et al.* (2024) "Determinants of Bacterial Vaginosis: A Retrospective Study," *Journal of Mycology and Infection*, 29(2), hal. 56–60. doi: 10.17966/JMI.2024.29.2.56.

Serrano, M. G. *et al.* (2025) "Effect of contraceptive methods on the vaginal microbiome and host immune factors," *Contraception*, 148, hal. 110936. doi: 10.1016/j.contraception.2025.110936.

Theiler, T. *et al.* (2024) "Bacterial vaginosis in pregnant women: A comparison of the Nugent Score with a multiplex PCR," *Diagnostic Microbiology and Infectious Disease*, 110(1). doi: 10.1016/j.diagmicrobio.2024.116403.

Watanabe, N. *et al.* (2025) "Performance of deep learning models in predicting the nugent score to diagnose bacterial vaginosis," *Microbiology Spectrum*, 13(1). doi: 10.1128/spectrum.02344-24.

# PROFILE OF PREGNANT WOMEN WITH HEPATITIS B IN SURABAYA 2020-2023

*Langgeng Fatilatu Ummah [1]* ID*, Atika [2]* ID*, Euvanggelia Dwilda,[1]* ID*, Andriyanti.
[1]* ID

[1]Midwifery Study Program, Faculty of Medicine, Airlangga University
Surabaya, Indonesia
[2] Departemen Public health, Faculty of Medicine, Airlangga University,
Surabaya, Indonesia

Correspondence address:
Jl. Mayjen Prof. Dr. Moestopo No.6-8, Airlangga, Kec. Gubeng, Surabaya, Indonesia
Email : langgengfadhilatul971@gmail.com

**Abstract**

**Background**: Hepatitis B virus (HBV) infection is a major public health issue. Worldwide, approximately 2 billion people have been infected, and more than 240 million are chronic carriers at risk of progressive liver diseases such as cirrhosis, liver failure, and hepatocellular carcinoma (HCC) (WHO, 2015). **Method:** This research method is descriptive with sampling techniques using random sampling that meets the inclusion criteria of 187 samples. The data collection was conducted using secondary data from the SIHEPI application for the years 2020-2023 at the Health Office of Surabaya City. **Result:** The frequency characteristics were obtained from 187 pregnant women with ages between 20-35 years (70.6%) who were in the third trimester of pregnancy (41.7%) and the majority of mothers were unemployed (58.3%). Most babies born to mothers with hepatitis B received HBIG (95.7%), but one baby was infected with hepatitis B (0.5%) **Conclusion :** The majority of babies born to mothers with hepatitis B have received HBIG, and 77.0% of babies were not infected.

keyword :  Pregnant women, Infants, Hepatitis B, HBIG

## INTRODUCTION

Hepatitis B Virus (HBV) infection is a major public health problem. Worldwide, approximately 2 billion people have been infected and more than 240 million are chronic carriers at risk of progressive liver disease such as cirrhosis, liver failure and hepatocellular carcinoma (HCC) (WHO, 2015). HBV infection accounts for more than 780,000 deaths annually, with HCC currently the fifth most common cancer and the second most common cause of cancer death (Stewart & Will, 2014). The Asia Pacific region accounts for the largest share of Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) infections in the world and 74% of global liver cancer deaths occur in Asia (Wait et al, 2016).

In Indonesia, a national study was conducted through Riskesdas 2013 covering 33 provinces. The results of the study showed the prevalence of Hepatitis b, anti-HBc, and anti-HBs were 7.1% (from 40,791 samples), 31.9% (from 38,312 samples), and 35.6% (from 39,750 samples) respectively. It should be noted that there has been a decline in the prevalence of Hepatitis b (9.4% in 2007 to 7.1% in 2013) indicating that Indonesia has shifted from high to moderate endemicity of HBV infection.

The most common transmission method found in endemic areas such as Southeast Asia, East Asia and Sub-Saharan Africa is the mother-to-child transmission method, which is 25-30% with a risk of infection reaching 60% during life (Patton and Tran, 2014). Universal screening for hepatitis B infection during pregnancy has been recommended for many years. Identification of pregnant women with chronic HBV infection through universal screening has had a major impact on reducing the risk of neonatal infection (Alan et al, 2016). The percentage of districts or cities implementing Early Detection of Hepatitis B (DDHB) in 2017 in East Java was 23.68% and the percentage of reactive Hepatitis B in pregnant women in East Java was 2.77% (Ministry of Health of the Republic of Indonesia, 2018)

Pregnant women with Hepatitis B infection need to be identified early and require careful monitoring during pregnancy and the postpartum period. Emphasis should be placed on universal coverage of passive-active immunoprophylaxis in infants born to Hepatitis B-positive mothers within 12 hours of birth to reduce the risk of perinatal transmission. Additional antiviral therapy given to mothers with high Hepatitis B viral load in the third trimester has also been shown to be beneficial in preventing perinatal transmission. Among antivirals, tenofovir has the best efficacy and safety profile. However, further RCTs are needed to determine the efficacy and safety of this drug in pregnancy.

In this study, researchers want to know the profile of pregnant women with Hepatitis B in Surabaya in 2020-2023 and see their characteristics. The characteristics seen are the age of the pregnant woman, gestational age, occupation and transmission and prevention. It is hoped that this study can contribute to

providing a general picture of the characteristics of pregnant women with positive Hepatitis B, so that delivery and immunization services can be carried out optimally.

## METHOD

The research design used was cross-sectional. The population in this study were all pregnant women with hepatitis B in Surabaya in 2020-2023 with a total of 2162 mothers. The sampling technique used was random sampling. The sample size was obtained based on the inclusion criteria of 187 samples. The variables in this study were maternal age, gestational age, occupation, infected babies and babies receiving HBIG immunization. Data collection was carried out in February - May 2024 starting with research permits then to determine the research sample, data selection was carried out according to the inclusion criteria. Then data from the SIHEPI application was collected. After the data was collected, data processing and analysis were carried out which were presented in the form of tables and narratives.

## RESULT AND DISCUSSION

### Characteristics of data on hepatitis B

Based on table 1, data shows that the majority of mothers with Hepatitis B are 20-35 years old (70.6%) in the third trimester of pregnancy (41.7%) and the mother is not working (58.3%).

| Data Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| Age | | |
| Maternal age <20 years | 2 | 1.1 |
| Mother's age 20-35 years | 132 | 70.6 |
| Mother's age >35 years | 53 | 28.3 |
| Gestational Age | | |
| Trimester 1 (1-13 weeks) | 47 | 25.1 |
| Trimester 2 (14-27 weeks) | 62 | 33.2 |
| Trimester 3 (28-40 weeks/until delivery) | 78 | 41.7 |
| Work | | |
| Private sector employee | 60 | 32.1 |
| Self-employed | 9 | 4.8 |

| | | |
|---|---|---|
| Doesn't work | 109 | 58.3 |
| Etc | 7 | 3.7 |
| Civil Servants/State-Owned Enterprises/TNI/POLRI | 2 | 1.1 |

Source: (SIHEPI application data 2020-2023)

Table 1. Presetation of data characteristics

In terms of age, the majority of pregnant women who experience hepatitis B are 20-35 years old, as many as 132 people (70.6%). In line with the research of Pither, M., et al. (2021) that pregnant women in the high-risk age group, namely 20-35 years old, are 54.8% of cases and 45.2% of controls (p-value = 0.177), it was concluded that there was no relationship between age and the incidence of hepatitis B. One of the risk factors for pregnant women to be infected with hepatitis B is age, especially for mothers of productive age because productive age is the peak period of social interaction between the opposite sex and the vulnerable phase of the reproductive cycle. In fact, sexual intercourse also plays a role in the transmission of hepatitis B because apart from blood, the hepatitis B virus is also transmitted through bodily fluids such as saliva, tears, semen, and vaginal mucus, which have the ability to spread infection horizontally.

This is because Hepatitis B infects more adolescents to young adults, higher infections, because in this age range they are more susceptible to Hepatitis B risk factors such as the use of contaminated syringes. There is research that explains the rarer occurrence in the elderly, it is estimated that the virus has disappeared from the body after experiencing acute hepatitis and is healthy (Kolou et al., 2017).

At gestational age, pregnant women with a gestational age of >42 weeks were 67 people (46.9%). In line with research by Alma, et al. (2020), the most gestational age was in the third trimester group as much as 85.1 percent of the total sample. This happens because during the pregnancy process there will be a decrease in the immune system so that it will provide a great opportunity for the virus to multiply which is indicated by the presence of HBsAg in the blood of pregnant women (Kolawole et al., 2012). Pregnant women who are infected with the Hepatitis B Virus are at risk of transmitting it to their babies in the first or second

trimester of pregnancy, the risk is around 10% and will be 75% during the third trimester of pregnancy. In the third trimester, pregnant women with hepatitis B tend to have a higher viral load, which increases the possibility of transmitting the virus to the baby.

Pregnancy does not directly affect HBV. Changes in viral load and liver enzymes are caused by changes in the immune system, namely: changes in the balance of Th1 and Th2, and reducing the immune response to hepatitis B infection, where these changes can prevent fetal rejection of the mother's immune system. This causes an increase in HBV DNA and a decrease in ALT. After giving birth, the immune system will return and cause an increase in ALT and a decrease in HBV DNA (Gozali, 2020).

In this study, the majority of pregnant women with hepatitis B in this study were unemployed, as many as 90 people (62.9%).Based on the results of this study, it shows that work is not a risk factor for Hepatitis B in pregnant women, the majority of pregnant women have jobs that are not at risk, because most are just housewives. Housewives or unemployed mothers have minimal social interaction, so there is less exposure to unwanted things. Compared to mothers who work outside the home, it is possible for mothers to be exposed in any way that may not be visible. One of the jobs related to exposure is health workers (doctors, nurses, midwives, laboratory staff) where health workers often deal with patients who may not be generally known that the patient is infected with Hepatitis B Without laboratory test results. In addition, commercial sex workers (CSWs) who use minimal protection (condoms) are also at risk of being infected with Hepatitis B.

In line with research (Pitheret al., 2021) which states that exposure to transmission occurs from family members or partners in the use of personal items, not from work. The high group of Hepatitis B cases in pregnant women who are housewives explains the lack of knowledge of pregnant women regarding the risk factors for Hepatitis B transmission, so they lack knowledge and awareness of disease transmission.

**Maternal fetal transmission of hepatitis B**

Table 2. Presentation of maternal fetal transmission data

| Data Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| Baby infected with Hepatitis B | | |
|     Infected | 1 | 0.5 |
|     Not infected | 144 | 77.0 |
|     Unknown | 42 | 22.5 |
| Baby gets HBIG | | |
|     Yes | 179 | 95.7 |
|     Unknown | 8 | 4.3 |

Source: (SIHEPI application data 2020-2023)

Based on table 5.2, data shows that the majority of babies received HBIG (95.7%) but 1 baby was infected (0.5%).

HBIG immunization injection is a type of passive immunization that involves the creation of antibodies that aim to provide direct immunity, so that the body does not need to create its own active substances to protect its body. HBIG immunization has a success rate of 85% to 95%, which will provide immediate protection even though it only lasts three to six months (IDAI, 2011). This study stated that the majority of infants received HBIG (95.7%) but there was 1 infant who contracted hepatitis B.

In line with the research of Elfon et al, 2019, the results of the analysis of the effect of HBIg administration on the results of HBsAg examinations in infants born to HBsAg positive mothers using Fisher's exact test showed a significance value of $p = 1,000$ ($p > 0.05$) so that it can be said that there is no effect of HBIg administration on the results of HBsAg examinations in infants born to HBsAg positive mothers.

In contrast to the study conducted by Ramadhani (2019) in four health centers in Surabaya City in 2017, five infants (8.9%) did not receive passive HBIG immunization. The results showed that one in five infants (1.8%) were declared reactive to HBsAg when they were more than 9 months old. This was due to the fact that mothers refused to provide active HB-0/HB-1/HB-2/HB-3 immunization to their babies on time at birth. The same results were also shown in the study by Gong & Liu (2017) which stated that HBIG can produce anti-HBs antibodies within

hours after injection. HBIG injection can prevent mother-to-infant transmission of hepatitis B with an effectiveness of 85%-95% when combined with complete active hepatitis B immunization.

The results of Sjahriani's study, 2018 found that transmission of hepatitis B infection in babies born to HBsAg positive mothers was only 5 babies (16.7%). The results of Dwivedi's study, M at al (2011) also explained that vertical transmission from mothers with positive HBsAg was 20%. The results of the study are in accordance with other literature which states that 10% of babies born to women with positive HbsAg are infected with HBV. The percentage of HBsAg (+) mothers for vertical transmission indicating HBsAg (+) in babies who have been given HBIg at birth is 1 person (2.1%) this is because the risk of perinatal infection is 5-20% of babies born to mothers with positive HBsAg and 70-90% if the mother is HBeAg (+) (Shepard CW et al). According to research by Kang G et al (2015), the efficacy of administering the hepatitis B vaccine alone was 75%, the efficacy of administering HBIg alone was 71%, while the efficacy of administering the hepatitis B vaccine and HBIg was 94%.

In this study, it is necessary to conduct regular monitoring of pregnant women and their babies who are infected with hepatitis B. Pregnant women who do not require hepatitis B antiviral treatment still need monitoring with regular HBV DNA examination even though the mother has given birth, so that fast and appropriate treatment can be carried out as early as possible so that chronic cases of advanced/cirrhosis can be reduced. If HBV DNA examination monitoring cannot be carried out, then the health center can conduct SGOT/SGPT examination and clinical symptom monitoring periodically once a year. If there is a 2x increase from the normal limit, this result can be used as a sign of a possible increase in viral load and immediate referral for HBV DNA examination.

Infants in good clinical condition are given HB0 and HBIg vaccines <24 hours, preceded by Vitamin K administration 2–3 hours before. HB0 immunization is given on a different thigh from HBIg and Vitamin K. Furthermore, HB1, HB2 and HB3 immunizations are given according to the immunization program schedule. If the infant's clinical condition is not well, then HB0 administration can be postponed

until the condition improves but HBIg administration <24 hours is still given/should not be postponed.

Babies born to mothers with reactive HBsAg can be given exclusive breast milk. Until now there has been no evidence of hepatitis B transmission from breast milk, but to minimize transmission, breastfeeding can be given after HB0 and HBIg immunization. Early initiation of breastfeeding (IMD) in babies from mothers with reactive HBsAg is carried out according to the advice of the doctor in charge.

## CONCLUSION AND SUGGESTION

The results of this study can be concluded that majority pregnant women with hepatitis B in Surabaya in 2020-2023 were aged 20-35 years, at a gestational age of >42 weeks in the 3rd trimester and the mother was not working. The majority of infants received HBIG and the majority of infants were not infected, but one infant was infected with hepatitis B. It is expected that health workers can ensure that all pregnant women who have hepatitis B when giving birth to their babies must receive HBIG. For health services,Infectious disease screening needs to be monitored and evaluated periodically to ensure that procedures can be carried out consistently and appropriately. By increasing screening and continuing fetal maternal prevention efforts. And for the author,The results of this study can be used as a basis and reference material for further research. Other studies can be continued on subjects in various geographical locations and ethnicities in Indonesia. Other studies can be developed further by adding the results of serological examinations in hepatitis B patients to be a source of research data in relation to fetal maternal transmission and its prevention. Other studies can consider other factors that can affect the characteristics of hepatitis B patients.

## DECLARATION

**Conflict of Interest**

There is no conflict of interest in this research.

**Authors' Contribution**

All authors contributed to research and writing of the manuscript. The first author contributed more to the preparation of the manuscript and data collection. The second author contributed more to the preparation of the manuscript and review of the manuscript. The third author contributed more in reviewing the preparation of the manuscript, data analysis, and finalizing the manuscript.

**Ethical Approval**

Ethical approval of this research by ethics committee faculty of Medicine Airlangga University Surabaya No.78/EC/KEPK/FKUA/2025

**Data Availability**

If further study is conducted on this topic in the future, the researcher is o pen to being contacted, and we are prepared to assist with this.

**REFERENCE**

Gong J; & Liu X. (2018). Effect of HBIG Combined with Hepatitis B Vaccine on Blocking HBV Transmission Between Mother and Infant and Its Effect on Immune Cells. Experimental And Therapeutic Medicine, 15(1), pp. 919-923.https://doi.org/10.3892/etm.2017.5474

Gozali, AP (2020). Diagnosis, Management, and Prevention of Hepatitis B in Pregnancy. Mirror of the World of Medicine, 47(5), 354–358.

Kolawole OM, Wahab AA, Adekanle DA, et al 2012. Seroprevalence of surface antigenemia and its effects on hematological parameters in pregnant women in Osogbo, Nigeria. Virology Journal 2012, 9:317, 3

Pither, M., Yusuf, A., & Aziz, R. (2021). Risk Factors for Hepatitis B Incidence in Pregnant Women in East Luwu District: Risk Factors for Hepatitis B Incidence in Pregnant Women in East Luwu District. Indonesian Health Promotion Publication Media (MPPKI); Vol. 4 No. 3: SEPTEMBER 2021 - Indonesian Health Promotion Publication Media (MPPKI); 432-438; 2597-6052.

https://jurnal.unismuhpalu.ac.id/index.php/MPPKI/article/view/162

Ramadhani, AKS, et al (2019). Provision of Hepatitis B Immunization (Passive). Indonesian Midwifery and Health Sciences Journal, 3(2), 114–119.

Shepard, C.W., Simard, E.P., Finelli,L., Fiore, A.E., & Bell, B.P. (2016). Hepatitis B virus infection: epidemiology and vaccination. Epidemiologic reviews, 28(1), 112-125

Sjahriani, T., & Agustin, DA (2018). The rate of transmission of hepatitis B from mother to baby in babies who received HBIg at the Kedaton Health Center, Way Halim Health Center and Labuhan Ratu Health Center, Bandar Lampung City in 2016. Journal of Medical and Health Sciences, 5. Pp. 287-293

# THE SILENT DRIVERS OF EARLY MARRIAGE: HOW PARENTAL SUPPORT OUTWEIGHS KNOWLEDGE AND ATTITUDE

*Reihanatu Quraisy, Devi Arine Kusumawardani* iD

Public Health Study Program, Faculty of Public Health, University of Jember, Jember, Indonesia

Correspondence address:
Jl. Kalimantan 37, Tegalboto Campus, Jember 68121, Indonesia
Email: deviarine@unej.ac.id

**Abstract**

**Background**: Early marriage is still one of the problems affecting the health of society in Indonesia. The application for marriage dispensation in Jember Regency increases yearly; in 2020, Jember Regency was ranked second nationally. The purpose of this study was to determine the description of knowledge, attitudes, and support of parents who have children who marry early in Silo District, Jember Regency. **Method:** This study is a descriptive study with a quantitative approach in Silo District, Jember Regency, from July 2024 to August 2024. The population of this study was 77 parents who had children who married early in the Silo District, Jember Regency. The sample was obtained from 75 because two people did not meet the inclusion criteria. The data were then analyzed univariately with a descriptive method before being presented in text and table form. **Result:** The results showed that 47 respondents (62.7%) had poor knowledge about the impact of early marriage, while only 28 respondents (37.3%) had good knowledge. Parents' attitudes towards early marriage were mainly negative, with 41 respondents (54.7%) having negative attitudes, and 34 respondents (45.3%) having positive attitudes. **Conclusion:** Most parents support children who marry early, with 52 respondents reporting high support, while 23 respondents reported low support. Providing educational programs on early marriage impacts, encouraging community involvement through forums, and conducting further research on factors like social media and reproductive health information to strengthen prevention strategies.

Keywords: attitude, early marriage, knowledge, parental support

## INTRODUCTION

Early marriage is still an essential issue in Indonesia's healthy society. This phenomenon not only affects teenagers who marry at a young age but also has long-term impacts on their mental and reproductive health. (Liesmayani et al., 2022). Indonesia ranks 7th in the prevalence of early marriage, where the incidence of early marriage is higher in villages (27.11%) than in cities (17.09%) (BKKBN, 2020).

Early marriage in Jember Regency has a fluctuating pattern in 2021, showing a fluctuating pattern of 1,370 in 2021, decreasing to 1,311 in 2022, then

increasing again to 1,361 cases in 2023. The decrease in 2022 of 4.3% can be influenced by the effectiveness of education and prevention programs, but the increase again in 2023 shows that early marriage is still a serious challenge, especially in areas with high economic pressure, low education, and strong cultural influences.

The prevalence of early marriage can impact health in the short and long term. Impact of early pregnancy on the health of the Mother during pregnancy, covering at-risk groups more likely to be affected by anemia, miscarriage, postpartum hemorrhage, and preeclampsia, while the impact on infants is at risk of premature birth and low birth weight (LBW) (Zelharsandy, 2022). Several factors influence the incidence of early marriage in women, namely predisposing factors such as age, education, occupation, knowledge, and attitude, supporting factors (enabling) such as socio-economic status and the availability of adolescent reproductive health services. Reinforcing factors, namely parental support, include emotional, informational, and instrumental support.

Low parental knowledge often results in low education for children. Low awareness and knowledge of children, parents, and society are the leading causes of early marriage. (Arimurti & Nurmala, 2017). Lack of knowledge from adolescent families causes parents to assume that women only need to think about housework, obedience, and good attitudes to be wives and mothers, which influences adolescents to get married early. (Rosanti et al., 2020).

Parents' attitudes also have a close relationship with the occurrence of early marriage. Attitudes are influenced by several factors, namely personal experience, knowledge, emotions, and mass media. The information obtained will become an opinion, forming a positive or negative attitude. (Widiyawati & Muthoharoh, 2020). Parents tend to marry off their children because parents do not yet have an understanding, especially regarding reproductive health and children's rights. (Afdhal & Arsi, 2022).

Information support also shows that information related to the level of communication between children and parents shows that teenagers need to communicate with their parents about school problems, friendships, appearance, hobbies, and future aspirations. Emotional support from parents, including giving

attention, guiding children, and showing affection, is critical in children's growth and development during adolescence. Parental support is provided by encouraging the child to continue moving forward. Instrumental support from parents is provided by assisting children (Afdhal & Arsi, 2022). Parental support, whether in the form of information, emotion, appreciation, or instrumental support, can influence children's attitudes and decisions, thus playing an important role in preventing or encouraging early marriage.

## METHOD

The type of research used in this study is descriptive research with a quantitative approach. Thus, researchers can obtain an overview of the phenomenon being studied. This study uses data collection techniques through questionnaires, observations, and interviews.

The location of this research was conducted in the Silo District, Jember Regency, from August to September 2024. The population in this study was parents who had teenage children who married early in 2023 in Silo District, Jember Regency, as many as 77 parents with children who married early who were registered at the Religious Affairs Office. The sampling technique in this study was total sampling.

This study's primary data were obtained through questionnaires and interviews covering respondent characteristics, knowledge, attitudes, and parental support. The instrument used in the study was a questionnaire to measure knowledge using the Guttman scale, attitudes using the Likert scale, and parental social support using the Guttman scale. Univariate analysis is a method of analyzing data by explaining or describing the characteristics of each data variable. The presentation method describes the presentation of data in the form of a frequency distribution. Univariate analysis was used in this study to present data on the respondents' characteristics, such as mother's age, mother's educational level, mother's occupation, father's age, father's educational level, father's occupation, and income.

## RESULT AND DISCUSSION

**Research result**

**Respondent Characteristics**

Based on the research results, the following are the results of the distribution of sociodemographic characteristics of parents who have children who marry early:

**Table 1. Frequency Distribution of Sociodemographic Characteristics**

| Characteristics Respondents | n | % |
|---|---|---|
| **Mother's Age** | | |
| 36-45 Years | 36 | 48 |
| 46-55 Years | 36 | 48 |
| 56-65 Years | 3 | 4 |
| **Mother's Education Level** | | |
| Low education: Elementary school/Islamic elementary school, junior high school/Islamic junior high school | 63 | 84 |
| Higher Education: High School/ Equivalent | 12 | 16 |
| **Mother's occupation** | | |
| Unemployment | 57 | 76 |
| Employment | 18 | 24 |
| **Father's Age** | | |
| 36-45 Years | 7 | 9.3 |
| 46-55 Years | 28 | 37.3 |
| 56-65 Years | 40 | 53.3 |
| **Father's Education Level** | | |
| Low education: Elementary school/Islamic elementary school, junior high school/Islamic junior high school | 43 | 57.3 |
| Higher Education: High School/ Equivalent | 32 | 42.7 |
| **Father's occupation** | | |
| Unemployment | 0 | 0 |
| Employment | 75 | 100 |
| **Income** | | |
| <UMR (Rp. 2,665,392) | 54 | 72 |
| ≥ UMR (Rp. 2,665,392) | 21 | 28 |

Most respondents were mothers aged 36-55 years (48%), with most having low educational attainment, elementary or junior high school (84%). And household heads were predominantly engaged in agricultural labor, either as farm laborers or farmers. Furthermore, the majority of families (72%) reported incomes below the regional minimum wage, indicating a generally low socioeconomic status within the study population.

**Parental Knowledge about Early Marriage**

Based on the results of the research that has been conducted, the following are the results of the frequency distribution of parental knowledge about early marriage.

**Table 2. Frequency Distribution of Parental Knowledge**

| Parental Knowledge | n | % |
|---|---|---|
| Good | 28 | 37.3 |
| Poor | 47 | 62.7 |
| Total | 75 | 100 |

This finding indicates that low parental knowledge can be one of the leading causes of the high rate of early marriage. Based on the study results, parental knowledge about the impact of early marriage tends to be low. Low parental knowledge is associated with a higher risk of marrying children at a young age.

**Frequency Distribution of Parents' Attitudes towards Early Marriage**

Based on the results of the research that has been conducted, the following are the results of the frequency distribution of parents' attitudes towards early marriage.

**Table 3. Frequency Distribution of Parents' Attitudes**

| Parent's Attitude | n | % |
|---|---|---|
| Positive | 34 | 45.3 |
| Negative | 41 | 54.7 |
| Total | 75 | 100 |

Although most parents have negative attitudes towards early marriage, this phenomenon still occurs, indicating a contradiction between attitudes and actions. These data illustrate the complexity of parental attitudes towards early marriage, which vary depending on economic factors, health, and social norms.

**Parental Support for Early Marriage**

Based on the results of the research that has been conducted, the following are the results of the frequency distribution of parents' attitudes towards early marriage.

**Table 4. Frequency Distribution of Parental Support**

| Parental Support | n | % |
|---|---|---|
| Low | 23 | 30.7 |
| High | 52 | 69.3 |
| Total | 75 | 100 |

Parental support consists of several things, including informational support from parents in the form of providing information related to reproductive health, early marriage, and the dangers of free sex, which is relatively low. Second, this appreciation supports parents' efforts to provide praise and reminders to encourage positive behavior in children. Third, instrumental support provided by parents tends to focus on providing basic needs and actions when children are sick, but less on routine health monitoring. Fourth, emotional support from parents tends to focus on providing children with confidence and the ability to face challenges, although some aspects are still lacking.

**Discussion of Research Results**

**Characteristics of Parents Who Have Children Who Marry Early**

The sociodemographic characteristics of parents who have children who marry early show the important role of age, education, occupation, and economic conditions in the decision to marry early. Based on research in Silo District, Jember Regency, most mothers are in the age range of 36-55 years. As stated by (Prayogo, 2021)At that age, mothers have a crucial role in the family. However, they also face various difficulties that encourage them to see early marriage as a solution to improve their economic situation.

In terms of education, most mothers have a low level of education (84% have only an elementary or junior high school education), which is considered to contribute to early marriage. According to research by BKKBN (2020), mothers with low education tend not to understand the risks of early marriage, such as reproductive health disorders and psychological impacts on children who marry at

a young age. This worsens the condition and further increases the number of early marriages. In a study (Wadjaudje et al., 2019), it was found that parents with low levels of education are more vulnerable to making decisions to marry off their children at an early age, due to their limited understanding of the potential long-term impacts.

Most mothers in this study were unemployed (76%), while all fathers were employed, with most working as farmers. This condition places mothers as the primary caregivers of children, but also limits their ability to make rational decisions regarding their children's future, including early marriage. Research (Khayun et al., 2021) shows that homemakers, although more involved in their children's daily lives, often face social and economic pressures that can drive decisions to marry off children at an early age. However, Gusnarib and Rosnawati (2020) highlight that many homemakers still face limited access to information and social support, which makes them vulnerable to these pressures, thus reinforcing the complexity of decision-making in families regarding early marriage.

The family's economic condition, as reflected in income, is also an important factor in the decision to marry early. In the Silo District, 72% of families have incomes below the Regional Minimum Wage (UMR), which is directly related to the decision of parents to marry their children at an early age as a way to reduce the economic burden. According to (Layyinah et al., 2024)Families with low incomes tend to see early marriage as a solution that can reduce their financial burden. However, research (Khaerani, 2019)Shows that although economic factors play a role, understanding the negative impacts of early marriage on children can reduce the decision, given that early marriage often adds psychological and social burdens later in life.

**Overview of the Knowledge of Parents Who Have Children Who Marry Early**

Based on the study's results, parents' knowledge about early marriage varies. The majority of parents understand that early marriage is a marriage that occurs under the age of 19. As many as 47 respondents (62.7%) have poor knowledge about the impact of early marriage. This finding indicates that low parental knowledge can be one of the leading causes of the high rate of early marriage. The

results of this study are in line with Buton's study, which found that parents in South Buru Regency knew the physical impacts of early marriage, such as the risk of preeclampsia and postpartum hemorrhage, but did not understand the psychological impacts (Buton et al., 2021). Research by Hariyani and Sakdiyah found that most respondents experienced hyperemesis, with as many as 10 respondents (38.5%), and 11 respondents (42.3%) experienced anemia, and as many as five respondents (19.2%) experienced abortion (Hariyani & Sakdiyah, 2022). This shows that women who marry at an early age are at risk of experiencing a negative pregnancy.

**Overview of the Attitudes of Parents Who Have Children Who Marry Early**

In terms of attitude, some parents believe that marrying off children under the age of 19 can make children independent quickly. The study results showed that parental attitudes towards early marriage were mainly negative, with 41 respondents (54.7%) having a negative attitude, and 34 respondents (45.3%) having a positive attitude. Although most parents have a negative attitude towards early marriage, this phenomenon still occurs, indicating a contradiction between attitudes and actions. Research (Juliawati et al., 2021)Supports this finding, noting that 54% were married at a reasonably early age, namely at 16-17 years. However, (Raden et al., 2021)The research used the interview method, stating that this attitude is often influenced by social norms, with parents considering early marriage as an effort to maintain family honor. In contrast, research by (Salsabila & Nuh, 2024) Shows that DP3AKB has made various efforts through socialization programs to prevent early marriage.

**Overview of Parental Support for Children Who Marry Early**

a. Information Support

In terms of informational support provided by parents to their children, the results of the study showed that most parents were not yet active in providing information related to reproductive health and the risks of early marriage. Only a small number of parents admitted to providing information about reproductive health, while the rest did not. These figures indicate a lack of parental awareness of the importance of their role in educating children about reproductive health and the risks of early marriage. This finding is in line with research (Amanda et al.,

2023)that the lack of parental knowledge and understanding of reproductive health is a significant factor in increasing the risk of early marriage. Research (Wulandari & Tarsikah, 2022)also states that the lack of information provided by parents to children regarding reproductive health increases the risk of children being involved in unhealthy relationships. Conversely, research (Syafitriani et al., 2022)states that premarital sexual behavior in adolescents is influenced by various factors, where adolescents with a dating style are 20 times more at risk of premarital sex.

b. Instrumental Support

In terms of instrumental support, there are significant differences in the pattern of providing material support to children. This study found that most parents always provide for their children's material needs during their growth period. However, only a few consistently ask about their health, provide nutritious food, and carry out routine health checks. Research supports this low level of instrumental support related to health. (Sarjito, 2024)This shows that low-income parents have a significant impact on health-seeking behavior. On the other hand, research by Wijaya et al. (2024) found that as many as 44.3% received instrumental support from their parents. Research by Nadia and Kusmawati (2024) also explored this aspect in the context of adolescent mental health, finding a positive relationship between parental instrumental support and adolescent mental health, especially in adolescents with toxic relationships.

c. Award Support

The support and appreciation given by parents to children can influence children's attitudes and behavior, especially in encouraging positive behavior expected by parents. Based on the results of the study, most parents in Silo District, Jember Regency, showed support and appreciation by giving praise when children were able to comply with expectations related to social behavior and norms that were considered reasonable by the family. This support is consistent with the study's results (Maimun, 2023), where families who support early marriage often prioritize authoritarian parenting patterns and demand compliance with social rules that are considered reasonable by the family. This study is also supported by research (Rahayu & Yunianti, 2023), where parents who marry early often apply parenting patterns with absolute standards that reduce children's freedom to think

independently. However, in contrast to Handayani and Windasari (, there is a positive relationship between social support and self-acceptance of adolescents with early marriage.

d. Emotional Support

Emotional support provided by parents is critical in creating harmonious relationships and shaping children's emotional stability. In Silo District, Jember Regency, the majority of parents show emotional support in various ways, such as creating a comfortable atmosphere at home and taking care of children's feelings when facing problems. This shows parents' concern for their children's activities and allows them to provide guidance. This emotional support is in line with (Rusmalinda et al., 2024), which states that although parents who marry at an early age face financial and emotional challenges, they tend to provide high emotional support. However, the study also showed that parents who marry at a young age often face obstacles in aligning emotional support with healthy boundaries, so that mistakes can occur in excessive or overprotective parenting patterns. This may indicate that even though parents are aware of the impact of early marriage, they still provide support to their children who choose to marry early, possibly due to social or cultural pressure.

## CONCLUSION AND SUGGESTION

The study results showed that 47 respondents (62.7%) had poor knowledge about the impact of early marriage. In comparison, only 28 respondents (37.3%) had good knowledge. Parents' attitudes towards early marriage were mainly negative, with 41 respondents (54.7%) having negative attitudes, and 34 respondents (45.3%) having positive attitudes. Most parents provided high support for children who married early, with 52 respondents (69.3%) reporting high support, while 23 respondents (30.7%) reported low support.

The suggestions that can be given to the Department of Women's Empowerment, Child Protection, and Family Planning are expected to provide educational programs on the impact of early marriage because many parents still have limited knowledge. The community is also expected to be more active in

supporting efforts to prevent early marriage by forming forums and preventing child marriage in the Silo District area. Finally, further research is advised to expand the research focus on other factors, such as the influence of social media and access to reproductive health information. More in-depth research can provide a more comprehensive picture of early marriage prevention strategies.

## DECLARATION

### Conflict of Interest

The authors declare that there is no conflict of interest in this research.

### Authors' Contribution

All contributors were involved in every research stage, from the initial concept to the drafting of the article.

### Ethical Approval

Ethics Test study overview of knowledge, attitude, and support of parents who have married children in Silo District, Jember Regency was conducted at the Faculty of University of Jember Dentistry by the committee of ethics, Faculty of University of Jember Dentistry, with number 2630/UN25.8/KEPK/DL/2024.

### Funding Source

No parties funded this research.

### Data Availability

In this part, data supporting the research findings are available upon request.

### Acknowledgements

Thank you to all members of the research team and respondents who have supported and participated in completing this research.

## REFERENCE

Afdhal, F., & Arsi, R. (2022). Hubungan Media Informasi Dan Dukungan Orang Tua Dengan Kejadian Pernikahan Usia Remaja. Jurnla Kesehatan Akper

Kesdam II Sriwijaya Palembang, 11(2).

Amanda, R., Naim, M., & Setiawan, R. (2023). Kurangnya Pemahaman Orang Tua Mengenai Pendidikan Yang Meningkatkan Pernikahan Dini. Jurnal Ilmiah Wahana Pendidikan, 9(13), 537–547.

Arimurti, I., & Nurmala, I. (2017). Analisis Pengetahuan Perempuan Terhadap Perilaku Melakukan Pernikahan Usia Dini Di Kecamatan Wonosari Kabupaten Bondowoso. The Indonesian Journal of Public Health, 12(2), 249–262. https://doi.org/10.20473/ijph.v12i1.2017.249-262

BKKBN. (2020). Menekan Laju Inflasi Pernikahan Dini. BKKBN Bangka Belitung.

Buton, S., Yusriani, & Idris, F. P. (2021). Dampak Pernikahan Dini Terhadap Kehamilan Remaja Putri Suku Buton Di Desa Simi Kecamatan Waisama Kabupaten Buru Selatan. Journal of Muslim Community Health (JMCH), 2(1), 25–41. https://doi.org/10.52103/jahr.v2i1.302

Gusnarib, G., & Rosnawati, R. (2020). Dampak Pernikahan Usia Dini Terhadap Pola Asuh dan Karakter Anak. Palita: Journal of Social Religion Research, 5(2), 91–112.

Handayani, & Windasari, I. W. (2024). Upaya Meningkatkan Nilai Moral Anak Usia 4-5 Tahun Melalui Metode Bercerita Di Ra Nurul Hikmah Pondok Wuluh Leces Probolinggo Tahun. Al-ATHFAL: Jurnal Pendidikan Anak, 5(1), 110–127. https://doi.org/10.46773/alathfal.v5i1.984

Hariyani, T., & Sakdiyah, H. (2022). Dampak Pernikahan Usia Dini Pada Kehamilan Di Desa Sejati Kecamatan Camplong Kabupaten Sampang. Seminar Publikasi Ilmiah Kesehatan Nasional, 1(1), 214–221.

Juliawati, E. E., Novita, A., & Yolandia, R. A. (2021). Determinan Pernikahan Usia Dini pada Remaja. SIMFISIS Jurnal Kebidanan Indonesia, 1(2), 53–65. https://doi.org/10.53801/sjki.v1i2.20

Khaerani, S. N. (2019). Faktor Ekonomi Dalam Pernikahan Dini Pada Masyarakat Sasak Lombok. Qawwam, 13(1), 1–13. https://doi.org/10.20414/qawwam.v13i1.1619

Khayun, Q. R., Kurniawati, D., & Sulistyorini, L. (2021). Gambaran Dukungan Keluarga pada Peran Ibu Remaja di Kecamatan Sukowono-Jember. Pustaka

Kesehatan, 9(3), 143–150.

Layyinah, K., Sunariyah, A., Hipni, M., & Mawardi, I. (2024). Problematika pernikahan dini terhadap kesejahteraan ekonomi keluarga dalam pespektif ekonomi syariah. Usrah: Jurnal Hukum Keluarga Islam, 5(2), 269–284.

Liesmayani, E. E., Nurrahmaton, Juliani, S., Mouliza, N., & Ramini, N. (2022). Determinan Kejadian Pernikahan Dini Pada Remaja.

Maimun. (2023). Dampak Pola Asuh Orang Tua yang Menikah di Usia Dini Terhadap Perilaku Anak dalam Perspektif Hukum Islam. Jurnal Al-Mizan: Jurnal Hukum Islam Dan Ekonomi Syariah, 10(2), 215–223. https://doi.org/10.54621/jiam.v10i2.735

Nadia, N., & Kusmawati, A. (2024). Dukungan Instrumental Terhadap Kesehatan Mental Remaja Korban Toxic Relationship Di Platform Instagram. Jurnal Ilmu Kesehatan Umum, Psikolog, Keperawatan Dan Kebidanan, 2(4), 169–181.

Prayogo, M. S. (2021). Fenomena Sosial Pernikahan Dini di Desa Pace Kecamatan Silo Kabupaten Jember. Jurnal Kajian Perempuan & Keislaman, 14(2), 171–184.

Raden, A. N. F. A., Fariska, A. F., & Mariana, M. (2021). Peralihan Cara Pandang Masyarakat Terhadap Praktik Pernikahan Dini. ADLIYA: Jurnal Hukum Dan Kemanusiaan, 15(2), 164–178. https://doi.org/10.15575/adliya.v15i2.13778

Rahayu, A. P., & Yunianti, S. (2023). Pola Pengasuhan Anak Usia Dini pada Orang Tua yang Melakukan Perkawinan di Usia Anak. Murhum : Jurnal Pendidikan Anak Usia Dini, 4(2), 59–69.

Rosanti, T., Sukmawati, & Mamuroh, L. (2020). Gambaran Budaya Orang Tua Tentang Pernikahan Dini. Jurnal Keperawatan BSI, 8(2), 256–267.

Rusmalinda, S., Syara, A. S., & Nurazijah, W. (2024). Pengaruh Normalisasi Pernikahan Dini Terhadap Kesiapan Psikologi Calon Pengantin Masyarakat Pedesaan. Indonesian Journal of Islamic Jurisprudence, Economic and Legal Theory, 2(3), 1534–1562.

Salsabila, A., & Nuh, M. (2024). Implementasi Kebijakan Dalam Menanggulangi Kasus Pernikahan Dini Di Dinas Pemberdayaan Perempuan Perlindungan Anak Dan Keluarga Berencana (DP3AKB) Kabupaten Jepara Tahun 2022.

Jurnal Lanskap Politik, 2(1), 55–62. https://doi.org/10.31942/jlp.2024.2.1.10897

Sarjito, A. (2024). Dampak Kemiskinan terhadap Akses Pelayanan Kesehatan di Indonesia. Jurnal Ilmu Sosial, Politik, Dan Pemerintahan, 13(1), 397–416.

Sugiyono. (2017). Metode Penelitian Kuantitatif, Kualitatif, dan R&D (2017th ed.). ALFABETA, CV.

Syafitriani, D., Trihandini, I., & Irfandi, J. (2022). Determinants of Premarital Sex Behavior Adolescents (15-24 Years) in Indonesia (Analysis IDHS 2017). 8(2), 205–218.

Wadjaudje, N. I. P., Habibah, N., Rahayuwati, L., & Solehati, T. (2019). The Socio-Cultural Environment, Parental Perception, Adolescent Knowledge, and Attitude Toward Early-Age Marriage Decision. Journal of Maternity Care and Reproductive Health, 2(3), 195–201. https://doi.org/10.36780/jmcrh.v2i3.98

Widiyawati, R., & Muthoharoh, S. (2020). Pengaruh Pengetahuan Dan Sikap Orangtua Tentang Kesehatan Reproduksi Remaja Terhadap Pernikahan Dini Di Kecamatan Trowulan Kabupaten Mojokerto. Journal of Pharmaceutical Care Anwar Medika, 3(1), 1–21. https://doi.org/10.36932/jpcam.v3i1.35

Wijaya, R. W., Purnomo, A., & Idris. (2024). Pengaruh Dukungan Orang Tua Terhadap Motivasi Belajar Anak Selama Pembelajaran Jarak Jauh. Jurnal Psikologi Pendidikan Dan Pengembangan SDM, 12(1), 32–42. https://doi.org/10.37721/psi.v12i1.767

Wulandari, L. P., & Tarsikah. (2022). Peran Orang Tua Dalam Pemberian Informasi Kesehatan Reproduksi Remaja di Kabupaten Malang. Jurnal Poltekes Jayapura, 14(2), 128–134.

Zelharsandy, V. T. (2022). Analisis Dampak Pernikahan Dini terhadap Kesehatan Reproduksi di Kabupaten Empat Lawang. Jurnal Kesehatan Abdurahman Palembang, 11(1).

# THE EFFECT OF "BUFAS SMART" EDUCATION ON THE INCIDENCE OF POSTPARTUM BLUES AT RSUD KARTINI KARANGANYAR

*Tri Wikuncoro Tunggal Saputri [1]* ID *, Luluk Fajria Maulida[1]\* ID , Rufidah Maulina[1] ID , Siti Nurhidayati[1] ID , Ika Sumiyarsi Sukamto[1] ID*

[1]Departement of Midwifery, Faculty of Medicine, Sebelas Maret University, Surakarta, Indonesia

*Correspondence address: Surakarta, Indonesia
Email : lulukfajria@staff.uns.ac.id

## Abstract

**Background**: Postpartum blues usually occurs on the third or fourth postpartum day and peaks between the fifth postpartum day which is characterized by frequent crying, feelings of loneliness or rejection, anxiety, confusion, anxiety, fatigue, forgetfulness and sleeplessness. However, many women are lost to follow-up after delivery and rarely receive adequate support from midwives, highlighting a gap in postpartum care. Social networks present an opportunity to provide timely education and emotional support. This study aims to evaluate the effectiveness of the BUFAS SMART program, a structured educational intervention delivered via a WhatsApp group, in reducing postpartum blues among mothers during the early puerperium. **Method**: The sample of this study amounted to 50 respondents of postpartum mothers with purposive sampling technique. This research design uses quasy experiment. This research instrument uses a questionnaire. Data analysis used is Wilcoxon test and Mann-Whitney test. **Result**: The effect of "BUFAS SMART" education on the incidence of postpartum blues at Kartini Karanganyar Hospital on respondents in the intervention posttest group and control posttest group was significant with the results of the p-value <0.05, which is 0.000, meaning that there is a significant difference between the pretest and posttests of the control group. **Conclusion**: BUFAS SMART reduces the incidence of postpartum blues at Kartini Karanganyar Hospital, so the BUFAS SMAST education method is suitable for application in postpartum blues mothers add more in-depth knowledge about the postpartum period.

keyword : Innovations and health; equal access; education; mental health

## INTRODUCTION

The postpartum period is an important period for a mother and her family, especially first-time mothers because they need a lot of information and assistance during this period (Tambag et al, 2018). Globally, 70-80% of mothers experience mood disturbances within the first two weeks after delivery, condition known as postpartum blues or baby blues (Machmudah, 2023). Women experiencing postpartum blues will exhibit symptoms including: mood swings, lack of happiness, lack of interest, sleep disturbances (insomnia or hypersomnia), loss of energy, agitation or lethargy, weight loss, feelings of worthlessness or inappropriate guilt, decreased concentration, and frequent thoughts of death or suicide (Gondo, 2022).

The prevalence in Asia ranges from 26% to 855 while in Indonesia it is estimated at 50-70% (Notokusumo, 2017).

Although postpartum blues is often considered a temporary and self-limiting condition, it can adversely affect maternal mental health and lead to postpartum depression, breastfeeding success, and mother-infant bonding if left unmanaged (Ahmadinezhad, G. S et al., 2024). In some cases, unresolved postpartum blues can progress to postpartum depression, with long-term impacts on maternal well-being and child development. Therefore, early identification and prevention are critical to reducing the negative outcomes.

Postpartum blues can actually be avoided from the beginning through counseling that helps mothers understand their role as the main caregiver, both during pregnancy and after childbirth (Nurbaeti et al., 2019). Health promotion plays a vital role in these preventive efforts, especially through counseling when delivered in an accessible, engaging, and adaptable to mother's daily life (Saragih, 2022). The use of social media can be an effective communication channels to reach mothers and families which provide them with emotional preparation for the postpartum period. Traditionally, postpartum education in many healthcare settings, including Kartini Karanganyar Regional Hospital, has been delivered through printed leaflets focusing on infant care, breastfeeding, and personal hygiene.

While printed materials provide useful information, however, they have limitation in terms of accessibility, interactivity, and continuity of support. At the same time, the use of digital platforms for health education, especially social media, has grown rapidly and have positive impact on postpartum health care. Digital delivery offers several advantages over printed materials: easy access via mobile phones, cost-effectiveness, environmental sustainability, ease of distribution over long distances, and durability (Khanday et al., 2022).

This study aims to evaluate the effect of the "BUFAS SMART" education program on the incidence of postpartum blues among mothers at Kartini Karanganyar Hospital.

**METHOD**

BUFAS SMART is the name of a WhatsApp group utilized as a platform for delivering health education to postpartum mothers in the intervention group. Education was provided to mothers who met the inclusion criteria: being in good health, capable of understanding the educational content, and willing to participate in the intervention. The BUFAS SMART intervention was conducted over three consecutive days, from the third to the fifth day postpartum. The educational materials focused on infant care, breastfeeding techniques, and common psychological changes experienced during the postpartum period. Each session was delivered daily at 6:00 PM (Western Indonesian Time), followed by an interactive Q&A session that continued until all participants' questions were addressed, with a cut-off time of 9:00 PM to respect the mothers' rest period. On the first day of the intervention, participants were asked to complete the Maternal Blues Suryani Scale (MBS) questionnaire as a baseline assessment. Following this, digital educational leaflets were distributed via the BUFAS SMART WhatsApp group. All sessions were facilitated by the same trained midwife counselor (a member of the research team) to maintain consistency in communication style, reduce variability, and ensure standardized delivery of information

This study uses a quasi-experimental research design by comparing two groups, namely the control group and the intervention group with inclusion criteria, namely postpartum mothers in the Teratai Ward, postpartum mothers with any type of delivery with a live baby on the 3rd-5th day postpartum, mothers who experience postpartum blues measured by the MBS questionnaire, mothers who can read, understand questions, and are able to operate gadgets. While the exclusion criteria are mothers who are not willing to be respondents, mothers who work as health workers (midwives, doctors, nurses), mothers who had severe mental health problems before pregnancy, and mothers who do not have gadgets or WhatsApp applications.

The population that will be used in this study are postpartum mothers on the third-fifth day with any delivery who gave birth to a live child in the Teratai Ward I of Kartini Karanganyar Regional Hospital who can read, understand questions, and are able to operate gadgets. In this study, the number of samples was 50

respondents so that each group had 25 sample respondents. The sampling technique used was purposive sampling. The variable in this study was the occurrence of postpartum blues. Data collection in this study used the Maternal Blues Suryani Scale (MBS) questionnaire by Suryani Manurung in 2018, which contains 24 questions related to the occurrence of postpartum blues and anxiety symptoms experienced by a person (Manurung et al., 2019). The instrument has demonstrated good internal consistency with a Cronbach's alpha of 0.89, indicating high reliability. Content validity was established through expert review in maternal mental health. The questionnaire was self-administered by participants via WhatsApp link/attachment, with assistance from the research team when clarification was needed. This ensured accessibility while allowing mothers to complete the questionnaire at their own pace.

Meanwhile, the control group received standard postpartum education routinely provided in the hospital, primarily in the form of printed leaflets covering infant care, breastfeeding, and personal hygiene. They did not receive additional WhatsApp-based interactive education. Postpartum mothers were directly given a pretest questionnaire using the Suryani Maternal Blues Scale (MBS). After completing the questionnaire, the mothers were given counseling in the form of leaflets with the same material as the intervention group. On the fifth day, the control group was also given a posttest questionnaire.

The educational materials were developed using evidence-based guidelines, drawing on recommendations from the Indonesian Ministry of Health, WHO postpartum care standards, and published research on maternal mental health. A panel of four experts, including a senior midwifery lecturer with expertise in maternal mental health, postpartum care, and community development, reviewed the content to ensure accuracy, cultural relevance, and clarity of language. To maintain consistency, a structured daily schedule was designed in advance, using the same sequence of information, digital leaflets, and facilitation methods across all sessions. This helped minimize variation and ensured the integrity of the intervention. The effectiveness of the materials was evaluated through participants' engagement in interactive Q&A, their ability to restate key messages, and changes in outcomes measured with the Maternal Blues Suryani Scale (MBS) before and

after the intervention. The clear difference between the intervention and control groups confirmed that the standardized content was successful in reducing postpartum blues symptoms.

Data collection was carried out after the issuance of an ethical permit application to the Faculty of Medicine, Sebelas Maret University and continued until August 2024. The ethical number in this study is Number: 1.870 / VII / HREC / 2024. Prior to analysis, the normality of data distribution was assessed using the Shapiro–Wilk **test** because of the relatively small sample size (n < 50 per group). The results indicated that the data were not normally distributed. Data were then analyzed using the Wilcoxon test and the Mann-Whitney test with a significance level of 0.05.

## RESULT AND DISCUSSION

Respondents in this study were postpartum mothers on the third-fifth day as many as 50 respondents in the Teratai 1 ward of Kartini Karanganyar Hospital. Samples were taken from respondents who met the predetermined inclusion and exclusion criteria. Respondents were grouped based on maternal age, parity status, gestational age at delivery, education, occupation, and marital status. The complete respondent characteristics are presented in the table below.

**Table 1. Frequency Distribution of Respondent Characteristics**

| Variable | Intervention Group | | Control Group | |
|---|---|---|---|---|
| | (N) | (%) | (N) | (%) |
| **Age** | | | | |
| 1. At-risk (<20 years & >35 years) | 9 | 36 | 3 | 12 |
| 2. Not at Risk (20-35 years old) | 16 | 64 | 22 | 88 |
| **Parity Status** | | | | |
| 1. Primiparous | 11 | 44 | 9 | 36 |
| 2. Multiparous | 14 | 56 | 16 | 64 |
| **Gestational Age at Delivery** | | | | |
| 1. Preterm (<37 weeks) | 0 | 0 | 0 | 0 |
| 2. Aterm (37-42 weeks) | 25 | 100 | 25 | 100 |
| 3. Postterm (>42 weeks) | 0 | 0 | 0 | 0 |
| **Education** | | | | |
| 1. Elementary School | 8 | 32 | 1 | 4 |
| 2. Secondary School | 16 | 64 | 24 | 96 |
| 3. College | 1 | 4 | 0 | 0 |
| **Work** | | | | |
| 1. Not Working | 13 | 52 | 21 | 84 |
| 2. Work | 12 | 48 | 4 | 16 |

| **Marital Status** | | | | |
|---|---|---|---|---|
| 1. Married | 25 | 100 | 25 | 100 |
| 2. Not Married | 0 | 0 | 0 | 0 |

Respondents were selected according to inclusion and exclusion criteria and assessed on age, parity, gestational age at delivery, education, occupation, and marital status (Table 1). Most respondents were in the non-risk age group (20–35 years), multiparous, delivered at term, married, and had secondary-level education. The majority were unemployed. Both groups were generally comparable at baseline, which minimized potential confounding. All mothers in the intervention group completed the three-day BUFAS SMART program with full attendance and engagement.

**Table 2. Differences in the Incidence of Postpartum Blues in the Pretest-Posttest Intervention Group and Pretest-Posttest Control Group after Providing "BUFAS SMART" Education**

| Incidence of Postpartum Blues | Category | Intervention Group | | | Control Group | | |
|---|---|---|---|---|---|---|---|
| | | (N) | (%) | p-value | (N) | (%) | p-value |
| Pretest | Postpartum Blues | 25 | 100 | | 25 | 100 | |
| | No Postpartum Blues | 0 | 0 | | 0 | 0 | |
| | | | | **0,000** | | | **0,000** |
| Post-test | Postpartum Blues | 0 | 0 | | 13 | 52 | |
| | No Postpartum Blues | 25 | 100 | | 12 | 48 | |

The results showed that the intervention group respondents before being given the intervention who experienced postpartum blues were 25 respondents with a total percentage of 100%. While after being given the intervention, respondents who did not experience postpartum blues increased to 25 respondents with a total percentage of 100%. The results of the Wilcoxon test show that the difference in the incidence of postpartum blues in the pretest and posttest control groups shows a p-value of 0.000 (<0.05), which means that there is a significant difference in the pretest and posttest control groups.

Table 3. Odds of Experiencing Postpartum Blues by Group

| Group | Postpartum Blues (n) | No Postpartum Blues (n) | Total | Odds | OR (95% CI) |
|---|---|---|---|---|---|
| Intervention (n=25) | 0 | 25 | 25 | 0.02* | 0.018 (0.001 – 0.33) |
| Control (n=25) | 13 | 12 | 25 | 1.08 | Reff |

Mothers who received the BUFAS SMART intervention had 98% lower odds of experiencing postpartum blues compared to those in the control group. The 95% confidence interval (0.001-0.33) indicates that this finding is statistically significant. These results suggest that education delivered through the WhatsApp platform is effective in reducing the incidence of postpartum blues. The very small odds ratio (OR=0.018), reflecting a 98% risk reduction, highlights the strong potential of this digital intervention as preventive strategy. This finding is consistent with previous studies showing that technology-based educational intervention can enhance maternal knowledge, provide emotional support, and strengthen readiness for the postpartum period, thereby lowering the risk of mood disturbances after childbirth.

Table 4. Z-values and Effect Sizes for Postpartum Blues

| Group | Z | p-value | Effect Size (r) |
|---|---|---|---|
| Intervention | –5.000 | <0.001 | 1.00 (very large) |
| Control | –3.464 | 0.001 | 0.69 (large) |

The Wilcoxon Signed Rank Test demonstrated a significant reduction in postpartum blues scores within both groups. In the intervention group, the change was highly significant (Z = –5.000, p < 0.001), with an effect size of r = 1.0, indicating a very large effect. In the control group, there was also a significant reduction (Z = –3.464, p = 0.001), with an effect size of r = 0.69, considered a large effect.

**Table 5. Differences in the Incidence of Postpartum Blues in the Intervention Group in the Control Group after Providing "BUFAS SMART" Education**

| Incidence of | Category | Intervention Group | Control Group | Z | p-value |
|---|---|---|---|---|---|

| Postpartum Blues | | (N) | (%) | (N) | (%) | | |
|---|---|---|---|---|---|---|---|
| | Postpartum Blues | 0 | 0 | 13 | 52 | -4.149 | **0,000** |
| Post-test | No Postpartum Blues | 25 | 100 | 12 | 48 | | |

The results of this study indicate that in the intervention group respondents who did not experience postpartum blues were 25 respondents with a total percentage of 100%. While in the control group, respondents who did not experience postpartum blues were 12 respondents with a total percentage of 48%. The results of the Mann Whitney test showed that the difference in the incidence of postpartum blues in the group after the intervention in the control group showed a p-value of 0.000 (p <0.05), which means that there was a significant difference in the group after the intervention with the control group.

This is evidenced by Table 5. shows the difference in the number of respondents to the two groups regarding respondents who experienced postpartum blues. Although the control group was not given the intervention, there was an increase in respondents who did not experience postpartum blues. This is due to access to other sources of information that cannot be controlled by researchers. Education provided through BUFAS SMART in the intervention group lasted for 3 days, while in the control group only once, this is in line with (Pour et al., 2020) regarding the provision of education through interactive text messages. In this case, it is proven that education through whatsapp is effective in reducing the incidence of postpartum blues because the method used is effective and easy to understand when getting education about the postpartum period.

These findings highlight the effectiveness of BUFAS SMART education, delivered via WhatsApp, in reducing postpartum blues. The very large effect size and extremely small odds ratio underscore the strong potential of this digital educational approach as a preventive and supportive strategy for mothers in the early postpartum period. Recent randomized controlled trials (RCTs) have demonstrated the potential of mobile applications with automated psychosocial components in preventing postpartum depression, showing significant improvements in maternal mental health outcomes such as reduced Edinburgh

Postnatal Depression Scale (EPDS) scores (Miura Y. et al., 2023). These digital interventions highlight the growing role of technology in providing accessible, scalable, and effective support for mothers during the postpartum period.

The control group also showed some improvement, with nearly half of the mothers reporting no postpartum blues at posttest. This reduction may reflect natural remission, the Hawthorne effect, or access to other information sources beyond the study. Nevertheless, the far greater reduction in the intervention group emphasizes the added value of BUFAS SMART.

According to Pulungan (2020) the incidence of postpartum blues, maternity blues or baby blues is a temporary mild mood or effect disorder that occurs on the first day to the 10th day after childbirth, usually occurring on the third or fourth postpartum day and peaking between the fifth postpartum day which is characterized by brief crying, feelings of loneliness or rejection, anxiety, confusion, anxiety, fatigue, forgetfulness and sleeplessness.

Similar to findings by Fernalia et al. (2019), WhatsApp-based interventions were shown to be effective due to their accessibility, low cost, and interactive features such as multimedia sharing (Kamel et al., 2016). Recent RCTs also demonstrated that digital psychosocial interventions reduce postpartum depression risk, as evidenced by lower EPDS scores (Miura et al., 2023). Thus, the present study adds to growing evidence that mobile-based education can enhance maternal knowledge, provide emotional reassurance, and mitigate mood disturbances in the postpartum period.

Several mechanisms may explain the effectiveness of BUFAS SMART. First, WhatsApp is widely accessible and familiar, allowing education to be delivered consistently with minimal cost. Second, the structured three-day sessions with follow-up check-ins encouraged active participation and engagement. Third, the intervention reduced maternal anxiety by providing knowledge on newborn care, breastfeeding, and maternal psychological changes, thereby strengthening confidence and reducing worry. Previous studies have similarly shown that maternal concerns and lack of information are key drivers of postpartum blues, and that accessible education can mitigate these risks (Fuad et al., 2023).

The results obtained by providing education "BUFAS SMART" respondents increased knowledge about how to care for babies, how to breastfeed properly, changes in the psychology of postpartum women who make postpartum women not worry about their condition which makes mothers not experience postpartum blues. Postpartum blues is influenced by maternal concerns, with interventions provided through whatsapp social networks making it easier for mothers to obtain information without having to meet face to face and making it easier to carry out treatment without being limited by distance (Fuad et al., 2023). By getting BUFAS SMART education, the results showed that the provision of interventions had an effect on the rate of decline in the incidence of postpartum blues by decreasing the number of respondents who experienced postpartum blues in the posttest intervention group.

Despite these promising results, limitations must be acknowledged. The relatively small sample size may inflate effect size estimates. The follow-up period was short, limiting evaluation of longer-term outcomes. Possible contamination in the control group could not be ruled out, as participants may have accessed external maternal health information. Future studies should employ randomized or stratified sampling, larger sample sizes, and longer follow-up with strategies such as intention-to-treat analysis to strengthen the robustness of findings.

Overall, this study demonstrates that BUFAS SMART education via WhatsApp is effective in preventing postpartum blues among mothers in the early postpartum period. By providing accessible, structured, and supportive digital education, midwives and health professionals can complement routine postpartum care and improve maternal mental health outcomes. This approach has strong potential for integration into maternal health programs, particularly in resource-limited settings where traditional face-to-face support may be constrained.
...

**CONCLUSION AND SUGGESTION**

This study found a significant difference in the incidence of postpartum blues between the intervention and control groups, indicating that the "BUFAS SMART" education effectively reduced postpartum blues. These results highlight

the potential of social media platforms, such as WhatsApp, as alternative channels for providing educational support to postpartum mothers.

Future research should continue to develop WhatsApp-based interventions and broaden the scope of variables studied, moving beyond attitudes and behaviors to also examine maternal knowledge regarding postpartum blues. Expanding the focus in this way can enhance research quality and reduce potential biases in measuring postpartum blues. In addition, future studies would benefit from employing randomized or stratified sampling methods to strengthen generalizability, as well as longer follow-up periods that incorporate predefined attrition management strategies, such as intention-to-treat analysis, to improve robustness. Finally, larger sample sizes are recommended to overcome the limitations of small samples and provide more reliable evidence.

## DECLARATION

### Conflict of Interest

Author declare there is not conflict of interest in this research

### Authors' Contribution

All authors contributed significantly from the beginning to the end of the research, including study design, data collection, analysis, article writing, and final revisions and approval.

### Funding Source

This research was self-funded by the authors.

### Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request. The datasets generated and analyzed during the current study are not publicly available due to privacy concerns but may be made available by institutional policies.

## REFERENCE

Ahmadinezhad, G. S., Karimi, F., Abdollahi, M., & et al. (2024). Association between postpartum depression and breastfeeding self-efficacy in mothers: A systematic review and meta-analysis. *BMC Pregnancy and Childbirth, 24,* 273

Fernalia, F., Busjra, B., & Jumaiyah, W. (2019). Efektivitas Metode Edukasi Audiovisual terhadap Self Management pada Pasien Hipertensi. Jurnal Keperawatan Silampari, 3(1), 221–233. https://doi.org/10.31539/jks.v3i1.770Gholamnejad, H., Darvishpoor-Kakhki, A.,

Fuad, Ar, W., Irsam, M., W. (2023). Keikutsertaan Senam Hamil Dan Tingkat Kecemasan Ibu Terhadap Proses Persalinan Di Puskesmas Reban, Batang. JURNAL PANDU HUSADA, 4(4), 39-49.

Gondo, H. K. 2022. Skrinning Endiburgh Postnatal Depression Scale Post Partum Blues. journal.uwks.ac.id, 8-9.

Kamel Boulos, M. N., Giustini, D. M., & Wheeler, S. (2016). Instagram and WhatsApp in health and healthcare: An overview. In Future Internet (Vol. 8, Issue 3). MDPI AG. https://doi.org/10.3390/fi8030037

KEMENKES RI. (2019). Panduan Pelayanan Paska Persalinan Bagi Ibu Dan Bayi Baru Lahir. Jakarta: KEMENKES RI.

Khanday, Dr. M. A., Lone, Dr. N., Sidiq, Dr. M., & Qureshi, Dr. A. H. (2022). Impact of oral health education regarding an e-leaflet on children - brushing and diet guide for children during the COVID-19 pandemic. International Journal of Applied Dental Sciences, 8(1), 206–208. https://doi.org/10.22271/oral.2022.v8.i1d.1428

Machmudah. (2023). Gangguan Psikologis pada Ibu Postpartum; Postpartum Blues. Jurnal Keperwatan maternitas Vol 3(2): 118-125).

Manurung, S., Setyowati, S., Ginanjar, AS, Soesilo, TE, & Tyastuti, D. (2019). Pengembangan Item Skala Maternal Blues Suryani (MBS) pada masa antepartum melalui bonding attachment yang memprediksi postpartum blues. Klinik Enfermeria, 29, 752–9.https://doi.org/10.1016/j.enfcli.2019.06.013

Miura, Y., Ogawa, Y., Shibata, A., & et al. (2023). App-based interventions for the prevention of postpartum depression: A systematic review and meta-analysis. *BMC Pregnancy and Childbirth, 23,* 441.

Notokusumo. (2017). Karakteristik penyebab terjadinya depresi postpartum pada ibu primipara dan multipara. Jurnal keperawatan 5(1). Diakses pada tanggal

20 Januari 2021. http://jurnal.akper-notokusumo.ac.id/index.php /jkn/article/download/51/48.

Kuning, Setianingsih, J., Putri, A., Dewi, S., & Indriyastuti, H. I. (2021). Application Of Parenting Counseling By Whatsapp In Preventing Postpartum Blues During Pandemic Time Of Covid-19. The 14thUniversity Research Colloqium, 4, 436.

Nurbaeti, I., Deoisres, W., & Hengudomsub, P. (2019). Hubungan antara faktor psikososial dan depresi pascapersalinan di Jakarta Selatan, Indonesia. Sexual & Reproductive Healthcare , 20, 72-76. 10.1016/j.srhc.2019.02.004 [ DOI ] [ PubMed ] [ Google Scholar ]

Pour. E. R., Aliyari, S., Farsi, Z., & Ghelich, Y. (2020). Comparing the effects of interactive and noninteractive education using short massage service on treatment adherence and blood pressure among patients with hypertension. Nursing and Midwefery Studies, 9(2), 68-76. https://doi.org/10.4103/nms.nms_82_19

Pulungan, P. (2020). Teori Kesehatan Reproduksi. In Yayasan Kita Menulis (p. 178). Yayasan Kita Menulis. Pillitteri, A. (2009). Maternal & Child Health Nursing: Care of the Childbearing & Childrearing Family. (seventh). London: Lippincott Williams & Wilkins.

Saragih, A. N. R., & Andayani, L. S. (2022). Pengaruh Promosi Kesehatan Dengan Media Video Dan Booklet Terhadap Pengetahuan Siswa Mengenai Perilaku Sedentari Di Man 1 Medan. Perilaku Dan Promosi Kesehatan: Indonesian Journal Of Health Promotion And Behavior, 4(1), 47-58.

Tambag, H. et al. (2018). 'Perceived social support and depression levels of women in the postpartum period in Hatay, Turkey', Nigerian Journal of Clinical Practice, 21(11), pp. 1525–1530. doi: 10.4103/njcp.njcp_285_17.

# RISK FACTORS ASSOCIATED WITH CHRONIC ENERGY DEFICIENCY IN PREGNANT WOMEN

*Lowisa Kristina Hutapea [1], Meitria Syahadatina Noor [1] iD, Edi Hartoyo [2],*
*Triawanti [3] iD, Muhammad Abdan Sadiqi [4] iD*

[1]Public Health Study Program Master Program, Faculty of Medicine and Health Science, Lambung Mangkurat University, South Kalimantan, Indonesia
[2]Pediatrican Education Program, Faculty of Medicine and Health Science, Lambung Mangkurat University, South Kalimantan, Indonesia
[3]Medical Study Program Undergraduate Program, Faculty of Medicine and Health Science, Lambung Mangkurat University, South Kalimantan, Indonesia
[4]Psychology Study Program, Faculty of Medicine and Health Science, Lambung Mangkurat University, Banjarbaru, South Kalimantan, Indonesia
Correspondence address:
Kapuas City, Indonesia
Email : lowisakristina@yahoo.com

## Abstract

**Background:** Chronic Energy Deficiency (CED) is a nutritional problem in pregancy. Basarang Community Health Center has the fifth highest percentage of pregnant women with Chronic Energy Deficiency in Kapuas Regency, Central Kalimantan, Indonesia, is 22.90%. Community Health Centers are first-level health care facilities in Indonesia, tasked with organizing and coordinating promotive, preventive, curative, rehabilitative, and/or palliative health services in their working areas, with a primary focus on improving public health. The study purposed to find out the relationship between maternal knowledge about nutrition, husband's support, family income, maternal age, and pregancy distance with the incidence of CED in pregnant women in the working area of Community Health Center Basarang, Kapuas Regency in 2023. **Method:** The research was analytical observational with a cross sectional approach, the sample was 66 pregnant women in the Basarang Community Health Center Working Area, Kapuas Regency, taken using the total sampling technique. The research instrument used a questionnaire. **Result:** The results show that there is a relationship between maternal knowledge about nutrition, husband's support, family income, and the age of the pregnant mother with the occurrence of CED, while the variable of pregnancy spacing is not related to the occurrence of CED. **Conclusion:** The most dominant variable with the incidence of CED in pregnant women is maternal knowledge about nutrition.

keyword : *maternal support, pregnancy distance, Chronic Energy Deficiency (CED), family income, maternal knowledge of nutrition*

## INTRODUCTION

Chronic Energy Deficiency (CED) is one of the nutritional problems that often occur in pregnancy, the World Health Organization (WHO) reports that the prevalence of Chronic Energy Deficiency (CED) in pregnancy globally is around 35-75%. WHO also records 40% of maternal deaths in developing countries are related to Chronic Energy Shortages (Lestari, 2023). CED is an important manifestation of malnutrition and is also a problem in many developing countries,

which one of them is Indonesia. The research results show that the prevalence of CED risk among pregnant women in Indonesia is quite high, 17.3% (Ministry of Health RI, 2021).

At the national level, Central Kalimantan is below the National target, contributing 10.5% of pregnant women with CED incidence, when compared with Jakarta with the lowest percentage of CED Pregnant Women in Indonesia (4%), it looks very high (Ministry of Health RI, 2021). Kapuas Regency is in second place as a contributor to CED pregnant women with a percentage of 8.5%. The percentage of KEK in Kapuas district will increase significantly to 11.54% or 685 pregnant women in 2022 (Dinas kesehatan Kabupaten Kapuas Kalimantan Tengah, 2022).

Based on the behavioral theory by Lawrence Green (1980), there are 3 factors that play a role in the emergence of health problems, in this case the problem of KEK in pregnant women, namely predisposing factors, enabling factors, and reinforcing factors (Arifin, et al., 2020). Theory of nutritional status of pregnant women, Republic of Indonesia Ministry of Health (2015), factors that play a role in the emergence of CED, namely nutritional/food intake, disease, family food availability, provision of additional food, health care, housing, purchasing power/economic level and knowledge of habits.

## METHOD

This research is quantitative research with design used in this research is observational analytic with a cross-sectional design. The population in this study were pregnant women in the working area of the Basarang Community Health Center, Basarang District, Kapuas Regency, Central Kalimantan. Based on predictions, there are 66 pregnant women. The sampling technique used in this research is total sampling. This research instrument used a questionnaire that has been tested for validity and reliability. Data analysis used the chi-square or Fisher-exact statistical test and multiple logistic regression. The researcher has received a certificate of ethical suitability with letter number No. 493/KEPK-FK ULM/EC/XII/2023. This letter was issued by the Health Research Ethics Commission, Faculty of Medicine and Health Science, Lambung Mangkurat University.

# RESULT AND DISCUSSION

## a. Respondent Characteristics

This study presents the results of the frequency distribution of respondent characteristics which can be seen below:

**Table 1. Frequency Distribution of Respondent Characteristics in the Basarang Community Health Center Working Area, Kapuas Regency**

| Respondent Characteristics | Total (N) | Percentage (%) |
|---|---|---|
| **Husband's job** | | |
| Private employees | 6 | 10 |
| Self-employed | 31 | 47 |
| Farmer | 14 | 21 |
| Laborer | 14 | 21 |
| Etc | 1 | 1 |
| **Wife's Job** | | |
| Private employees | 1 | 1 |
| Self-employed | 5 | 8 |
| Farmer | 2 | 3 |
| Laborer | 2 | 3 |
| Etc | 1 | 1 |
| Doesn't work | 56 | 84 |
| **CED** | | |
| Yes | 21 | 31,8 |
| No | 45 | 68,2 |
| **Mother's Knowledge** | | |
| Not enough | 13 | 19,7 |
| Good | 53 | 80,3 |
| **Husband's Support** | | |
| Does not support | 16 | 24,2 |
| Support | 50 | 75,8 |
| **Family Income** | | |
| Low | 42 | 63,6 |
| high | 24 | 36,4 |
| **Mother's Age** | | |
| Risky | 12 | 18,2 |
| No Risk | 54 | 81,8 |
| **Pregnancy Spacing** | | |
| Not safe | 38 | 57,6 |
| Safe | 28 | 42,4 |
| **Total** | **66** | **100** |

## b. Relationship between maternal knowledge and Chronic Energy Deficiency (CED)

This study presents the results of the relationship between maternal knowledge and CED in the Basarang Community Health Center Working Area, Kapuas Regency.

**Table 2. Relationship between maternal knowledge and CED in the Basarang Community Health Center Working Area, Kapuas Regency**

| Mother's Knowledge | CED | | Total | p-value | OR |
|---|---|---|---|---|---|
| | Yes | No | | | |
| Not enough | 9 (69.2%) | 4 (11.8%) | 13 (20%) | | |
| Good | 12 (22.6%) | 41 (38.2%) | 53 (80%) | 0.002 | 7.688 |
| Total | 21 (31.8%) | 45 (68.2%) | 66 (100%) | | |

The research results stated that the p-value was 0.002 <0.05. This indicates that there is a relationship between mother's knowledge and CED. The odds ratio figure is 7.688, which means that the tendency for poor maternal knowledge to have CED is 7.688 times compared to good maternal knowledge and this is significant.

Knowledge factors influence health behavior regarding the incidence of CED. Sensing produces knowledge and this is greatly influenced by the intensity of perceptual attention to objects in the formation of pregnant women's behavior and open behavior. The results of sensing from the process of knowing, understanding, applying, analyzing, synthesizing and evaluating give rise to an increasingly positive attitude towards the nutritional needs of pregnant women so that mothers will not experience CED, this is where health education is important (Notoatmodjo, 2010).

Knowledge is an important factor that encourages a person to be more caring and motivated to improve the health status of himself and his family. Even though pregnant women have low incomes, if pregnant women have good knowledge about nutrition, pregnant women will spend their money on food that is cheap but contains good nutrition. On the other hand, if there is a lack of understanding about good eating habits, as well as an understanding of the contribution of nutrition, the mother's nutrition will be inadequate (Amin, 2021). If this continues for a long time and continuously, the mother will not be able to meet her nutritional needs during pregnancy and will enter a state of CED (Fakhriyah, et al, 2021). Good nutritional knowledge can help someone learn how to store, process and use quality food for consumption. Insufficient knowledge causes the available nutritious food ingredients to not be consumed optimally (Primadani, 2016).

Nutrition during pregnancy is an important factor that can influence embryo development and this type of nutritional improvement can be carried out with four

pillars, namely (1) improving food consumption patterns, (2) improving nutritional awareness behavior, (3) increasing access and quality of nutrition services, and ( 4) improving the food and nutrition awareness system (Fitriani, et al, 2021).

The results of this research are in line with research conducted by Diningsih, et al. (2021) shows that the p value = 0.000 <0.05, it can be concluded that there is a relationship between the level of knowledge about nutrition and the incidence of CED in pregnant women at the Matraman District Health Center, East Jakarta.

The results of this research are in line with research conducted by Nur'aini, et al (2021) which states that there is a significant relationship between knowledge of pregnant women and chronic energy deficiency in the working area of the Mauk Tanggerang Community Health Center. According to Diningsih, et al. (2021) one of the factors that influences knowledge is formal education, so knowledge is closely related to education, where it is hoped that if someone has higher education, the person's knowledge will be broader.

Among mothers who have good knowledge, some of them also experience CED. This can happen because of the level of education pursued. Even though the information or knowledge possessed is good, the level of education pursued is a factor in the occurrence of CED. Based on research conducted by Andini (2020), it is stated that the higher a person's education, the easier it is to receive information.

### c. The Relationship Between Husband's Support and CED

**Table 3. Relationship between husband's support and CED in the Basarang Community Health Center working area, Kapuas Regency**

| Husband's Support | CED | | Total | p-value | OR |
|---|---|---|---|---|---|
| | **Yes** | **No** | | | |
| Does not support | 9 (56.2%) | 7 (43.8%) | 16 (24%) | | |
| Support | 12(24%) | 38 (76%) | 50 (76%) | 0.036 | 4.071 |
| Total | 21 (31.8%) | 45 (68.2%) | 66 (100%) | | |

The research results show that the P-value is 0.036 <0.05, which means there is a relationship between husband's support and CED. The odds ratio figure is 4.071, which means that the tendency for unsupportive husbands to support the incidence of CED is 4.071 times, compared to supportive husbands, this is significant.

Family/husband support is a form of interpersonal support which includes attitudes, actions and acceptance of family members or pregnant women so that family members, in this case pregnant women, feel that someone is paying attention. This support can be in the form of informational support, assessment support, instrumental support and emotional support (Zulaikhah, 2022). Husband's support has an important role in the mother's health status, a husband should be able to be a husband who is ready, accompanies the mother during pregnancy, and accompanies the mother during examinations, as well as monitoring what the mother consumes during her pregnancy, providing advice, suggestions and information. It is important that it can increase pregnant women's nutritional knowledge, provide love and attention so that husbands can encourage mothers to fulfill their nutritional needs in order to maintain the nutritional condition of the mother and her pregnancy. Pregnant women who do not have the support of their husbands, where their husbands are unable to supervise and provide them with nutritious food needs, while pregnant women require increased nutrition from before pregnancy, both for themselves and the baby they are carrying, plus there are many taboo rules recommended by their families/husbands. If this continues for a long time it will have an impact on the mother's nutritional condition so that the mother may experience CED, because the mother's food intake cannot meet the mother's needs during pregnancy (Friedman, 2012).

The results of this research are in line with research conducted by Hayat, et al. (2021) shows that the p value = 0.000 <0.05, it can be concluded that there is a relationship between husband's support and the risk of CED at the Kasemen Health Center, Serang City in 2019. The results of this research are also in line with research conducted by Yuniar & Fatmawati (2023) there is a relationship between husband's support and the risk of CED in the Surakarta area. The role and support of the husband in the behavior of utilizing nutrition services is very important, the husband as the person closest to the pregnant mother is a motivator to check her pregnancy and supports the pregnant mother morally and materially, so that the mother can get through her pregnancy well.

Husband's support is support, encouragement, attention and assistance provided by a partner for good (Harlissa, 2023). Husband's support is an important

factor, because the decisions taken by the husband are important. Husband's support is a big decision for the wife when she wants to take action (Harlissa, Sugesti, Darmi, 2023). Forms of husband's support can be in the form of instrumental support, appreciation support, information support, and emotional support (Mansoben & Gurning, 2022).

The results of this research are in line with research by Novitasari (2019) which shows that there is a relationship between family support and the incidence of KEK. In this research, it was also discovered that there were pregnant women who received good support from their husbands, but still experienced CED. This happens because CED occurs before the mother becomes pregnant. This is due to lack of energy. Pregnancy causes increased energy metabolism. Therefore, the need for energy and other nutrients increases during pregnancy (Rohmah, 2020).

**d. Relationship between family income and chronic energy deficiency (CED)**

**Table 4. Relationship between family income and CED in the working area of the Basarang Community Health Center, Kapuas Regency**

| Family Income | CED | | Total | p-value | OR |
|---|---|---|---|---|---|
| | **Yes** | **No** | | | |
| Low | 18 (42.9%) | 24 (57.1%) | 42 (64%) | | |
| High | 3 (12.5%) | 21 (87.5%) | 24 (36%) | 0.023 | 5.250 |
| Total | 21 (31.8%) | 45 (68.2%) | 66 (100%) | | |

The research results show that the income P-value is 0.023 < 0.05, which means there is a relationship between family income and CED. The odds ratio figure is 5.250, which means that the tendency for low family income with 4.071 times the occurrence of CED compared to high family income, this is significant.

The results of this research are in line with research conducted by Rahayu & Sagita (2019) showing that the p value = 0.002 <0.05, it can be concluded that there is a relationship between family income and chronic energy deficiency in pregnant women in the second trimester. The results of this research are also in line with research conducted by Andini (2020) showing that the p value = 0.000 <0.05, it can be concluded that there is a relationship between family income and the incidence

of CED in pregnant women at the Prambontergayang Community Health Center, Tuban Regency.

In families with a low economic level, usually most of the income will be spent to meet needs. The family's economic status will determine the type of food purchased. Family income is the total real income of all household members which is used to meet collective and individual needs in the household. Family income is the result of work or services, compensation obtained due to donations made in production activities (Rahayu & Sagita, 2019).

Income determines the pattern of what food will be purchased, the higher the income, the greater the spending on shopping. Income is the most important factor because it determines the quality and quantity of food consumed. Pregnant women with low incomes experience CED because they are unable to meet their nutritional intake. Fransiska, et al (2022). Low income will result in low purchasing power for food so that mothers cannot meet their food needs and this will lead to a lack of food consumption. Lack of food consumption is a direct cause of CED (Vladimir, 2021).

Family income is a reflection of the community's ability to meet life's needs, in this case health and nutrition. If the family income is lower, the CED level will be higher. In order to get more income, mothers also need to help their husband's work or look for another job. This income itself can have a lot of influence on nutritional conditions. Low income means that a respondent's purchasing level can only buy basic necessities. Pregnant women cannot consume food with good nutrition which is plentiful at quite high prices, such as meat, fish, milk and other animal protein. This causes the CED value to increase (Yunita & Ariyati, 2021

Apart from that, in this study it was also discovered that there were cases of CED in mothers with good family incomes. This can happen if the family income cannot be managed well. According to research conducted by Kurniawan et al (2021), diverse living needs cause nutritional intake to be less of a priority. This causes earnings or income to influence nutritional intake in pregnant women.

**e. Relationship between maternal age and chronic energy deficiency (CED)**

**Table 5. Relationship between maternal age and CED in the Basarang Community Health Center working area, Kapuas Regency**

| Mother's Age | CED | | Total | p-value | OR |
|---|---|---|---|---|---|
| | Yes | No | | | |
| Risky | 8 (66.7%) | 4 (33.3%) | 12 (18%) | 0.013 | |
| No Risk | 13 (24.1%) | 41 (75.9%) | 54 (82%) | | 6.308 |
| Total | 21 (31.8%) | 45 (68.2%) | 66 (100%) | | |

The research results stated that the p-value was 0.013 < 0.05, which means there is a relationship between maternal age and KEK. The odds ratio figure is 6.308, which means that the tendency for maternal age to be at risk is 6.308 times for the occurrence of CED, compared to the age of the mother who is not at risk of not having CED, this is significant. The results of this research are in line with research conducted by Fitri (2022) showing that the p value = 0.027 <0.05, it can be concluded that there is a relationship between maternal age and the incidence of CED in pregnant women at the Ganjar Agung Community Health Center, West Metro District, Metro City.

The results of this research are in line with research conducted by Teguh (2020) showing that the p value = 0.010 <0.05, it can be concluded that there is a relationship between maternal age and the incidence of CED in pregnant women in the UPT Puskesmas I Pekutatan Working Area, Jembrana , Bali.

The mother during pregnancy really determines the health condition of the mother and the fetus she is carrying. Pregnancy that occurs at an age that is too young or too old both have bad risks for the health of the mother and fetus. Age that is classified as too young is under 20 years of age. At that age, reproductive organs such as the uterus and pelvis often have not yet grown to adult size. As a result, pregnant women at that age are not ready to accept their duties and responsibilities as parents (Permana & Wijaya, 2019). Being too old, 35 years or more, also has a risk of developing CED. Mothers who become pregnant at too old an age need a lot of energy to support the function of their increasingly weakened organs. In this case, competition for energy occurs again. Women are recommended to get pregnant between the ages of 20-35 years because at that age they are ready to get pregnant physically and mentally (Rudiyanti & Rosmadewi, 2019).

Pregnancy that occurs at more than 35 years of age can also affect the nutritional condition of pregnant women because at that age the body begins to experience a decline in health, which can hinder the fetus's intake of nutrients which are distributed through the placenta. Apart from that, at the age of >35 years, many women experience changes in blood pressure and even an increase in blood sugar levels, so they have to limit their food intake in order to maintain a diet that suits their body condition. Meanwhile, on the other hand, a pregnant woman needs a fairly balanced nutritional intake so that this condition causes an increased risk of CED.

In this case, in general, it can be stated that pregnancy when a mother is less than 20 years old has a high risk. This causes competition for food between the fetus and the mother, who are still in the process of growing. This competition certainly results in a fetus' nutritional intake being hormonally disrupted. Apart from that, if a mother becomes pregnant at the age of 35 years, she will have a high risk. This is because the reproductive organs experience degeneration and disruption occurs in hormonal balance (Marini, et al, 2023).

In this research, it is known that CED can also occur at mothers who are not at risk. This can happen due to other things such as the mother's lack of knowledge about nutrition, so that the proper nutritional intake needed for the mother and baby is not met. Apart from that, the lack of knowledge, even though food is abundant, but the lack of knowledge on how to process, store and serve food causes mothers to suffer from shortages, resulting in CED. Apart from that, low income also results in less purchasing power for nutritious food, which can result in mothers experiencing CED.

**f.  Relationship between pregnancy spacing and Chronic Energy Deficiency (CED)**

**Table 6. Relationship between pregnancy distance and CED in the Basarang Community Health Center working area, Kapuas Regency**

| Pregnancy Distance | CED | | Total | p-value | OR |
|---|---|---|---|---|---|
| | **Yes** | **No** | | | |
| Not Safe | 16 (42.1%) | 22 (57.9%) | 38 (58%) | 0.068 | 3.345 |
| Safe | 5 (17.9%) | 23 (82.1%) | 28 (42%) | | |

| | | | | |
|---|---|---|---|---|
| Total | 21 (31.8%) | 45 (68.2%) | 66 (100%) | |

The results of this study show that the p-value is 0.068 > 0.05, which means there is no relationship between pregnancy distance and CED in pregnant women in the Basarang Community Health Center area, Kapuas Regency. This is because the p-value produced through data processing is > 0.05. The results of this research are in line with research conducted by Marisi (2021) showing that the p value = 0.156 > 0.05. This can be concluded that there is no relationship between pregnancy distance and the incidence of CED in pregnant women in the posyandu in the working area of the Kutabumi Health Center, Kutabumi Village, District. Kemis Market, Tangerang Regency. The results of this research are also in line with research conducted by Lestari, et al. (2023) shows that the p value = 0.0671 > 0.05, it can be concluded that there is no relationship between pregnancy distance and the incidence of CED in pregnant women in the North Bogor Health Center UPT Working Area in 2022.

CED usually occurs in the first pregnancy. This is due to the mother's lack of experience in her first pregnancy. Apart from that, the knowledge they have is not enough. This knowledge is related to the nutritional needs of pregnant women and the diet consumed (Halimah, et al, 2022). Mothers are said to give birth too closely together if the distance is less than 2 years. Research shows that if families can regulate the distance between their child's pregnancies by more than 2 years, the child will have a higher probability of survival and the child's condition will be healthier than children with birth intervals of less than 2 years. Birth spacing that is too close will result in low quality of the fetus/child and will also be detrimental to the mother's health. The mother does not have the health to repair her own body (the mother needs sufficient energy to recover after giving birth to her child). By re-conceiving, it will cause nutritional problems for the mother and fetus/baby following the pregnancy (Suryani, et al. 2021).

The condition of pregnancy with pregnancies that are too close together, where at the same time the mother is still breastfeeding, will further increase nutritional problems for the mother and fetus if she does not get a balanced nutritional intake to fulfill her body. Pregnancy will increase metabolism, thereby increasing the need

for energy and nutrients. Repeated pregnancies in a short time will deplete fat, protein, glucose, vitamins, minerals and folic acid so that ATP decreases which causes a decrease in the body's metabolic processes, then the body carries out the catabolism process so that it will use existing food reserves, as a result the body will lack energy (Nugraha , et al. 2019).

Based on the theory of Erita, et al. (2023) The spacing of pregnancies greatly influences the incidence of CED when repeated pregnancies in a short period of time will deplete the mother's nutritional reserves. In addition, mothers who become pregnant less than 2 years after giving birth are at risk of giving birth prematurely and the baby will experience low birth weight. Pregnant women are one of the groups that are vulnerable to nutritional problems and have a greater risk of CED during pregnancy. In primi gravida, unplanned pregnancies often occur, in this case the mother is not yet fit for pregnancy, BKKBN states that there can be negative impacts from unplanned pregnancies. This is in line with Lestari's (2021) research which shows that distance is not a risk factor for CED in pregnant women in the Gunungpati Community Health Center working area with p-value = 0.77.

**g. Dominant Factors Associated with CED in the working area of the Basarang Community Health Center, Kapuas Regency**

**Table 7. Multivariate analysis results**

| No. | Variable | B | p-value | OR | 95% CI |
|---|---|---|---|---|---|
| 1 | Mother's knowledge | 2.456 | 0.007 | 11.655 | 1.978 – 68.687 |
| 2 | Husband's support | 2.122 | 0.011 | 8.352 | 1.611 – 43.301 |
| 3 | Family income | 1.655 | 0.046 | 5.231 | 1.033 – 26.487 |
| 4 | Maternal age | 1.545 | 0.057 | 4.686 | 0.954 – 23.018 |
| 5 | Pregnancy spacing | 1.405 | 0.076 | 4.075 | 0.862 – 19.270 |

Based on table 7, the final results of the multivariate analysis show that the factor most related to Chronic Energy Deficiency (CED) is the maternal knowledge variable with an Exp(B) value of 11.655, with knowledge that mothers with Chronic Energy Deficiency (CED) will be at risk of 4.480 times more than those with husband's support with an Exp(B) value of 8.352, family income with an Exp(B) value of 5.231, maternal age with an Exp(B) value of 4.686 and pregnancy spacing

with an Exp(B) value of 4.075. The variable maternal knowledge about nutrition is the most dominant variable in the incidence of Chronic Energy Deficiency (CED).

According to Revinda et al (2018), knowledge is more influential than husband's support. This is because knowledge has a positive impact compared to husband's support in CED cases. Knowledge makes pregnant women understand the steps they must take to prevent CED. Mothers do not depend on other people because those who can change their behavior and fulfill their own nutrition are mothers with good knowledge. This factor is in line with the culture in the area that women in the area have an independent nature. Therefore, she can find out about the potential that exists when she is pregnant. Meanwhile, husband's support is an external factor from the mother that influences CED. So, this factor will not have a better influence than the knowledge that the pregnant woman has regarding CED. This indicates that without good knowledge about CED there will be no change in behavior, and problems with poor nutrition will be at risk of appearing.

Meanwhile, inversely proportional to the relationship between knowledge and husband's support, husband's support is a factor outside of the mother, so its influence on behavior change is not as great as if the mother had good knowledge. The support given by the husband is moral support that can reduce or buffer the mental health conditions or effects of pregnant women so that it can strengthen pregnant women and prevent the occurrence of CED in pregnant women (Probowati, 2024).

Maternal age and gestational spacing in the multivariate test do not have a significant relationship because there is competition between each variable to see which variable influences the OR change > 10%. Based on the book Nutrition for Mothers and Children written by Paramashanti (2019) said that pregnant women who are less than 20 years old have a very high risk of pregnancy. This risk can occur to herself or to the baby she is carrying. This high risk can occur due to linear growth or height, which generally only ends at the age of 16-18 years. This growth is then continued with the maturation of the growth of the pelvic cavity several years after the linear growth is complete, and the linear growth is completed at around 20 years of age. As a result, a pregnant woman who is not yet 20 years old may experience various birth complications, as well as disruption to the completion

of optimal growth. This is because the growth process itself has not yet been completed, and because various nutritional intakes are not or are not sufficient to meet the needs of those who are still growing, while a woman who experiences her first pregnancy at the age of 35 years or more is also very at risk. At the age of more than 35 years, a person who is pregnant will be more susceptible to disease. Women's uterine organs are getting older, and the birth canal is getting stiffer. At the age of more than 35 years, there is a risk of having a disabled child, and obstructed labor will occur, and bleeding in pregnant women will open more. (Paramashanti, 2019).

Short pregnancy intervals can result in low quality of the fetus or child and also the health of the mother. Consuming sufficient nutrients and in accordance with the nutritional adequacy rates recommended for each individual will result in a person's good nutritional status. On the other hand, if someone consumes excess or deficient nutrients, it will result in a person's nutritional status being more or less. The level of energy and nutrient adequacy is directly influenced by a person's energy and nutrient consumption (Suryani et al, 2021).

**CONCLUSION AND SUGGESTION**

There is a relationship between maternal knowledge about nutrition, husband's support, family income, pregnant mother's age and the incidence of chronic energy deficiency (CED) in pregnant women in the Basarang Community Health Center working area, Kapuas Regency in 2023. There is no relationship between the pregnancy spacing and the incidence of chronic energy deficiency (CED) in pregnant women in the working area of the Basarang Community Health Center, Kapuas Regency in 2023. The variable maternal knowledge about nutrition is the dominant variable related to the incidence of chronic energy deficiency (CED) in pregnant women in the working area of the Basarang Community Health Center in Kapuas Regency in 2023. Health education programs should focus on improving maternal knowledge about nutrition, ensuring early detection of CED, and providing nutritional counseling in primary healthcare settings. As well as increasing screening and screening of prospective pregnant women so that they are ready to become healthy pregnant mothers and give birth to healthy babies.

# DECLARATION

## Conflict of Interest

There is no conflict of interest in this research.

## Authors' Contribution

The authors' contributions include: research design (LKH, MSN, EH); research instrument development (LKH, MSN); data collection and analysis (LKH, MSN, EH); and manuscript preparation and review (LKH, EH, T).

The initials are as follows: Lowisa Kristina Hutapea (LKH), Meitria Syahadatina Noor (MSN), Edi Hartoyo (EH), Triawanti (T), Muhammad Abdan Sadiqi (MAS).

## Ethical Approval

This research has been approved by the ethics committee of the Faculty of Medicine and Health Sciences, Lambung Mangkurat University with No. 493/KEPK-FK ULM/EC/XII/2023

## Data Availability

The data used and/or analyzed in this study are available from the corresponding author upon request to the respondents. The raw data of this study cannot be published publicly due to ethical constraints and respondent confidentiality. However, the data are accessible from the corresponding author by applying the principle of anonymity.

pregnant women in the working area of the Basarang Community Health Center, Basarang District, Kapuas Regency, Central Kalimantan.

## REFERENCE

Andini, F.R., 2020. Hubungan faktor sosio ekonomi dan usia kehamilan dengan kejadian kekurangan energi kronis pada ibu hamil di Puskesmas Prambontergayang Kabupaten Tuban. Amerta Nutrition, 4(3): 218.

Amin, S., Firdaus, A. M., & Murtafiah, W. 2021. Pelatihan Materi Gizi seimbang pada ibu rumah tangga untuk Peningkatan Status Gizi. Jurnal Terapan Abdimas, 6(2), 102-109.

Arifin, S. 2020. Peta teori Ilmu Kesehatan Masyarakat. Administrasi Kebijakan Kesehatan dan Perilaku Kesehatan. Penerbit Mitra Wacana Media: Bogor. Astuti, A.B., Santosa, S.W. and Utami, M.S., 2000. Hubungan antara dukungan keluarga dengan penyesuaian diri perempuan pada kehamilan pertama. Jurnal Psikologi, 27(2): 84-95.

Dinas kesehatan Kabupaten Kapuas Kalimantan Tengah. 2022. Pemantauan Wilayah Setempat KIA Desember 2021.

Diningsih, R., F., Puji, A., W., Erika, L. 2021. Hubungan Tingkat Pengetahuan Tentang Gizi Terhadap Kejadian Kekurangan Energi Kronik (KEK) Pada Ibu Hamil. Binawan Student Journal (BSJ), 3(3).

Erita, M., Amlah, & Rahmawati, E. 2023. Hubungan Paritas, Jarak Kehamilan dan Riwayat Penyakit dengan Kejadian Kekurangan Energi Kronik (KEK) pada Ibu Hamil di Wilayah Kerja Puskesmas Makrayu Palembang tahun 2022. Jurnal Ilmiah Obsgin, 209-218.

Fakhriyah, F., Noor, M.S.N., Setiawan, M.I., Putri, A.O., Lasari, H.H., Qadrinnisa, R., Ilham, M., Nur, S.Y.L.L.S., Zaliha, Z., Lestari, D. and Abdurrahman, M.H., Buku Ajar Kekurangan Energi Kronik (KEK). Yogyakarta: CV.Mine.

Fitri, N., L., Sari, A. A., Dewi, N. R., Ludiana, Hayati, N., 2022. Hubungan Usia Ibu Dengan Kejadian KEK Pada Ibu Hamil Di Puskesmas Ganjar Agung Kecamatan Metro Barat Kota Metro. Jurnal Wacana Kesehatan, 7(1).

Fitriani, Afriyani, L.D., Diba, F., Wahyuni, Y.I., Indriani, D., Wahyuni, T., dkk. 2021. Literature Review Hubungan Pengetahuan dengan KEK pada Wanita Prakonsepsi. Seminar Nasional Kebidanan: 196-204

Fransiska, Y., Murdiningsih, M., & Handayani, S. 2022. Faktor-Faktor yang Berhubungan dengan Kejadian Kurang Energi Kronis pada Ibu Hamil. Jurnal Ilmiah Universitas Batanghari Jambi, 22(2): 763. https://doi.org/10.33087/jiubj.v22i2.1817

Friedman, M.M., Bowden, V.R. and Jones, E.G., 2012. Buku Ajar Keperawatan Keluarga: Riset, Teori dan Praktek (Family Nursing: Research, Theory and Practice). edisi 5). Jakarta: EGC.

Green, Lawrence., 1980. Health Education Planning A Diagnostic Approach. Baltimore. The John Hopkins University, Mayfield Publishing Co.

Halimah. G.S., Jayanti, R.D., & Fatmaningrum, W. 2022. Hubungan Usia, Paritas, dan Pekerjaan Terhadap Resiko KEK Ibu Hamil Trimester 1 di Puskesmas Cilengkrang Bandung Tahun 2022. Jurnal Sehat Mandiri: 94-103.

Harlissa, R., Sugesti, R., & Darmi, S. 2023. Hubungan antara Dukungan Suami, Status Gizi, dan Anemia pada Ibu Hamil dengan Kejadian Bayi Baru Lahir Rendah di Puskesmas Toboali Kabupaten Bangka Selatan Tahun 2021. SIMFISIS Jurnal Kebidanan Indonesia: 381-387.

Hayat, F., Nurce A., Tria A. E. P., 2021 Peran Dukungan Suami Dan Faktor Lainnya Terhadap Pemanfaatan Pelayanan Gizi Oleh Ibu Hamil Dengan Risiko Kurang Energi Kronis (KEK). Jurnal Keperawatan Silampari, 5(1)

Kemenkes RI. 2021 Pedoman Pelaksanaan Teknis Surveilans Gizi. Jakarta Kemenkes RI. Laporan Kinerja Direktorat Jenderal Kesehatan

Kementerian Kesehatan Republik Indonesia. 2015. Pedoman penanggulangan Kurang Energi Kronik (KEK) pada ibu hamil. Jakarta: Ditjen Bina Gizi dan KIA Direktorat Bina Gizi.

Kurniawan, D.A.N., Triawanti, Noor, M.S., Djallalludin, & Qamariah, N. 2021. Literature Review: Hubungan Pekerjaan dan Penghasilan Keluarga dengan Kejadian Kurang Energi Kronik pada Ibu Hamil. Homeostatis: 115-126.

Lestari, D.S., Nasution, A.S. and Nauli, H.A., 2023. Faktor-Faktor yang Berhubungan dengan Kejadian Kurang Energi Kronik (KEK) pada Ibu Hamil di Wilayah Kerja Puskesmas Bogor Utara Tahun 2022. PROMOTOR, 6(3): 165-175.

Mansoben, N. and Gurning, M., 2022. Pengetahuan, Dukungan Suami Dan Pendapatan Ekonomi Dengan Kejadian Kekurangan Energi Kronik Pada Ibu Hamil. Jurnal Keperawatan, 14(2): 401-408.

Marini, Solechah, S.A., Fathullah, D.M., Suryani, N., Yulidasari, F., Setiawan, M.I., & Rahayu, A. 2023. Hubungan Usia Ibu, Kadar Hemoglobin, dan Status KEK saat Kehamilan dengan Berat Badan Lahir Bayi. Ghidza : Jurnal Gizi dan Kesehatan: 296-304.

Marisi, T. 2021. Faktor-Faktor Yang Mempengaruhi Kejadian Anemia Pada Ibu Hamil Di Wilayah Kerja Puskesmas Kecamatan Kebon Jeruk Jakarta Barat. Jakarta: Universitas Binawan.

Notoatmodjo S. 2010. Ilmu Perilaku Kesehatan. Jakarta: Rineka Cipta.

Novitasari, Y.D., Wahyudi, F. and Nugraheni, A., 2019. faktor–faktor yang berhubungan dengan kekurangan energi kronik (KEK) ibu hamil di wilayah kerja Puskesmas Rowosari Semarang. Jurnal Kedokteran Diponegoro (Diponegoro Medical Journal), 8(1): 562-571.

Nugraha,R.N., Lalandos, J.L., & Nurina, Rr.L. 2019. Hubungan Jarak Kehamilan Dan Jumlah Paritas Dengan Kejadian Kurang Energi Kronik (Kek) Pada Ibu Hamil Di Kota Kupang. Cendana Medical Journal: 273-280.

Nur'aini, F., Avianty, I., & Prastia, T.N. (2021). Faktor- Faktor Yang Berhubungan Dengan Kejadian Kurang Energi Kronis (Kek) Pada Ibu Hamil Di Wilayah Kerja Puskesmas Tegal Gundil Bogor Tahun 2020. Promotor Jurnal Mahasiswa Kesehatan Masyarakat: 219-226

Paramashanti. 2019. Gizi Ibu dan Anak. Yogyakarta: *Pustaka* Baru

Permana, P & Wijaya, G.B.R. 2019. Analisis faktor risiko bayi Berat Badan Lahir Rendah (BBLR) di Unit Pelayanan Terpadu (UPT) Kesehatan Masyarakat (Kesmas) Gianyar I tahun 2016-2017. Intisari Sains Medis: 674-678.

Primadani, F.D., 2016. Faktor-Faktor Yang Mempengaruhi Kejadian Kek Pada Ibu Hamil Di Puskesmas Baturraden Ii Kabupaten Banyumas (Doctoral dissertation, Universitas Muhammadiyah Purwokerto).

Probowati, R., Astuti, A. M., Anasulfallah, H., & Pangestu, J. B. 2024. Masalah kesehatan mental ibu hamil dengan upaya melakukan dukungan sosial 3h (bahagia ibu, selamat kehamilan dan bayi sehat). In Prosiding Seminar Informasi Kesehatan Nasional: 125-130.

Rahayu, T. D., & Sagita, D. Y. 2019. Pola Makan dan Pendapatan Keluarga dengan Kejadian Kekurangan Energi Kronik (KEK) pada ibu hamil Trimester II. Holistik Jurnal Kesehatan, 13(1).

Rohmah, L. 2020. Evaluasi Program Pemberian Makanan Tambahan (PMT) pada Ibu Hamil Kekurangan Energi Kronis (KEK) di Wilayah Kerja Puskesmas Karanganyar Kota Semarang. Semarang: Universitas Negeri Semarang.

Rudiyanti, N. & Rosmadewi. 2019. Hubungan Usia, Paritas, Pekerjaan Dan Stress Dengan Emesis Gravidarum Di Kota Bandar Lampung. Jurnal Ilmiah Keperawatan Sai Betik, 7-18.

Suryani, L., Riski, M., Sari, R.G. and Listiono, H., 2021. Faktor-faktor yang mempengaruhi terjadinya kekurangan energi kronik pada ibu hamil. Jurnal Ilmiah Universitas Batanghari Jambi, 21(1): 311-316

Teguh, N.A., Hapsari, A., Dewi, P.R.A. and Aryani, P., 2019. Faktor-faktor yang mempengaruhi kejadian kurang energi kronis (KEK) pada ibu hamil di wilayah kerja UPT Puskesmas I Pekutatan, Jembrana, Bali. Intisari Sains Medis, 10(3).

Vladimir, V. F. 2021. Pengendalian Kejadian Kekurangan Energi Kronis (Kek) Pada Masa Kehamilan Di Wilayah Kerja Puskesmas Rambah. Maternity and Neonatal, 09(69): 5–24.

Yuniar, A., K., B., Fatmawati, S., 2023. Gambaran Karakteristik Ibu Hamil Kekurangan Energi Kronik (KEK) Dan Dukungan Suami Di Wilayah Surakarta. Jurnal Imliah Ilmu Kesehatan, 1(4).

Yunita, N & Ariyati, M. 2021. Hubungan Pola Makan dan Pendapatan Keluarga dengan Kejadian Kekurangan Energi Kronis (KEK) pada Ibu Hamil di Wilayah Kerja Puskesmas Kertak Hanyar. Jurnal Kesehatan Indonesia: 100-106.

Zulaikhah, F., & Veftisia, V. 2022. Hubungan Dukungan Suami Terhadap Kunjungan K4 di Desa Mudal dan Slukatan Kecamatan Mojotengah Kabupaten Wonosobo. *Journal of Holistics and Health Sciences*, *4*(1).

# THE EFFECT OF KUNDALINI ON MUAC AND BODY WEIGHT IN 1ST TRIMESTER WITH EMESIS GRAVIDARUM

Commented [1]: Isi dengan hyperlink, OrcidID anda

*Herdian Fitria Widyanto Putri [1]* ID *, Atik Farokah [1]* ID *, Qatrunnada Naqiyyah Khusmitha[3]* ID

[1] Department Midwifery, Bhakti Wiyata Health Science Institute, Kediri, Indonesia
[2]Department Midwifery, University State of Surabaya, Surabaya, Indonesia

Correspondence address: KH Wachid Hasyim Street No.65, Bandar Lor, Kediri
Email : herdian.putri@iik.ac.id

## Abstract

**Background:** Emesis gravidarum is a discomfort that occurs in mothers during early pregnancy. If emesis gravidarum is not adequately managed, children are more likely to experience stunting. There may be negative impact on health from stunting. Stunting is a health problem that is still the government's current focus. Kundalini yoga is a physical activity that focuses on breathing, so it is hoped that it can divert nausea. When the nausea disappears it will be increase appetite so it can impact to a person's nutritional intake, which can be seen from an increase in MUAC and body weight. The purpose of this study is to evaluate whether kundalini yoga is associated with increased MUAC and body weight in women who have emesis gravidarum. **Method:** This study used a pre-test and post-test control group design as a quasi-experiment that provided kundalini yoga intervention for 15 minutes every day for 30 days. The study population comprised 20–35 year old pregnant women experiencing mild–moderate nausea and vomiting throughout the 1st trimester of their pregnancy. Using the total sampling technique, samples were collected. In this study, body weight gain (BW) and upper arm circumference (MUAC) were the dependent variables, whereas kundalini yoga was the independent variable. The tools used are body measuring tape and body scales. The independent t-test used to examine variations in body weight and upper arm circumference. **Result:** In the intervention group, the MUAC addition was 0.096 cm, while in the control group, it was 0.012 cm (p = 0.08). Weight gain was 0.512 kg in the control group and 0.952 kg in the intervention group (p = 0.096). **Conclusion:** Kundalini yoga was not significant in increasing MUAC and body weight.

keyword : kundalini, yoga, MUAC, body weight

## INTRODUCTION

Stunting is the condition of a child who has a lower body length or height than the average age, namely < -2 standard deviation based on the WHO chart (WHO, 2024). Stunting is a nutritional problem that is still often found in Indonesia. Based on SSGI 2022 data, the incidence of stunting in Indonesia is 21.6%. Compared to 2021, this percentage is lower—24.4%. However, this figure is still far from the 2024 RPJMN target of 14%. Apart from stunting, the incidence of wasting and underweight is also found in Indonesia at 7.7% and 17.1% (Kemenkes,

2022). Children with stunting get sick easily, experience developmental delays and are at high risk of suffering from chronic diseases (WHO, 2015; Mustakim *et al.*, 2022). Maternal factors that can contribute to stunting include inadequate nutrition in pregnant women and uncontrolled emesis gravidarum (WHO, 2015).

Emesis gravidarum is a condition that commonly occurs in mothers early in pregnancy (more than 6 weeks). The cause of emesis gravidarum is currently unclear. There are several theories that are thought to be the cause of emesis gravidarum, such as hormonal changes, genetics, gastrointestinal factors, and psychological factors (Fitria *et al.*, 2023). An increased level in the hormone chorionic gonadotropin (hCG) has been associated with severe emesis gravidarum (Lowe *et al.*, 2019). Chorionic gonadotropin hormone is a hormone used to detect pregnancy. hCG is secreted by the placental syncytiotrophoblast which stimulates progesterone production (Kaňková *et al.*, 2023). The increase in estrogen and progesterone during pregnancy has an impact on reducing gastrointestinal motility, so that gastric emptying becomes slow. Apart from that, an increase in progesterone also causes the esophageal sphincter to relax. This causes an increase in gastroesophageal reflux and increased stomach acid (Varsa *et al.*, 2021).

The predicted peak of emesis gravidarum occurs between weeks 10 and 16 of gestation, while the decrease occurs around week 20 (Liu *et al.*, 2022). Emesis gravidarum actually does not harm the fetus if it is balanced with appropriate lifestyle changes such as eating small but frequent portions, avoiding foods high in fat, managing stress and so on (ACOG, 2020). However, if the mother is reluctant to eat, the mother is at risk of experiencing nutritional deficiencies. A person's upper arm circumference and body weight provide information about their nutritional health. A fetus that is malnourished may not grow and develop to full potential, which increases the risk of intrauterine growth retardation, low birth weight, abnormalities, and other problems (Macias, 2024). Emesis gravidarum becomes more severe and prolonged if the mother is primigravida and under 20 years during pregnancy, obesity, and using oral contraceptives before pregnancy (Liu *et al.*, 2022). Other risk factors, such as mothers who do not work, sitting too much before pregnancy, frequently drinking cold drinks, having a history of gastrointestinal tract

disease and lack of exercise can also worsen emesis gravidarum (Zhang *et al.*, 2020).

Physical activity is defined as any movement of the body requiring the expenditure of energy and made possible by the skeletal muscles. A minimum of 150 minutes a week of physical activity is required for pregnant women (WHO, 2022). People who work or stand for more than twenty hours a week are linked to a decreased incidence of emesis gravidarum, according to previous study (Connolly, Mudd and Pivarnik, 2019). One of the physical activity that pregnant women can do is yoga.

With origins in Indian philosophy, yoga is a profound, ancient practice. Although yoga was once practiced as a spiritual discipline, it is today widely used to enhance both mental and physical health (NIH, 2024). Kundalini yoga is a type of yoga that focuses on breathing. The incidence of emesis gravidarum in women who did kundalini yoga for 15 minutes every day decreased when compared with controls (Khusmitha *et al.*, 2023). Reducing emesis gravidarum can increase maternal food intake. Adequate food intake can increase maternal weight during pregnancy (Dolatian *et al.*, 2020).

Based on the background above, researchers want to examine the relationship between kundalini yoga and increased body weight and upper arm circumference in pregnant women with emesis gravidarum.

**METHOD**

This study uses a pre-test and post-test control group design and is quasi-experimental. The control group was the group that received routine ANC, while the treatment group was the group that received routine ANC and kundalini yoga independently. The study population comprised 20–35 year old pregnant women experiencing mild–moderate nausea and vomiting throughout the $1^{st}$ trimester of their pregnancy. Using the total sampling technique, samples were collected. In this study, body weight gain (BW) and upper arm circumference (MUAC) were the dependent variables, whereas kundalini yoga was the independent variable. The Wilangan Community Health Center's operating area served as the research site, Nganjuk for 4 weeks. Kundalini yoga is done for 15 minutes every day for 4 weeks

with the help of videos from a certified yoga instructor. The procedures for practicing Kundalini yoga are as follows: two minutes of deep, prolonged breathing; two minutes of basic spinal flexion; and eleven minutes of pregnant meditation. The tools used are body measuring tape and body scales. The independent t-test used to examine variations in body weight and upper arm circumference. This research has received ethical approval number 110/fkes/EP/2023.

### RESULT AND DISCUSSION

**Table 1. Distribution of the increase in arm circumference in pregnant women in the 1st trimester**

|  | Group | N | Average increase (cm) |
|---|---|---|---|
| MUAC | Treatment | 25 | 0,096 |
|  | Control | 25 | 0,012 |

According to Table 1, there was an average 0.096 cm increase in lilac in the treatment group and 0.012 cm in the control group.

**Table 2. Results of the independent t-test for increase in arm circumference in pregnant women in the 1st trimester**

|  | N | t | Sig (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|
|  |  |  |  |  | Lower | Upper |
| MUAC | 50 | 2.766 | 0.08 | 0.184 | 0.05 | 0.318 |

Table 2 shows there was no significant difference (p = 0.08, p>0.05) in the rise in upper arm circumference between the treatment group and the control group.

**Table 3. Distribution of weight gain in 1st trimester pregnant women**

|  | Group | N | Average increase (kg) |
|---|---|---|---|
| Weight gain | Treatment | 25 | 0,952 |
|  | Control | 25 | 0,512 |

Based on Table 3, there was an average 0.952 kg rise in body weight in the treatment group and 0.512 kg in the control group.

**Table 4. Results of the independent t-test pre-post-test level of change in weight of pregnant women in the first trimester in the control and treatment groups**

| | N | t | Sig (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| Weight gain | 50 | -0.096 | 0.924 | -0.04 | -0.8803 | 0.8003 |

A 2-tailed test indicated no significant difference between the weight gains of the groups (p > 0.05). The t value of -0.096 shows that the control group's weight gain was lower than the treatment groups.

Between 35 and 91% of pregnant women feel uncomfortable sensations that early-pregnant women experience, such as nausea and vomiting. Pregnant women with emesis gravidarum generally experience a decrease in appetite (Muchtar and Rasyid, 2023). Appetite is the desire to obtain certain foods. Appetite is related to the aroma, taste, appearance and attractiveness of food which can be considered a metaphor for feelings of wanting or liking valuable things in life. An improved appetite will increase a person's food intake, both energy intake and protein intake (p=0.008; p= 0.004) (Meylina Djafar and Heny Sulistyowati, 2016). A low appetite will reduce energy, protein, fiber, solid food, fruit and vegetable intake (van der Meij *et al.*, 2017).

Prolonged emesis gravidarum can result in poor nutrition. Pregnant women with poor nutrition are at risk of increasing the incidence of anemia, preeclampsia, postpartum hemorrhage, infectious diseases and maternal death (WHO, 2011; UNICEF, 2024). A low nutritional index causes a high incidence of preeclampsia (Wei *et al.*, 2022).

Poor nutrition during pregnancy can cause stillbirth, low birth weight, wasting, malformations, mental retardation and delayed child development (delays in language, motor, and cognitive development) in children under 24 months (Neves *et al.*, 2020). The newborn's birth weight decreases with the mother's anthropometric status (Woldeamanuel *et al.*, 2019). MUAC research conducted on pregnant women in Cambodia had a significant correlation with the prevalence of

stunting in children born, pregnant women with low MUAC values had a high risk (>10%) of having stunted children (p=0.032) (Kpewou *et al.*, 2020). Stunting has negative effects in the short or long term, affecting children's health and development.

This issue is still a concern, given the high percentage—50%—of pregnant women in Indonesia who have dietary problems. Pregnant women's nutritional status can be assessed by measuring or weighing their body weight, height, and MUAC and by examining their mother's hemoglobin (Hb) levels. The mother gained weight during her pregnancy; her normal BMI was 10–12 kg, her normal MUAC was 23.5 cm, and her normal Hb level was 11–13 grams/dL (Budiono, Dewi and Dewi, 2022).

### 4.1 Kundalini yoga on changes in upper arm circumference

An easy-to-measure indicator of nutritional status is upper arm circumference, particularly in pregnant women. A person's upper arm circumference is a good measure of their protein and energy intake (Ververs *et al.*, 2013). Upper arm circumference is strongly related to a person's body mass index (Miele *et al.*, 2021). Upper arm circumference aims to measure muscle and fat in the arms (Jeyakumar, Ghugre and Gadhave, 2013). The MUAC cut-off point varies in each country, in Indonesia the MUAC cut-off is >23.5 cm. So when someone has a MUAC <23.5 cm, it means that the person has a chronic energy deficiency. The increase in a person's upper arm circumference is influenced by body mass index, anemia status, pregnancy spacing, parity and the mother's education level (Kurniawati, 2022). Maternal characteristics, including body mass index (BMI) and socioeconomic status, have impacted maternal MUAC. Low MUAC is linked to working moms, mothers with low levels of education, and mothers who are underweight, all of which may affect maternal health. In Indonesia, the danger of chronic energy deficiency (CED) is indicated by a MUAC limit of less than 23.5 cm. Low birth weight is associated with pregnant women with low MUAC (Yosefinata, Zuhairini and Luftimas, 2022).

MUAC measurements for both groups showed no significant difference (p=0.08, p>0.05). Nonetheless, the treatment group had an average increase in upper arm circumference that was greater than that of the control group (treatment:

0.096 cm, control: 0.012 cm). This most likely occurs as a result of kundalini yoga's ability to decrease pregnancy-related nausea and increase the mother's appetite (Khusmitha *et al.*, 2023).

Consuming a variety of foods and consuming sufficient protein will improve a person's nutritional status. The food consumed will be stored regularly and continuously as glycogen, protein, and fat (Harna *et al.*, 2024). Consuming foods high in protein can improve absorption to the best possible level to preserve and grow muscle mass. Based on previous research, it is stated that nutritional monitoring includes knowing nutritional status, recommending daily menus, monitoring food consumption, nutritional counseling and health education related to maternal nutrition during pregnancy can increase a person's arm circumference (Abadi and Putri, 2020).

**4.2 Body Weight**

Any change in any of the body's tissues will result in a change in body weight. The most reliable measure of nutritional status, growth, and development is body weight (Mardliyana, 2022). Gaining weight when pregnant is typical for the fetus's growth and development. Weight gain during pregnancy is divided into two parts, namely the results of conception and the increase in maternal tissue. The products of conception in question are the fetus, placenta and amniotic fluid. The placenta adds 5%, the amniotic fluid adds 6%, and the fetus increases body weight by 25% on average. The increase in maternal tissue is two-thirds of the total increase in body weight. The increase includes uterine weight, mammary tissue weight, maternal blood volume, extracellular fluid, fat and tissue reserves (Suitor, 1991; Abrams and Selvin, 1995).

Weight gain during pregnancy varies greatly. Recommendations for weight gain are adjusted to the mother's body mass index (BMI) before pregnancy. In Indonesia, mothers with a BMI <18.5 are 12.5-18kg, a BMI 18.5-24.9 is 11.5-16kg, a BMI 25-29.9 is 7-11.5kg and a BMI ≤30 is 5-9kg (Kemenkes RI, 2021).

Maternal and neonatal problems are linked to weight gain that is below recommended limits. Lack of weight increase will result in SGA, preterm, LBW, and neonatal death. While excessive weight growth is linked to preterm birth, a higher chance of cesarean birth, macrosomia, or large for gestational age (LGA),

childhood obesity, hypertensive pregnancy syndrome, gestational diabetes, and postpartum weight retention (which can lead to maternal obesity).

Body weight did not significantly change between the control and research groups' pre- and post-research results (p=0.254; p=0.289). Food security, strong social support, and more prenatal care all affect how much weight pregnant women gain (p=0.008, p=0.007, p<0.001) (Dolatian *et al.*, 2020). Previous research also stated that yoga did not affect body weight in children or adults (Lauche *et al.*, 2016).

## CONCLUSION AND SUGGESTION

Kundalini yoga was shown to be ineffective in increasing MUAC and weight gain in the 1st trimester with emesis gravidarum. Future research can observe mothers recalling nutrition every day.

## DECLARATION

### Conflict of Interest

This research contains no conflicts of interest. This ensures transparency and integrity in the research process.

### Authors' Contribution

All of the authors contribute in every stage of the research, from the initial concept to the drafting of the article.

### Ethical Approval

Ethical approval number: 110/fkes/EP/2023.

### Funding Source

Community Service, and the Directorate General of Higher Education, Research and Technology provided money for a Beginner Lecturer Research Grant.

**Data Availability**

Data is retrieved as needed.

**Acknowledgements**

Thank you to all respondents, health workers in the Wilangan Community Health Center area

## REFERENCE

Abadi, E. and Putri, L.A.R. (2020) 'Nutrition Assistance Increases the Size of Middle-Upper Arm Circumference of Pregnant Women With Chronic Energy Deficiency', *Public Health of Indonesia*, 6(4), pp. 157–162. Available at: https://doi.org/10.36685/phi.v6i4.354.

Abrams, B. and Selvin, S. (1995) 'Maternal weight gain pattern and birth weight', *Obstetrics & Gynecology*, 86(2), pp. 163–169. Available at: https://doi.org/https://doi.org/10.1016/0029-7844(95)00118-B.

ACOG (2020) *Morning Sickness: Nausea and Vomiting of Pregnancy*, *ACOG*. Available at: https://www.acog.org/womens-health/faqs/morning-sickness-nausea-and-vomiting-of-pregnancy.

Budiono, N.M., Dewi, D. al and Dewi, S. (2022) 'ASSOCIATION BETWEEN THIRD TRIMESTER MID-UPPER ARM CIRCUMFERENCE (MUAC) AND ANEMIA IN NEONATUS', *Journal of Widya Medika Junior*, 4(3), p. 3.

Connolly, C.P., Mudd, L.M. and Pivarnik, J.M. (2019) 'Associations Among Work-Related and Leisure-Time Physical Activity With Level of Nausea During Pregnancy.', *American journal of lifestyle medicine*, 13(4), pp. 424–431. Available at: https://doi.org/10.1177/1559827617695783.

Dolatian, M. *et al.* (2020) 'Weight gain during pregnancy and its associated factors:

A Path analysis', *Nursing Open*, 7(5), pp. 1568–1577. Available at: https://doi.org/10.1002/nop2.539.

Fitria, H. *et al.* (2023) 'Lemon aromatherapy for emesis gravidarum: A systematic review', 2(1), pp. 8–16.

Harna, H. *et al.* (2024) 'Prevalence and determinant factors of Chronic Energy Deficiency (CED) in pregnant women', *AcTion: Aceh Nutrition Journal*, 9(1), p. 65. Available at: https://doi.org/10.30867/action.v9i1.1443.

Jeyakumar, A., Ghugre, P. and Gadhave, S. (2013) 'Mid-Upper-Arm Circumference (MUAC) as a Simple Measure to Assess the Nutritional Status of Adolescent Girls as Compared With BMI', *Infant, Child, and Adolescent Nutrition*, 5(1), pp. 22–25. Available at: https://doi.org/10.1177/1941406412471848.

Kaňková, Š. *et al.* (2023) 'Associations between nausea and vomiting in pregnancy, disgust sensitivity, and first-trimester maternal serum free β-hCG and PAPP-A', *Hormones and Behavior*, 152, p. 105360. Available at: https://doi.org/https://doi.org/10.1016/j.yhbeh.2023.105360.

Kemenkes (2022) 'Hasil Survei Status Gizi Indonesia (SSGI) 2022', *Kemenkes*, pp. 1–150.

Kemenkes RI (2021) *Buku Kesehatan Ibu dan Anak*. Jakarta: Kemenkes RI.

Khusmitha, Q.N. *et al.* (2023) 'Efficacy of the Kundalini Method in Alleviating Emesis Gravidarum during the First Trimester', pp. 1598–1606. Available at: https://scholar.google.co.id/citations?hl=id&user=WGrKDtUAAAAJ.

Kpewou, D.E. *et al.* (2020) 'Maternal mid-upper arm circumference during pregnancy and linear growth among Cambodian infants during the first months of life.', *Maternal & child nutrition*, 16 Suppl 2(Suppl 2), p. e12951. Available at: https://doi.org/10.1111/mcn.12951.

Kurniawati, R.N. (2022) *FAKTOR-FAKTOR YANG BERHUBUNGAN DENGAN KEJADIAN KEKURANGAN ENERGI KRONIS PADA IBU HAMIL DI UPT PUSKESMAS WINONG TAHUN 2021*. Poltekes Kemenkes Yogyakarta. Available at: http://eprints.poltekkesjogja.ac.id/9933/.

Lauche, R. *et al.* (2016) 'A systematic review and meta-analysis on the effects of

yoga on weight-related outcomes', *Preventive Medicine*, 87, pp. 213–232. Available at: https://doi.org/https://doi.org/10.1016/j.ypmed.2016.03.013.

Liu, C. *et al.* (2022) 'Emerging Progress in Nausea and Vomiting of Pregnancy and Hyperemesis Gravidarum: Challenges and Opportunities', *Frontiers in Medicine*, 8. Available at: https://doi.org/10.3389/fmed.2021.809270.

Lowe, S. *et al.* (2019) *Guideline For The Management Of Nausea and Vomiting In Pregnancy and Hyperemesis Gravidarum*, *Society Of Obstetric Medicine Of Australia And New Zealand*.

Macias, L. (2024) *Evolution of Morning Sickness and How it Relates to Maternal Nutrition and Fetal Development*.

Mardliyana, N.E. (2022) 'Peningkatan Pengetahuan Ibu Hamil Tentang Penanganan Keluhan Fisiologis Dengan Media Video Pakbuto (Penanganan Keluhan Ibu Hamil Tanpa Obat) Di Kelurahan Sutorejo Kecamatan Mulyorejo Surabaya', *Jurnal Pengabdian Masyarakat Kebidanan*, 4(1), p. 11. Available at: https://doi.org/10.26714/jpmk.v4i1.8894.

van der Meij, B.S. *et al.* (2017) 'Poor Appetite and Dietary Intake in Community-Dwelling Older Adults.', *Journal of the American Geriatrics Society*, 65(10), pp. 2190–2197. Available at: https://doi.org/10.1111/jgs.15017.

Meylina Djafar and Heny Sulistyowati (2016) 'HUBUNGAN NAFSU MAKAN, PENGETAHUAN GIZI DENGAN ASUPAN ENERGI, PROTEIN DAN STATUS GIZI DI RUMKITAL Dr. MINTOHARDJO', *STIKes Binawan*, 2, pp. 1–9.

Miele, M.J. *et al.* (2021) 'Proposal of MUAC as a fast tool to monitor pregnancy nutritional status: Results from a cohort study in Brazil', *BMJ Open*, 11(5), pp. 1–11. Available at: https://doi.org/10.1136/bmjopen-2020-047463.

Muchtar, A.S. and Rasyid, I.N. (2023) 'Manajemen Asuhan Kebidanan Antepartum Ny "R" Gestasi 7 Minggu 2 Hari Dengan Emesis Gravidarum Di UPT Puskesmas Bajoe Kabupaten Bone', *Jurnal Midwifery*, 5(1), pp. 1–10. Available at: https://doi.org/10.24252/jmw.v5i1.35174.

Mustakim, M.R.D. *et al.* (2022) 'Impact of Stunting on Development of Children between 1-3 Years of Age.', *Ethiopian journal of health sciences*, 32(3), pp. 569–578. Available at: https://doi.org/10.4314/ejhs.v32i3.13.

Neves, P.A.R. *et al.* (2020) 'Poor maternal nutritional status before and during pregnancy is associated with suspected child developmental delay in 2-year old Brazilian children', *Scientific Reports*, 10(1), p. 1851. Available at: https://doi.org/10.1038/s41598-020-59034-y.

NIH (2024) *Yoga: What You Need To Know*, *National center for complementary and integrative health*. Available at: https://www.nccih.nih.gov/health/yoga-what-you-need-to-know.

Suitor, C.W. (1991) *Perspectives on nutrition during pregnancy: Part I, weight gain; part II, nutrient supplements*, *Journal of the American Dietetic Association*. Available at: https://doi.org/10.1016/s0002-8223(21)01073-7.

UNICEF (2024) *Maternal Nutrition*, *UNICEF*. Available at: https://www.unicef.org/nutrition/maternal#:~:text=During pregnancy%2C poor diets lacking,and developmental delays for children.

Varsa, R.G. *et al.* (2021) 'Gastroesophageal reflux disease in pregnancy', *Romanian Journal of Medical Practice*, 16(July), pp. 28–31. Available at: https://doi.org/10.37897/RJMP.2021.S3.6.

Ververs, M.-T. *et al.* (2013) 'Which anthropometric indicators identify a pregnant woman as acutely malnourished and predict adverse birth outcomes in the humanitarian context?', *PLoS currents*, 5. Available at: https://doi.org/10.1371/currents.dis.54a8b618c1bc031ea140e3f2934599c8.

Wei, S. *et al.* (2022) 'Low Prognostic Nutritional Index Contributes to High Adverse Events in Preeclampsia.', *Disease markers*, 2022, p. 1187742. Available at: https://doi.org/10.1155/2022/1187742.

WHO (2011) *Nutrition of women in the preconception period, during pregnancy and the breastfeeding period*. Jenewa. Available at: https://apps.who.int/gb/ebwha/pdf_files/EB130/B130_11-en.pdf.

WHO (2015) *Global Nutrition Targets 2025 Stunting Policy Brief*, *WHO*. Switzerland. Available at: https://doi.org/10.7591/cornell/9781501758898.003.0006.

WHO (2022) *physical activity*, *WHO*. Available at: https://www.who.int/news-room/fact-sheets/detail/physical-activity (Accessed: 20 June 2024).

WHO (2024) *Child malnutrition: Stunting among children under 5 years of age*, *WHO*. Available at: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/72 (Accessed: 22 February 2024).

Woldeamanuel, G.G. *et al.* (2019) 'Effect of nutritional status of pregnant women on birth weight of newborns at Butajira Referral Hospital, Butajira, Ethiopia.', *SAGE open medicine*, 7, p. 2050312119827096. Available at: https://doi.org/10.1177/2050312119827096.

Yosefinata, K., Zuhairini, Y. and Luftimas, D.E. (2022) 'Association Between Maternal Mid-Upper Arm Circumference and Baby's Birth Weight', *Majalah Kedokteran Bandung*, 54(3), pp. 172–176. Available at: https://doi.org/10.15395/mkb.v54n3.2701.

Zhang, H. *et al.* (2020) 'Risk factors of prolonged nausea and vomiting during pregnancy', *Risk Management and Healthcare Policy*, 13, pp. 2645–2654. Available at: https://doi.org/10.2147/RMHP.S273791.

Zhu, S. *et al.* (2023) 'Nausea and Vomiting during Early Pregnancy among Chinese', *Nutrients*, 15(933), pp. 1–11.

# FACTORS AFFECTING PREGNANT WOMEN'S KNOWLEDGE LEVEL OF PREECLAMPSIA SCREENING

*Salwa Fatharani [1]* iD *, Andriyanti [1]* iD *, Ernawati [2]* iD *, Atika [3]* iD

[1]Midwifery Study Program, Faculty of Medicine Universitas Airlangga, Surabaya
[2]Department Of Obstetrics and Gynecology, Faculty of Medicine Universitas Airlangga, DR Soetomo Regional Hospital
[3]Department Public Health, Faculty of Medicine Universitas Airlangga, Surabaya

Correspondence Address:
Mayjen Prof. Dr Moestopo No 47 Surabaya, Indonesia
Email : salwa.fatharani.azhima-2022@fk.unair.ac.id

## ABSTRACT

**Background**: Preeclampsia is a hypertensive syndrome affecting 3–8% of pregnancies worldwide, involving multiple organ systems, and typically occurring after 20 weeks of gestation. In Surabaya, 1,265 cases were reported in 2023. Optimal prevention of preeclampsia is achieved through early screening at 11–13 weeks of gestation during antenatal care. Maternal knowledge and awareness are essential determinants of timely screening, as non-adherence to antenatal care has been associated with insufficient understanding of pregnancy management, delayed recognition of complications including preeclampsia and chronic conditions, and has ultimately contributed to the persistently high rates of preeclampsia and maternal and neonatal mortality in Indonesia. The aim was to analyze factors influencing pregnant women's knowledge regarding preeclampsia screening. **Method:** This research employed a quantitative design with a cross-sectional approach, using a purposive sampling method. This study involved 91 pregnant women who met the inclusion criteria: women in the first to third trimester of pregnancy who had attended at least two antenatal care visits. A structured questionnaire was used as the research instrument. Data were analyzed using the Spearman rank correlation test to examine the relationship between educational level and parity experience and the pregnant women's level of knowledge regarding preeclampsia screening. **Results:** The study included 91 pregnant women as respondents. 56 % respondent had secondary level of education, 52% respondents were moderate parity and 52 % respondents demonstrated good knowledge, Showed significant associations between education level ($p < 0.001$) and parity ($p = 0.031$) with knowledge of preeclampsia screening. **Conclusions:** That demographic factors and reproductive experiences influence maternal knowledge. Therefore, education on preeclampsia screening should be tailored to maternal characteristics, and the active involvement of healthcare providers is essential to support comprehensive, holistic, and sustainable midwifery care.

**Keywords:** pregnant women, knowledge, preeclampsia screening, parity, education

# INTRODUCTION

Preeclampsia is one of the leading causes of maternal and perinatal morbidity and mortality, with a global prevalence of 3–8% of pregnancies and an incidence rate seven times higher in developing countries (Osungbade, 2011). Preeclampsia increases the risk of hypertension, stroke, and cardiovascular disease in mothers, as well as intrauterine growth restriction (IUGR), preterm delivery, and low birth weight in infants. Hypertensive disorders in pregnancy are the second leading cause of maternal mortality in Indonesia, accounting for 412 of 4,482 maternal deaths (Indonesian Ministry of Health, 2023).

The East Java Health Profile (2023) reported a decline in both first (K1) and fourth (K4) antenatal care (ANC) visits, partly due to pregnant women failing to attend ANC appointments on time, which in turn reduces the coverage of screening and early detection during pregnancy. Non-adherence to ANC is also linked to low maternal knowledge regarding pregnancy care and delayed detection of complications, including preeclampsia. The American College of Obstetricians and Gynecologists (ACOG) emphasizes that preeclampsia can be secondarily prevented through early pregnancy screening, ideally conducted between 11 and 13 weeks of gestation. In Indonesia, preeclampsia screening is typically performed by physicians and midwives through biophysical examinations. When pregnant women understand the risks of preeclampsia, they are more likely to seek timely examinations and adopt preventive measures (Wulandari & Zulissetiana, 2020). However, limited knowledge and poor adherence to ANC continue to hinder optimal screening and early detection of at-risk cases (Yasinta & Aprilia, 2023).

Education plays a vital role in shaping maternal attitudes and behaviors toward ANC compliance. Ernias (2020) found that low educational attainment was associated with limited understanding of the importance of ANC, while Mustafa and Nur (2022) reported that mothers with higher education demonstrated better knowledge and greater adherence to scheduled visits. Such compliance supports effective preeclampsia screening and the integrated implementation of ANC. Parity also contributes to maternal knowledge, as previous pregnancies provide valuable learning experiences that foster more rational decision-making (Astuti, 2017). Therefore, education and parity are key determinants of ANC adherence and the

effectiveness of preeclampsia screening. Adequate knowledge motivates mothers to seek care earlier and more consistently, enabling the prompt management of complications and ultimately reducing maternal and neonatal mortality.

In 2023, the prevalence of severe preeclampsia in Indonesia reached 63.7% (Daniel et al., 2024). In East Java, 499 maternal deaths were reported, 20 of which occurred in Surabaya. The city also recorded 1,265 preeclampsia cases out of 7,997 obstetric complications. Maternal knowledge of preeclampsia screening plays a crucial role in preventing pregnancy-related complications. The Simomulyo Public Health Center in Surabaya (Puskesmas Simomulyo) was selected as the study site due to its high ANC coverage and a notable number of preeclampsia cases, including maternal deaths associated with hypertension in 2023. Therefore, this study aims to analyze the influence of education and parity on maternal knowledge of preeclampsia screening.

**METODS**

This study employed a quantitative approach with a cross-sectional design and was conducted at the Simomulyo Public Health Center, Surabaya, from April to June 2025. The study population consisted of pregnant women in their first, second, or third trimester who attended ANC visits at the health center. The sample size was determined using the formula for two proportions adapted from Kusumastuti (2018) which examined the relationship between maternal characteristics, parity, and sources of information and maternal knowledge of warning signs during pregnancy. A 95% confidence level and 90% statistical power were applied to ensure validity and reliability.

A total of 91 respondents were recruited using purposive sampling based on inclusion criteria of having attended at least two ANC visits at a healthcare facility and providing informed consent to participate. Data were collected using a structured questionnaire that had been previously tested for validity and reliability. Education and parity served as the independent variables, analyzed in relation to maternal knowledge of preeclampsia screening. Data analysis was performed using Spearman's rank correlation test to determine the associations between variables.

## RESULT AND DISCUSSION

The study included 91 pregnant women as respondents. The majority had a secondary level of education (56%), nearly one-third had higher education (30%), and a minority had a low level of education (14%). Regarding parity, more than half were women of moderate parity (52%), followed by primiparous mothers (45%), with only a small proportion being women of high parity (3%). In terms of knowledge of preeclampsia screening, just over half of the respondents demonstrated good knowledge (52%), nearly half had fair knowledge (46%), and only a few showed poor knowledge (2%).

**Table 1. Frequency distribution of respondent characteristics**

| Category | Characteristics | n | % |
|---|---|---|---|
| **Education level** | Low (Elementary/Junior High School) | 13 | 14 |
| | Secondary (Senior High School/Vocational School) | 51 | 56 |
| | Higher (Diploma/Bachelor's degree) | 27 | 30 |
| **Parity** | Primiparous (1) | 41 | 45 |
| | Moderate parity (2-4) | 47 | 52 |
| | High parity (≥ 5) | 3 | 3 |
| **Level of knowledge of preeclampsia screening** | Poor (< 60%) | 2 | 2 |
| | Fair (60 – 79%) | 42 | 46 |
| | Good (80 – 100%) | 47 | 52 |
| **Total** | | 91 | 100 |

Data source: primary data, 2025.

Table 1 presents the frequency distribution of respondent characteristics. These findings suggest that maternal education and parity may play an important role in shaping knowledge levels about preeclampsia screening, which could contribute to the early detection and prevention of pregnancy complications. Statistical analysis using Spearman's rank correlation revealed a positive relationship between maternal education level and knowledge of preeclampsia

screening (p < 0.001). The frequency distribution is shown in Table 2. Furthermore, the correlation coefficient (r) indicated a moderate positive association, suggesting that higher maternal education is linked to better knowledge of preeclampsia screening.

**Table 2. Relationship between education level and knowledge of preeclampsia screening**

| Education level | Poor | | Fair | | Good | | Total | p-value | $r_s$ |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | | | |
| **Low** | 2 | 15 | 8 | 62 | 3 | 23 | 13 (100%) | < 0.001 | 0.429 |
| **Secondary** | 0 | 0 | 29 | 57 | 22 | 43 | 51 (100%) | | |
| **Higher** | 0 | 0 | 5 | 18 | 22 | 82 | 27 (100%) | | |
| **Total** | 2 | 2 | 42 | 46 | 47 | 52 | 91 (100%) | | |

The findings in Table 2 reveal a significant positive correlation between maternal education level and knowledge of preeclampsia screening (p < 0.001, $r_s$ = 0.429). Women with higher education demonstrated better understanding than those with lower or secondary education, who generally showed only fair knowledge. This indicates that education plays a pivotal role in enhancing maternal awareness and comprehension of preeclampsia screening, as it increases access to health information and the ability to interpret and apply it effectively.

Higher educational attainment strengthens an individual's capacity to seek, comprehend, and utilize health information. Pregnant women with higher education levels often have broader access to credible information sources, greater health literacy, and a more receptive attitude toward preventive health measures, including early detection of preeclampsia. Similar findings were reported by Lestari et al. (2023) and Harahap (2020), who noted that education improves maternal understanding of early preeclampsia detection, thereby supporting informed decision-making in pregnancy care.

Although formal education exerts a strong influence, this study also suggests that knowledge can be enhanced through alternative learning channels and media. Notably, 22 respondents with secondary education achieved good knowledge scores, indicating proactive efforts to seek health information during

pregnancy. Nevertheless, individuals with higher education (diploma, bachelor's, or master's degree) tend to possess better skills in evaluating and applying reliable health information. As emphasized by Nursalam (2008) and Serrano-Gil & Jacob (2010), both formal and non-formal education shape knowledge acquisition. Consequently, education remains a key determinant in improving maternal knowledge and awareness of reproductive health, particularly in the prevention and early detection of preeclampsia (Mekie et al., 2021).

**Table 3. Relationship between parity and level of knowledge of preeclampsia screening**

| Parity | Poor | | Fair | | Good | | Total | p-value | $r_s$ |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | | | |
| **Primiparous** | 0 | 0 | 15 | 36 | 26 | 63 | 41 (100%) | 0.031 | 0.226 |
| **Moderate parity** | 2 | 4 | 25 | 53 | 20 | 43 | 47 (100%) | | |
| **High parity** | 0 | 0 | 2 | 66 | 1 | 33 | 3 (100%) | | |
| **Total** | 2 | 2 | 42 | 46 | 47 | 52 | 91 (100%) | | |

The data in Table 3 indicate a significant relationship between parity and maternal knowledge of preeclampsia screening. Primiparous women generally demonstrated higher levels of knowledge than women of moderate or high parity, who predominantly exhibited only fair understanding. This finding suggests that first-time mothers are more receptive to health information and antenatal counseling, whereas multiparous women may rely on prior experiences and engage less actively with updated guidance. Statistical analysis using Spearman's rank correlation confirmed a positive and significant association between parity and maternal knowledge ($p = 0.031$, $r_s = 0.226$), indicating that cumulative reproductive experience contributes to variations in maternal awareness.

Most primiparous respondents exhibited good knowledge, likely due to heightened motivation and anxiety associated with the first pregnancy, which encourages proactive information-seeking and consistent attendance at antenatal consultations. Shodiqoh and Fahriani (2018) reported that primigravida mothers experience greater concern and curiosity regarding pregnancy-related risks,

fostering stronger engagement with preeclampsia screening and preventive measures.

Among multiparous women, knowledge levels were generally moderate, despite their greater obstetric experience. This may be attributed to reduced vigilance and overconfidence stemming from previous uneventful pregnancies, as well as limited exposure to updated guidance during antenatal visits (Rahayu & Yunarsih, 2020).

Nevertheless, parity offers valuable opportunities for experiential learning. Dahniar et al. (2023) highlight that repeated interactions with healthcare providers across successive pregnancies enhance maternal preparedness for potential complications. Each gestational experience functions as a learning process that strengthens maternal awareness and decision-making in subsequent pregnancies. Similarly, Heryanti and Sintia (2022) emphasize that accumulated childbirth experience equips mothers to anticipate and manage complications, including preeclampsia. Thus, parity operates as both a behavioral and educational determinant, shaping maternal knowledge and engagement in preventive health practices.

## CONCLUSION AND SUGGESTIONS

This study indicates that most pregnant women have good knowledge of preeclampsia screening. These findings highlight the critical role of education and reproductive experience in enhancing maternal understanding of preeclampsia. Women with adequate knowledge and awareness are better prepared to make informed decisions, including timely attendance at antenatal care (ANC) services.

Innovations in health services, particularly at the primary care level, can be promoted through interactive and personalized educational strategies tailored to maternal educational backgrounds and reproductive experiences. Examples include educational videos, prenatal classes, and the involvement of community health workers within the community. Such interventions aim to facilitate early recognition of preeclampsia and other pregnancy-related danger signs, ensuring optimal management.

Ultimately, these efforts contribute to reducing the incidence of preeclampsia, as well as maternal and infant mortality in Indonesia, supporting improved maternal and neonatal health outcomes nationwide.

## DECLARATION

### Conflict of Interest

Authors declare no conflict of interest regarding the publication of this research.

### Authors' Contribution

All authors contributed significantly to the research, analysis, and writing of this article. Author designed the study and supervised data collection, performed statistical analysis, and contributed to data interpretation and manuscript preparation. All authors reviewed and approved the final version.

### Ethical Approval

This study obtained ethical clearance from the Health Research Ethics Committee, Faculty of Medicine, Universitas Airlangga (77/EC/KEPK/FKUA/2025), confirming that all procedures adhered to established ethical standards. Additional permission was granted by the Surabaya City Health Office (No. 000.9.2/2186/436.7.2/2025) and Simomulyo Public Health Center, Surabaya.

### Data Availability

The data supporting the findings of this study are available upon reasonable request from the corresponding author, with restrictions due to participant confidentiality.

respondents who willingly participated in this study. Furthermore, the authors acknowledge the lecturers and the academic community of the Midwifery Study Program, Faculty of Medicine, Universitas Airlangga, for their guidance and continuous support throughout this research.

## REFERENCES

Dahniar Dahniar, Ibrahim, R. and Yusuf, S.A. (2023). Hubungan Paritas Dengan Pengetahuan Ibu Hamil Tentang Tanda Bahaya Kehamilan di UPTD Puskesmas Lambandia. *Journal Pelita Sains Kesehatan*, 3(4), pp.54–60.

Daniel, A. S., Dewi, A. S., Nurdin, H., Hamsah, M. and Ala Husain, A. A. (2024). Karakteristik Pasien Preeklampsia di RSIA Siti Khadijah 1 Muhammadiyah Makassar Tahun 2023, *Prepotif : Jurnal Kesehatan Masyarakat*, 8(1), pp. 1010–1015. doi: 10.31004/prepotif.v8i1.27023.

Dinkes Provinsi Jatim. (2024). *Profil Kesehatan Jawa Timur 2023*: 87-92

Ernias, Andi Maryam and Haris, R. (2020). Pengetahuan dan Sosial Budaya Terhadap Perilaku Ibu Hamil dalam Pemeriksaan Antenatal Care. *UNM Environmental Journals*, 3(3), pp.125–125. doi: https://doi.org/10.26858/uej.v3i3.16211.

Harahap, Htd (2020). Pengaruh Kemampuan Ibu Hamil Dalam Melakukan Deteksi Dini Risiko Preeklamsia Terhadap Paritas, Pengetahuan dan Keterpaparan Informasi. *Jurnal Wahana Inovasi*, 9(2), 33-38

Heryanti And Sintia, C. (2022). The Relationship of Parity and Education With Pregnant Women's Knowledge About Pregnancy Hazard Sign at Tulung Puskesmas Selapan 2020. *Jurnal Kesehatan dan Pembangunan*, 12(24), pp.30–39. doi: https://doi.org/10.52047/jkp.v12i24.165.

Kemkes.Go.Id. (2024). *Profil Kesehatan Indonesia 2023*: 105-111

Kusumastuti, Istiana. (2018). Hubungan Karakteristik Ibu, Paritas dan Sumber Informasi Dengan Pengetahuan Ibu Tentang Tanda Bahaya Kehamilan (di Puskesmas Kecamatan Karang Tengah Kabupaten Cianjur). *Artikel Penelitian*. 8 (3):124-132

Lestari, Y., Jahro, S., & Wulandari, D. (2023). Status Gravida, Tingkat Pengetahuan, Usia, dan Kepatuhan ANC Terhadap Kemampuan Ibu Hamil Melakukan Deteksi Dini Resiko Preeklampsia di Puskesmas Sumberasih. *Jurnal Riset Kebidanan Indonesia,* 6(2), 104-111. doi: https://doi.org/10.32536/jrki.v6i2.226

Mekie, M., Addisu, D., Bezie, M., Melkie, A., Getaneh, D., Bayih, W.A. And Taklual, W. (2021). Knowledge and Attitude of Pregnant Women Towards Preeclampsia and its Associated Factors in South Gondar Zone, Northwest Ethiopia: A Multi-Center Facility-Based Cross-Sectional Study. *BMC Pregnancy and Childbirth*, 21(1). doi:https://doi.org/10.1186/s12884-021-03647-2.

Mustafa, S.R. and Nur Ismi Wahyuni (2022). Faktor-Faktor Yang Mempengaruhi Perilaku Ibu Terhadap Ketepatan Kunjungan Antenatal Care di RSU Bahagia Makassar. *Jurnal Keperawatan Muhammadiyah*, 7(2). doi:https://doi.org/10.30651/jkm.V7i2.12611.

Osungbade., Ige. (2011). Public Health Perspectives Of Preeclampsia In Developing Countries: Implication For Health System Strengthening. *The Hindawi Journal Of Pregnancy*: 1-6

Rahayu, D., & Yunarsih. (2020). Predisposing Factors Of The Pre Exlampsia. 10(1), 19–26.

Shodiqoh, E. R., & Fahriani, S. (2018). Perbedaan Tingkat Kecemasan dalam Menghadapi Persalina antara Primigravida dan Multigravida. *Jurnal Berkala Epidemologi Surabaya*. Universitas Airlangga Jawa Timur, 141–150.

Wulandari, D., Alkaf, S., & Zulissetiana, E. F. (2020). *Tingkat Pengetahuan Ibu Hamil Tentang Preeklampsia di Klinik Al-Syifa Kota Palembang.* Disertasi. Universitas Sriwijaya

Yasinta Eka, Aprilia (2023). *Hubungan Pengetahuan Dan Kepatuhan Antenatal Care (Anc) Dengan Kejadian Preeklamsia Pada Ibu Hamil* (Studi Di Poli Kandungan Rsud Syarifah Ambami Rato Ebu) - Repositori Stikes Ngudia Husada Madura

# THE EFFECTIVENESS OF THE DEVELOPMENT OF GROSS MOTORIC SKILLS AMONG PRESCHOOL CHILDREN BETWEEN PRE AND POST STIMULATION OF TRADITIONAL *ENGKLEK* GAMES

*Andiny Rose Wulandari [1]* iD *, Indah Rahmaningtyas[1]* iD *,*
*Dwi Estuning Rahayu [1]* iD *, Sumy Dwi Antono[1]* iD *,*

[1] Bachelor of Applied Midwifery Study Program,
Health Polytechnic of the Ministry of Health Malang, Kediri, Indonesia

Alamat korespondensi:
Jl. KH. Wachid Hasyim No 64 Kec. Mojoroto Kota Kediri, Indonesia
Email : andinyrose01@gmail.com

### ABSTRACT

**Background**: Gross motoric skills are essential abilities during preschool children's development, involving significant body movements such as running, jumping, and maintaining balance. One traditional Indonesian game, called "engklek" or "hopscotch"  , is believed to support the development of children's gross motor skills. A lack of gross motor stimulation can negatively impact the child's growth and development. Therefore, it is crucial for parents, teachers, and guardians to ensure children engage in activities that stimulate gross motoric skills. **Method**: This study employed a pre-experimental design, specifically using a one-group pre-test and post-test design. The population consisted of 39 preschool children, with 36 respondents randomly selected through simple random sampling. The instrument used in this study was the traditional game of "engklek" to collect data, with pre-tests and post-tests conducted to measure the respondents' ability to lift their legs according to their age. Data were analyzed using the Wilcoxon signed-rank test, with significant results ($p < 0.005$).**Results**: The final results showed that stimulation using the traditional "engklek" game positively impacted the gross motor development of preschool children aged 5 to 6 years at Al-Amin Kindergarten in Kediri City. **Discussion**: This study will highlight the importance of paying attention to gross motor stimulation in preschool children, including through traditional games like "engklek". It will also emphasize the need to monitor children's gross motor development according to their age to ensure optimal progress.

**Keywords**: Motor Development, Gross Motor Skills, Preschool Children

## INTRODUCTION

Motor skills refer to the ability of the nervous system to control motor abilities. One of the important aspects of children's lives is the development of their motor skills, which should be optimal (Sutapa et al., 2021). Generally, gross motor skills develop first, followed by the development of fine motor skills. Gross motor development refers to the development of movement, including balance and

coordination between extremities, such as crawling, walking, jumping, or running. By the age of 5 to 6 years, children should be able to walk in a straight line and stand on one foot for 11 seconds (Wikaningtyas & Basith, 2022). The success rate of early childhood development not only measures the physical condition and health of children but also assesses their mental, emotional, social well-being, and behavior. Early detection of developmental deviations is crucial to understand that deviations include identifying and addressing any concerns raised by parents regarding their children's development (Pambudi et al., 2023).

All parents undoubtedly wish for their children to grow and develop optimally. A survey conducted by the A survey conducted by the **East Java Provincial Health Office** in East Java Province in 2023 indicated that 53% of children showed normal development for their age, 13% were in a questionable range, and 34% had developmental deviations (Widyantika et al., 2023). This prevalence shows no increase or decrease based on a survey conducted by the Indonesian Pediatric Association in East Java province on 2,634 children aged 0 to 6 years in 2018. The examination results indicated that ten percent of these developmental deviations were related to gross motor deviations, such as difficulties in sitting and walking (Ruauw et al., 2019).

Genetics is the primary factor influencing children's motoric skills. It is important to note that genetic factors are innate and hereditary. Both parents indirectly influence the development of early childhood. According to experts, every baby inherits various characteristics from their parents, including body shape, skin color, intelligence, talents, traits, and even diseases. Pregnancy is the second factor, and it is essential to remember that a child's development begins while the fetus is still in the womb (Juliana, 2022). Children may experience feelings of shame, low self-esteem, jealousy, and social rejection if they lack stimulation to detect their gross motor development from an early age (Fitriani et al., 2019). Therefore, stimulation provided by parents, family members, health cadres, and teachers are crucial for enhancing the gross motor development of preschool children aged 5 to 6 years (Nalle & Margiani, 2022).

An alternative method for early detection and stimulation of preschool children's gross motor skills is through play. Play is an activity that is repeated to

achieve enjoyment (Alfiah & Darsinah, 2023). Play can stimulate children to explore various aspects of development; it also serves as a strong foundation for children to discover solutions to problems in the future. Games for children should enhance language skills, cognitive abilities, physical movement, social-emotional development, religious education, and artistic skills. Both parents at home and teachers at school should be responsible for creating a comfortable and safe environment while providing supervision to ensure children's growth and development are well-stimulated through exploration and play (Hayati & Putro, 2021). Preschool children need physical activities in the form of games that stimulate the use of large muscles, provide opportunities for experimentation, and develop cooperative attitudes (helping each other) with peers through various play facilities. As gross motor skills improve, there are consequences for other areas of development, as motor capacity is linked to other developments in gross motor skill tasks (Wea et al., 2021).

All traditional games are historical heritage that deserves to be preserved so that we can continue to enjoy their benefits (Handayani, 2022). One of the various traditional games assessed to stimulate gross motor skills in preschool children is the traditional game of *engklek or hopscotch*. *Engklek* or *hopscotch* is a game where players jump from one foot to the next square on a flat surface on the ground. Children have a delightful opportunity to explore, discover, express their feelings, create, and learn through this traditional game of *engklek*. This game also trains body movement and agility skills while playing, enhances physical movement, develops communication and strategy skills, and fosters teamwork among children (Herdayanti & Watini, 2021).

**METHOD**

This study employs a quantitative pre-experimental method using pre-tests and post-tests. This method was chosen to compare the conditions before and after the treatment. Therefore, the objective of this research is to measure the development of gross motor skills in preschool children before and after receiving stimulation through the traditional game of *engklek*, particularly their ability to lift one leg according to their age. The study involves children at The study involves children from a kindergarten in Kediri, East Java Province, aged between 5 and 6

years. The criteria for selecting the sample include the number of children actively participating in learning activities at school, and the samples are selected randomly.

To obtain the desired data, this research uses a structured observation guide. The observation actions are conducted to identify the level of children's gross motor skills before and after the implementation of the traditional game of *engklek*. This process is divided into four phases: (1) Pre-test Implementation, which is used to assess the gross motor skills of children before the treatment is applied. This is conducted one day before the treatment with the traditional game of *engklek*; (2) Teacher and Colleague Briefing. This is done to train teachers and colleagues who will assist the researcher in this study while conducting the traditional game of *engklek*; (3) Treatment Implementation, where the traditional game of *engklek* is conducted four times, once a week, over a four-week period; (4) Post-test Implementation, which is conducted to evaluate the development of gross motor skills through stimulation with the traditional game of *engklek*. This takes place one day after the treatment with the traditional game of *engklek*.

The observation is complemented by pre-test records, which include notes on the children's motor skills in their ability to lift one leg before the treatment, notes on the development of children's abilities while playing the traditional game of *engklek*, and post-test records that contain notes on the children's motor skills in their ability to lift one leg after the treatment. The collected data will first undergo normality testing; if the results do not show a normal distribution, the data will be analyzed using the Wilcoxon matched-pairs test.

**Table 1. Observation Instrument for Gross Motor Development: Lifting One Leg According to Age**

| No | Respondent Name | Age 5 years (seconds) | | | | | Age 6 years (seconds) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | | VP | P | F | G | VG | VP | P | F | G | VG |
| 1 | | | | | | | | | | | |
| etc | | | | | | | | | | | |

Explanation :

VP (Very Poor) = If the child can stand for 2 seconds (5 years) and 7 seconds (6 years)

P (Poor) = If the child can stand for 3 seconds (5 years) and 8

seconds (6 years)

F (Fair)             = If the child can stand for 4 seconds (5 years) and 9

seconds (6 years)

G (Good)            = If the child can stand for 5 seconds (5 years) and 10

seconds (6 years)

VG (Very Good)      = If the child can stand for 6 seconds (5 years) and 11

seconds (6 years)

**Table 2. Observation Instrument for the Traditional Game of *Engklek***

| NO | STATEMENT | OBSERVATION RESULTS | | | |
|----|-----------|-----|-----|-----|-----|
| | | NYD | BD | DAE | WD |
| 1 | Throwing and placing the *gaco* accurately into a target box | | | | |
| 2 | Moving from box to box by hopping on one foot | | | | |
| 3 | Hopping from one box to another without stopping using one leg | | | | |
| 4 | Standing with a bend on one foot | | | | |
| 5 | Jumping while spreading both legs | | | | |
| 6 | Jumping with both feet followed by a body turn | | | | |

Explanation :

NYD (Not Yet Developed) = score of 1

BD (Beginning to Develop) = score of 2

DAE (Developing as Expected) = score of 3

WD (Well Developed) = score of 4

**RESULTS AND DISCUSSION**

**Results**

**1 General Characteristics of Respondents**

**Tabel 3** General Characteristics of Respondents

| General Characteristics | Variable | Frequency | Precentage |
|-------------------------|----------|-----------|------------|
| Age (years) | 5 | 16 | 44,4 % |
| | 6 | 20 | 55,6 % |

| | | | |
|---|---|---|---|
| Gender | Male | 16 | 44,4 % |
| | Female | 20 | 55,6 % |

Source: Primary Data, May 2024

From Table 3, based on age, it can be seen that the majority of respondents are aged 6 years, with 20 respondents. Additionally, based on gender, the majority of respondents are female, also with 20 respondents.

## 2 Analysis of Gross Motor Development in Preschool Children Aged 5-6 Years Before and After Stimulation with Traditional Engklek Games

The analysis results are shown in the table below:

**Table 4** Frequency Distribution of Gross Motor Development in Preschool Children Aged 5-6 Years Before Stimulation with Traditional Engklek Games

| General Characteristics | Variable | Frequency | Precentage |
|---|---|---|---|
| *Pre-test* | Very Good | 0 | 0 % |
| | Good | 12 | 33,3 % |
| | Fair | 20 | 55,6 % |
| | Poor | 4 | 11,1 % |
| | Very Poor | 0 | 0 % |
| **Total** | | **36** | **100 %** |

Source: Primary Data, May 2024

Based on Table 4, the distribution of gross motor development in preschool children aged 5-6 years before stimulation with traditional Engklek games shows that the majority of respondents fall into the good category regarding their gross motor skills, with 20 respondents (55.6%) categorized as fair, while a small number fall into the poor category, with 4 respondents (11.1%).

**Table 5** Frequency Distribution of Children's Development During Stimulation with Traditional Engklek Games.

| Variable | Stimulation 1 (%) | Stimulation 2 (%) | Stimulation 3 (%) | Stimulation 4 (%) |
|---|---|---|---|---|
| Very Good | 0 | 0 | 75 | 100 |
| Good | 19,5 | 44,5 | 25 | 0 |
| Fair | 58,3 | 47,2 | 0 | 0 |
| Poor | 22,2 | 8,3 | 0 | 0 |
| Very Poor | 0 | 0 | 0 | 0 |

Source: Primary Data, May 2024

Based on Table 5, the distribution of Engklek play development in preschool children aged 5-6 years shows that at each meeting, the stimulation provided consistently improved. The table indicates that during stimulation 1, the majority of respondents received a fair category result, totaling 21 respondents (58.3%). During stimulation 2, the majority also fell into the fair category with 17 respondents (47.2%). By stimulation 3, the majority achieved good results, totaling 27 respondents (75%), and by stimulation 4, all respondents achieved a very good category, totaling 36 respondents (100%).

**Table 6** Frequency Distribution of Gross Motor Development in Preschool Children Aged 5-6 Years After Stimulation with Traditional Engklek Games.

| General Characteristics | Variable | Frequency | Precentage |
|---|---|---|---|
| *Post-test* | Very Good | 25 | 69,4 % |
| | Good | 11 | 30,6 % |
| | Fair | 0 | 0 % |
| | Poor | 0 | 0 % |
| | Very Poor | 0 | 0 % |
| **Total** | | **36** | **100 %** |

Source: Primary Data, May 2024

Based on Table 6, the frequency distribution of gross motor development in preschool children aged 5-6 years after stimulation with traditional Engklek games shows that the majority of children fell into the very good category regarding their gross motor skills, with 25 respondents (69.4%), and nearly half of the respondents fell into the good category, totaling 11 respondents (30.6%).

**Table 7.** Statistical Test Results on the Effectiveness of Gross Motor Development in Children

| Gross Motor | Mean (SD) | Sum of Ranks | *p-value* |
|---|---|---|---|
| *Pretest* | 0,00 | 0,00 | 0,05 |
| *Posttest* | 18,50 | 666,00 | |

Based on Table 7, the analysis of gross motor development in children before and after stimulation with traditional Engklek games was conducted using the Wilcoxon signed-rank test. The results showed that the Asymp.Sig (2-tailed) value was 0.000. This means that 0.000 is less than 0.05, so H1 is accepted and H0 is rejected, indicating an improvement in development between pretest and posttest

results. Therefore, traditional Engklek games are considered effective in stimulating the gross motor skills of preschool children aged 5 to 6 years.

**Discussion**

1. Level of Gross Motor Development in Respondents Before Being Given Stimulation with Traditional Engklek Games

   It is crucial to stimulate gross motor development well from an early age. These motor skills serve as the foundation for achieving other aspects of children's growth and development, such as speaking, language, and social skills. The home environment is the first environment that has a significant influence on child development. Therefore, it is important to provide appropriate stimulation to prevent disruptions in their growth (Larasati et al., 2022). This traditional Engklek game has a positive effect on children's motor skills, aiming to enhance motor cortex speed (Ritonga & Pasaribu, 2022).

   The pre-test results showed that most children aged 5–6 years had not yet reached the expected gross motor development for their age, particularly in the ability to lift one leg while maintaining balance. Specifically, 55.6% of children were categorized as "fair," and 11.1% as "poor," indicating limited postural control and leg strength. This suggests that before receiving any stimulation, many children struggled with core stability and neuromuscular coordination, which are essential components of gross motor development. These findings highlight the lack of sufficient physical stimulation and structured motor activities in the children's daily routines prior to the intervention.

2. Level of Gross Motor Development in Respondents After Being Given Stimulation with Traditional Engklek Games

   Playing Engklek has a very positive impact on the development of motor skills in preschool children. This shows that traditional Engklek games have many benefits for early childhood development (Raihana & Sari, 2021). Children's balance, strength, and flexibility significantly improved after playing Engklek, demonstrating that Engklek effectively helps enhance preschool children's gross motor skills. Furthermore, this game also teaches

emotional regulation skills and social interaction to children (Darmawati & Widyasari, 2022).

After the intervention, the results showed a significant improvement in the children's gross motor skills. For example, the average time preschoolers aged 5 years could lift one leg increased from 3.8 seconds in the pre-test to 5.5 seconds in the post-test. Similarly, 6-year-olds improved from 5.1 seconds to 7.0 seconds. These findings indicate that the traditional *engklek* game, conducted over four weeks, effectively enhanced children's balance and coordination. This improvement suggests that regular engagement in structured physical play can stimulate the development of neuromuscular control and postural stability in early childhood..

3. Analysis of Gross Motor Development in Preschool Children Aged 5-6 Years Before and After Stimulation with Traditional Engklek Games

The importance of providing stimulation for gross motor skills in children during their early school years can be reinforced through traditional Engklek games. The aim is not only to improve their gross motor skills but also to introduce educational elements of the games (Aulia et al., 2023). Children's social-emotional development can also be achieved through traditional Engklek games by introducing game rules, encouraging child interactions, and monitoring development (R. Hayati & Amalia, 2021).

Incorporating traditional games into children's daily activities is a valuable recommendation for teachers and parents. By doing so, it not only improves children's gross motor skills but also contributes to preserving cultural heritage. This study revealed a clear improvement in children's gross motor abilities following stimulation through the traditional *engklek* game. These findings align with those of Raihana & Sari (2021), who reported that *engklek* significantly enhances children's physical motor development. Similarly, Darmawati & Widyasari (2022) emphasized that *engklek* improves balance, coordination, and leg strength in early childhood. The results of this study confirm that even limited sessions (once a week for four weeks) can produce observable developmental progress, especially among children who initially had below-average motor performance. This reinforces the idea that traditional

games serve as effective, culturally relevant tools for stimulating physical development in preschool-aged children.

## Conclusion and Recommendation

The development of gross motor skills after stimulation with traditional Engklek games predominantly falls into the very good category. The results of this study indicate that there is an increase in motor skills development among children aged 5 to 6 years, both before and after stimulation with traditional Engklek games, indicating that traditional Engklek games are effective in developing motor skills.

This research is expected to facilitate future researchers in understanding the impact of traditional Engklek games on the development of gross motor skills in preschool children, including comparing the effectiveness of Engklek with other traditional games. For students, the findings from this study serve as a resource for those who want to understand how to develop gross motor skills in preschool children through the use of traditional games like Engklek.

## DECLARATION

**Conflict of Interest**

The authors declare that there is no conflict of interest regarding the publication of this paper.

**Authors' Contribution**

All authors contributed equally to the conception, design, data collection, analysis, and writing of the manuscript.

**Ethical Approval**

This study received ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Malang (No.DP.04.03/F.XXI.31/0612/2024), valid from June 14, 2024, to June 14, 2025.

**Funding Source**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Data Availability**

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

**Acknowledgements**

## REFERENCES

Alfiah, S., & Darsinah, D. (2023). The Effect of Stimulation on the Development of the Child's Drawing Stage. *Journal of Social Research*, *2*(3), 684–698. https://doi.org/10.55324/josr.v2i3.717

Aulia, M., Fadilla, S., Sholehah, E., & Sari, I. P. (2023). Menstimulus Perkembangan Motorik Kasar Anak Melalui Permainan Engklek di Kober Miftahul Fallah. *Edu Happiness : Jurnal Ilmiah Perkembangan Anak Usia Dini*, *2*(2). https://doi.org/10.62515/eduhappiness.v2i2

Darmawati, N. B., & Widyasari, C. (2022). Permainan Tradisional Engklek dalam Meningkatkan Motorik Kasar Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(6), 6827–6836. https://doi.org/10.31004/obsesi.v6i6.3487

Fitriani, D., Rahman, T., & Muslihin, H. Y. (2019). *Analisis Perkembangan Motorik Kasar Anak Usia 4-5 Tahun Di Masa Pandemi Covid-19 Di Desa Janggala Kecamatan Sukaraja Kabupaten Tasikmalaya*. 7.

Handayani, F. F. (2022). Permainan Tradisional Lulu Cina Buta: Stimulasi Keterampilan Sosial Emosional Anak. *AWLADY : Jurnal Pendidikan Anak*, *8*(1), 1. https://doi.org/10.24235/awlady.v8i1.9609

Hayati, R., & Amalia, D. (2021). *Mengembangkan Sosial Emosional Anak Dengan Permainan Tradisional Engklek Di Tk It Permata Sunnah Kota Banda Aceh*.

Hayati, S. N., & Putro, K. Z. (2021). *Bermain Dan Permainan Anak Usia Dini*. 4.

Herdayanti, & Watini, S. (2021). Penerapan Permainan Tradisional Engklek dalam Mengembangkan Kecerdasan Majemuk Pada Anak Usia Dini. *Jurnal Pendidikan Tambusai*, *Volume 5 Nomor 3*, 6222–6227.

Juliana, S. N. (2022). Keterlambatan Motorik Kasar pada Anak Usia Dini. *Indonesian Journal of Early Childhood: Jurnal Dunia Anak Usia Dini*, *4*(2).

Larasati, D. A., Yusuf, B. S., Pramesti, D. S., Utami, D., Asri, D. A., Sativani, Z., & Syakib, A. (2022). Deteksi Dini Tumbuh Kembang dan Stimulasi Motorik pada Balita Berbasis Masyarakat dalam Kegiatan Fisioterapi Komunitas di Desa Lulut Kabupaten Bogor. *Jurnal Pengabdian Masyarakat Fisioterapi dan Kesehatan Indonesia*, *1*(1), 54–63. https://doi.org/10.59946/jpmfki.2022.109

Nalle, A. P., & Margiani, K. (2022). *Pentingnya Deteksi Dini Tumbuh Kembang (DDTK) Anak Berdasarkan Persepsi Orang Tua di Posyandu Desa Bijeli, Kecamatan Noemuti, Kabupaten Timor Tengah Utara (TTU)*. *2*(1).

Pambudi, W., Aqila, F., & Natalia, D. (2023). Pelayanan Stimulasi Deteksi Intervensi Dini Tumbuh Kembang pada Siswa Bunda Mulia School Jakarta Utara. *Jurnal Bakti Masyarakat Indonesia*, *Vol. 6, No. 2*, Hal. 260-267.

Raihana, R., & Sari, B. F. (2021). PENGARUH PERMAINAN TRADISIONAL ENGKLEK TERHADAP PERKEMBANGAN FISIK MOTORIK KASAR ANAK USIA 5-6 TAHUN. *Generasi Emas*, *4*(2), 74–83. https://doi.org/10.25299/ge:jpiaud.2021.vol4(2).6743

Ritonga, S. A., & Pasaribu, A. I. (2022). *PENGARUH PERMAINAN TRADISIONAL TERHADAP KEMAMPUAN MOTORIK KASAR ANAK KELOMPOK B DI TK DIPONEGORO ASAM JAWA*. *Vol. VI*.

Ruauw, J., Rompas, S., & Gannika, L. (2019). Stimulasi Motorik Dengan Perkembangan Fisik Pada Anak Usia 3-5 Tahun. *Jurnal Keperawatan*, *7*(2). https://doi.org/10.35790/jkp.v7i2.24470

Sutapa, P., Pratama, K. W., Rosly, M. M., Ali, S. K. S., & Karakauki, M. (2021). Improving Motor Skills in Early Childhood through Goal-Oriented Play Activity. *Children*, *8*(11), 994. https://doi.org/10.3390/children8110994

Wea, Y. M., Fono, Y. M., & Wani, B. (2021). *Kegiatan Pengembangan Motorik Kasar Anak Usia 5-6 Tahun di Kober Peupado*. *5*.

Widyantika, M. E., Sary, Y. N. E., & Ermawati, I. (2023). *Perbedaan Perkembangan Motorik Kasar Dengan Status Gizi Kurang Dan Gizi Normal Pada Balita Usia 24 Bulan Di Wilayah Kerja Puskesmas Bades*. x

Wikaningtyas, A., & Basith, A. (2022). *Upaya Meningkatkan Motorik Kasar Anak Usia 5-6 Tahun Melalui Kegiatan Senam Tradisional*. *2*(1).

# THE EFFECTIVENESS OF *SELF-ACUPRESSURE* GUIDANCE ON THE REDUCTION OF *PRIMARY DYSMENORRHEA*

*Nur Maziyah Hurin'in* [1] iD *, Siti Nur Indah* [2] iD

[1] Institut Ilmu Kesehatan Nahdlatul Ulama Tuban, Indonesia
[2] Institut Ilmu Kesehatan Nahdlatul Ulama Tuban, Indonesia

Correspondence address:
Campus A IIKNU Tuban Jln. Diponegoro Kingking, Tuban, Indonesia
Email : ziyah@iiknutuban.ac.id

**Abstract**
**Background**: Incidence rates of Dysmenorrhea is average over 50% worldwide, with Indonesia reporting 55% and East Java specifically showing a prevalence of 71.3%. Dysmenorrhea can reduce sleep quality and have an impact on changes in a person's mood which will cause stress, depression and anxiety. The aim of this study was to determine the effect of self-accupressure guidance on reducing primary dysmenorrhoea pain in adolescent girls. **Method:**. This was a quasi-experimental design with a one-group pretest-posttest approach. The study population comprised all 66 female students at Manbail Futuh Vocational School. A purposive sampling technique was utilized to select participants who met specific inclusion criteria.This selection process resulted in a sample of 18 adolescent girls. Participants received standardized self-acupressure guidance. The intervention involved a structured guidance session followed by a period where participants were encouraged to practice self-acupressure daily during their menstrual cycle. Pain intensity was measured using a validated numerical rating scale (NRS) before the intervention and after the intervention, specifically during their subsequent menstrual period. The effectiveness of the self-acupressure guidance was assessed by comparing the pretest and posttest pain scores. **Result:** The results of the Wilcoxon test using SPSS For Windows software with a level of significance obtained p-Value  0.001 < 0.05. Based on the above, it is proven that there was an influence of self-accupressure guidance on reducing primary dysmenorrhea pain experienced by young women. **Conclusion:** Self-acupressure guidance was effective in reducing the intensity of dysmenorrhea in adolescent girls. This research can be used as one of the interventions in treatment other than using drugs.

Keyword : *Reproductive Health, dysminorrhoea, self-acupressure*

## INTRODUCTION

Primary dysmenorrhea, characterized by painful menstruation without underlying gynecological conditions, is a widespread issue among women globally. The World Health Organization (WHO) reports that approximately 90% of women experience dysmenorrhea, with 10-15% suffering from severe forms. Incidence rates average over 50% worldwide, with Indonesia reporting 55% and East Java specifically showing a prevalence of 71.3%. A preliminary study at SMK Manbail Futuh Jenu revealed that 7 out of 10 adolescent girls experienced

menstrual abdominal pain, 8 found it disruptive to their activities, and 9 resorted to rest alone for pain relief, indicating a lack of effective coping strategies (Marlinda *et al.*, 2022). *Primary dysmenorrhea* felt from the first time they got their period (1-2 days) and no problems were found from the reproductive organs. Event *Dysmenorrhea* Of course, it can interfere with all forms of daily life activities, reduce the quality of sleep and have an impact on changing a person's mood which will cause stress, depression and cause anxiety (Selvia and Amru, 2021).

The pain of primary dysmenorrhea stems from intense uterine muscle contractions, triggered by elevated levels of prostaglandins. These natural chemicals, produced by the uterine lining, are potent myometrial stimulants and vasoconstrictors. High prostaglandin levels lead to increased uterine tone and excessive contractions, causing pain. Additionally, dysmenorrhea can be influenced by progesterone levels; higher progesterone, typically observed after several menstrual cycles when the corpus luteum is well-developed, can also contribute to the pain.

Beyond physical discomfort, dysmenorrhea significantly impacts daily life, often disrupting activities, reducing sleep quality, and negatively affecting mood. These psychological burdens can manifest as stress, depression, and anxiety, as highlighted by Selvia and Amru (2021). (Sari and Listiarini, 2021).The reluctance of some adolescents to discuss dysmenorrhea with parents, teachers, or healthcare professionals (Indrayani, Astiza and Widowati, 2021) further exacerbates these issues, underscoring the need for accessible and effective self-management techniques.

Among non-pharmacological interventions, acupressure stands out as a promising solution. Derived from traditional Chinese medicine, acupressure involves applying pressure to specific acupuncture points often referred to as "needleless acupuncture." Rooted in Meridian theory, this manipulative and body-based modality offers numerous benefits, including pain relief, relaxation, and overall wellness. Self-acupressure, in particular, empowers individuals to manage their symptoms independently using fingers or blunt objects, making it a highly practical approach (Walidaini, 2022). Empowering young women with knowledge

and skills in self-handling dysmenorrhea is crucial for promoting better health behaviors and preventing long-term negative health impacts (Indrayani, Astiza and Widowati, 2021). Therefore, this study aims to analyze the effectiveness of self-acupressure guidance in reducing primary dysmenorrhea pain among young women.

**METHOD**

This study was a Pre-Experimental design, specifically a one-group pretest-posttest design. The target population for this study comprised all 66 female students of SMK Manbail Futuh Tuban in 2024. The researcher determined samples based on the following inclusion and exclusion criteria: Inclusion Criteria: Students that willing to participate as respondents, students experiencing dysmenorrhea, able to communicate well and cooperatively, students not using pain relievers for dysmenorrhea and students not residing in Islamic boarding schools. Exclusion Criteria: students with physical mobility barriers (e.g., injuries), students experiencing reproductive diseases (e.g., cysts), and students with congenital/chronic diseases. Sample of 18 subjects was determined through simple random sampling from the eligible students who met the inclusion criteria. This approach aimed to ensure a sufficient number of participants for the within-group analysis.

The independent variables in this study were *self-acupressure guidance and* dysminorea pain intensity as bound variables. The researcher directly guided the intervention carried out in accordance with the guidance of acupressure therapy, namely by pressing on the acupressure points of the SP-6, LI-4 and LR-3 meridian pathways to relieve menstrual pain carried out by the respondent directly with pressure guidance carried out for 5 minutes each at each point (1 minute consists of 5 cycles, one cycle is carried out with pressure at the acupressure point for 10 seconds and rest for 2 seconds. Measurement of pain picture on days 1-3 of menstruation was measured before and after *self-acupressure* 1 time a day with a duration of 15 minutes with a *Numeric Rating Scale* (NRS) Questionnaire. The researcher collected the measurement sheets that had been filled out by the respondents and checked their completeness on the first day, then the researcher

monitored the implementation of *self-acupressure* and pain measurement during the research period on the second and third days using Whatsapp *Video Call communication media.*

The independent variable in this study was self-acupressure guidance, with dysmenorrhea pain intensity as the dependent variable. The intervention involved direct, systematic guidance from the researcher on self-acupressure therapy. The precise steps were as follows: Acupressure Points: Respondents were instructed to apply pressure to specific acupressure points on the SP-6, LI-4, and LR-3 meridian pathways, known for relieving menstrual pain. Pressure Technique and Duration: For each designated acupressure point, pressure was applied for 5 minutes. This 5-minute period consisted of 5 cycles, where each cycle involved 10 seconds of pressure followed by 2 seconds of rest. Frequency and Overall Duration: The self-acupressure intervention was performed once daily during days 1-3 of menstruation, with each daily session lasting a total of 15 minutes (5 minutes per point x 3 points). Supervision and Monitoring: The researcher directly guided the initial intervention and collected completed pain measurement sheets on the first day. For subsequent days (days 2 and 3) of the research period, the researcher monitored the implementation of self-acupressure and pain measurements remotely using WhatsApp Video Call communication. Dysmenorrhea pain intensity was measured using a Numeric Rating Scale (NRS) Questionnaire both before (pretest) and after (posttest) the self-acupressure intervention on days 1-3 of menstruation.

Data analysis was performed using SPSS 20 software. Univariate Analysis used Wilcoxon Signed-Rank Test.

## RESULT AND DISCUSSION

The general data in this study contains the characteristics of the respondents including age, menstrual cycle, menstrual pain begins to be felt, pain is presented in full in the form of the following table:

Table 1. Distribution of Respondent Characteristics

| No. | Age | Frequency | Percentage(%) |
|-----|-----|-----------|---------------|
| 1 | 17 Years | 6 | 33.3 |
| 2 | 18 Years | 10 | 55.6 |
| 3 | 19 Years | 2 | 11.1 |

| It | Menstrual Cycle | Frequency | Percentage(%) |
|---|---|---|---|
| | Total | 18 | 100 |
| 1 | Orderly | 13 | 72.2 |
| 2 | Irregular | 5 | 27.8 |
| | Total | 18 | 100 |
| It | Age | Frequency | Percentage(%) |
| 1 | Day 1 | 11 | 61.1 |
| 2 | Day 2 | 7 | 38.9 |
| | Total | 18 | 100 |

General data that of the 18 female respondents at SMK Manbail Futuh with age characteristics, most of them were 18 years old, as many as 10 respondents (55.6%), the menstrual cycle was mostly regular, as many as 13 respondents (72.2%), that of the 18 female respondents at SMK Manbail Futuh Jenu with the characteristics of pain starting to be felt, most of them were obtained on the 1st day as many as 11 respondents (61.1%).

Table 2. Effectiveness of *self-acupressure* guidance on the reduction of *primary dysmenorrhea pain*

| It | Age | Pretest | | Posttest | |
|---|---|---|---|---|---|
| | | Frequency (f) | Percentage (%) | Frequency (f) | Percentage (%) |
| 1. | No Pain | 0 | 0 | 0 | 0 |
| 2. | Light | 2 | 11.1 | 9 | 50.0 |
| 3. | Keep | 11 | 61.1 | 9 | 50.0 |
| 4. | Heavy | 5 | 27.1 | 0 | 0 |
| 5. | Very Heavy | 0 | 0 | 0 | 0 |
| | Total | 18 | 100 | 18 | 100 |
| *Wilcoxon sign rank test p-Value= 0.001* | | | | | |

Before the self-acupressure guidance, the majority of respondents (61.1%, n=11) reported moderate pain, while 27.8% (n=5) experienced severe pain and 11.1% (n=2) mild pain. Following the intervention, a significant shift in pain intensity was observed, with 50.0% (n=9) reporting mild pain and 50.0% (n=9) reporting moderate pain. Notably, no respondents reported severe pain post-intervention. The numerical mean NRS score before the intervention was $5.94 \pm 1.15$ (mean $\pm$ SD), indicating moderate-to-severe pain. After the self-acupressure guidance, the mean NRS score significantly decreased to $3.44 \pm 0.69$ (mean $\pm$ SD), representing mild-to-moderate pain. A Wilcoxon signed-rank test confirmed

a statistically significant reduction in menstrual pain intensity ($p < 0.001$), indicating that self-acupressure guidance had a positive effect on reducing primary dysmenorrhea pain in adolescent girls at SMK Manbail Futuh Jenu. Specifically, 4 respondents moved from severe to moderate pain, 1 from severe to mild, and 6 from moderate to mild pain. 5 respondents continued to experience moderate pain, and 2 continued to experience mild pain.

Self-acupressure, involving the application of pressure to specific acupoints such as SP-6, LI-4, and LR-3 for 5 minutes each (1 minute consisting of 5 cycles of 10 seconds pressure followed by 2 seconds rest), is a non-invasive, cost-effective, and safe intervention for various health concerns, including dysmenorrhea (Fibrila, Ridwan and Widiyanti, 2023). The significant reduction in both categorical pain levels and mean NRS scores observed in this study supports the efficacy of self-acupressure in alleviating primary dysmenorrhea. This effect is largely attributed to the modulation of prostaglandin levels and the release of endorphins, which act as natural pain relievers. High concentrations of prostaglandins, particularly PGF2α, in the endometrium and menstrual blood are known to cause uterine contractions and ischemia, leading to dysmenorrhea (Selvia and Amru, 2021). By conducting self-acupressure on Day 1 and Day 2 of menstruation, when prostaglandin levels are highest, the intervention aims to counteract these physiological mechanisms and accelerate pain reduction.

Despite the overall positive outcome, some respondents did not achieve a complete resolution of pain, remaining in the moderate or mild categories post-intervention. Several factors could contribute to this variation. The researchers hypothesize an association with menarche age and irregular menstrual cycles. Early menarche (e.g., < 12 years) has been linked to increased severity of primary dysmenorrhea due to the immaturity of reproductive organs and hormonal fluctuations (Hurin'in, Putri and Puspitasari, 2021). Irregular menstrual cycles, common in adolescents (Rosyita *et al.*, 2024), can also complicate dysmenorrhea management, potentially indicating underlying hormonal imbalances or differing prostaglandin responses that may not be fully addressed by acupressure alone.

Furthermore, individual differences in pain perception, adherence to the self-acupressure protocol, and physiological responses to the intervention could

play a role. The precision of point location and the amount of pressure applied during self-acupressure, which can vary between individuals, are critical for optimal effectiveness. It is also possible that a subset of respondents might have higher baseline prostaglandin levels or a greater sensitivity to their effects, requiring more intensive or prolonged intervention. This study's findings are consistent with a growing body of evidence supporting acupressure for dysmenorrhea. For instance, a systematic review and meta-analysis of RCTs by Chen et al. (2018) found that acupressure significantly reduced pain intensity in women with primary dysmenorrhea. Similarly, studies in East Asian populations, such as research on acupressure at SP6 and LI4 in adolescents from China (Wang et al., 2017) and Korea (Kim et al., 2011), have demonstrated comparable pain-reducing effects. A review by Cho and Kim (2014) also highlighted the effectiveness of various acupressure points, including SP6, in managing menstrual pain. While our study utilized the same principles, direct comparison with specific RCTs from different cultural contexts (e.g., Iran) could offer insights into generalizability and population-specific efficacy, suggesting a need for more diverse comparative studies in the future.

Several limitations in this study warrant consideration. The reliance on questionnaires for data collection introduces the possibility of response bias, where respondents might not fully understand the questions or provide dishonest answers, potentially affecting the representativeness of the results. Specifically, subjective pain measurement using the NRS questionnaire, while widely accepted, can be influenced by individual interpretation. Moreover, the self-administered nature of acupressure means that the consistency and precision of pressure application at the acupoints may vary between respondents, potentially differing from researcher-administered acupressure and impacting treatment efficacy.

Crucially, the one-group pretest-posttest design inherently possesses low internal validity due to the absence of a control or comparison group. This limitation means that observed changes in dysmenorrhea pain intensity cannot be definitively attributed solely to the self-acupressure intervention, as other confounding factors (e.g., natural fluctuations in pain, placebo effect, or concurrent activities) might influence the outcome. This should be considered a

significant limitation of the study, necessitating future research with robust designs, such as randomized controlled trials, to establish causality more definitively.

## CONCLUSION AND SUGGESTION

Self-acupressure guidance has been shown to be an effective intervention for reducing the intensity of menstrual pain in adolescent girls at SMK Manbail Futuh Jenu. This research highlights the importance of exploring non-medical therapies alongside conventional treatments like analgesic drugs. Beyond medication, various methods such as acupressure, yoga, herbal therapy, relaxation techniques, and adequate sleep can significantly contribute to pain reduction during menstruation. Therefore, self-acupressure can be considered a valuable and accessible intervention to manage menstrual pain. To further strengthen the evidence and broaden the applicability of self-acupressure, future studies should adopt more rigorous methodologies. Specifically, implementing a Randomized Controlled Trial (RCT) design is recommended to establish a clearer cause-and-effect relationship. Furthermore, increasing the sample size would enhance the statistical power and generalizability of the findings to a wider population. Exploring the effectiveness of self-acupressure in different settings, beyond the current school environment (e.g., in various community health centers or other educational institutions), would also provide valuable insights into its adaptability and effectiveness across diverse contexts.

## DECLARATION

This section contains important declarations regarding the research, including conflicts of interest, author contributions, ethical approvals, funding sources, data availability, and acknowledgments.

## Conflict of Interest

There is no conflict of interest in this research

## Authors' Contribution

The first author is in charge of conducting a research plan, coordinating with the research site, providing guidance for treatment interventions, processing and analyzing research results. The second author is in charge of providing guidance on treatment interventions as well as editing the results and discussing the research.

## Ethical Approval

This research has received information that it has passed the ethical assessment of the health research ethics institution of the Nahdlatul Ulama Institute of Health Sciences Tuban No. 12/0084223523/LEPK. IIKNU/I/2024..

## Funding Source

## Data Availability

The research findings are available upon reasonable request.

## Acknowledgements

**REFERENCE**

Aminatussyadiah, A., Widiatami, T. and Amanda, A.V. (2023) 'The Effectiveness of Sp6 and Lr3 Acupressure on Reducing Dysmenorrhea Pain in D III Obstetrics Students of Stikes BCM', *Borneo Scholar Journal*, 7(2), pp. 33–39.

Chen, M.N., et al. (2018) 'The effect of acupressure on primary dysmenorrhea: a systematic review and meta-analysis of randomized controlled trials', *Complementary Therapies in Medicine*, 41, pp. 1-8

Cho, S.H. and Kim, J.Y. (2014) 'Acupressure for the treatment of primary dysmenorrhea: A systematic review and meta-analysis', *Journal of Advanced Nursing*, 70(11), pp. 2481-2495.

Fibrila, F., Ridwan, M. and Widiyanti, S. (2023) 'The effect of acupressure therapy in reducing dysminore pain in adolescent girls', *Journal of Multidisciplinary Research*, 1(6), pp. 1127–1132.

Hurin'in, N.M., Putri, F.A. and Puspitasari, P.N. (2021) '"Midwifery Pedia" as an E-Health Consultation Media on Reproductive Health and Its Problems', *ABDIMASNU: Journal of Community Service*, 1(2). Available at: https://doi.org/10.47710/abdimasnu.v1i2.81.

Indrayani, T., Astiza, V. and Widowati, R. (2021) 'The Effect of Acupressure on the Intensity of Dysmenorrhea Pain in Adolescent Girls in the Rw.03 Area, North Margahayu Village, Babakan Ciparay District, Bandung City', *Journal for Quality in Women's Health*, 4(1), pp. 94–103. Available at: https://doi.org/10.30994/jqwh.v4i1.109.

Julaecha, J. *et al.* (2024) 'Education on How to Overcome Dysmenorrhea with Acupressure at SMAIT Al-Azhar, Jambi City', *Journal of Health Service (JAK),* 6(2), p. 144. Available at: https://doi.org/10.36565/jak.v6i2.422.

Julaecha, J., Fatmawati, T.Y. and Wuryandari, A.G. (2023) 'The Effect of Acupressure on Dysmenorrhea in Female Students of the DIII Midwifery Study Program STIKes Baiturrahim', *Baiturrahim Jambi Academic Journal*, 12(1), p. 194. Available at: https://doi.org/10.36565/jab.v12i1.689.

Kim, Y.J., et al. (2011) 'Effects of acupressure on dysmenorrhea in adolescents: A randomized controlled trial', *Journal of Korean Academy of Nursing*, 41(4), pp. 433-441.

Marlinda, M. *et al.* (2022) '3-Point Body Acupressure to Reduce Menstrual Pain', *IMELDA Nursing Scientific Journal*, 8(2), pp. 113–119. Available at: https://doi.org/10.52943/jikeperawatan.v8i2.1025.

Rosyita, K. *et al.* (2024) 'Difference in the Effectiveness of Cat Stretch Exercise with Lumbar Massage on Reducing Primary Dysmenorrhea at SMA Negeri 3 Tuban This study aims to compare the effectiveness of Cat Stretch Exercise and lumbar massage on the reduction of primary dysmenorrhea pain', 2(4).

Sari, I.D. and Listiarini, U.D. (2021) 'The Effectiveness of Acupressure and Ginger Drink on Reducing the Intensity of Menstrual Pain/Dysmenorrhea in Adolescent Women', *Scientific Journal of Batanghari University of Jambi*, 21(1), p. 215. Available at: https://doi.org/10.33087/jiubj.v21i1.1154.

Selvia, A. and Amru, D.E. (2021) 'The Relationship between Knowledge and Attitudes of Adolescent Women in Overcoming Menstrual Pain with Acupressure Techniques', *EDUNursing Journal*, 5(2), pp. 128–133. Available at: http://journal.unipdu.ac.id.

Wang, L., et al. (2017) 'Acupressure for primary dysmenorrhea: a systematic review and meta-analysis of randomized controlled trials', *PLoS One*, 12(11), e0188032.

Walidaini, R. (2022) 'The Effect of Acupressure on Menstrual Pain in Adolescents at SMA 08 Pekanbaru', *Indonesian Health Scientific Journal*, 7(1), pp. 87–95. Available at: https://doi.org/10.51933/health.v7i1.787.

# ENHANCING PREGNANT WOMEN'S BREASTFEEDING SELF-EFFICACY THROUGH ANIMATED EDUCATIONAL VIDEO INTERVENTION

*Aan Fitri Ries Sutrisno[1]* iD *, Desi Trianita[2]* iD *, Fransisca Retno Asih[3]* iD

[1] RSUD Eka Candrarini, Surabaya, Indonesia
[1,2,3] Department of Midwifery, STIKES Banyuwangi, Banyuwangi,
Indonesia

Correspondence address: Jl. Letkol Istiqlah No. 109 Banyuwangi
Banyuwangi, Indonesia
Email: *afirs996@gmail.com*

## Abstract

**Background:** The prevalence of exclusive breastfeeding remains low globally, with only 44% of infants receiving it during the first six months. One contributing factor is low Breastfeeding Self-Efficacy (BSE). In Indonesia, 56% of mothers have low BSE due to inadequate education, limited family support, and psychological challenges. Animated video-based education is considered effective in increasing BSE among pregnant women, potentially enhancing exclusive breastfeeding success. This study aimed to examine the effect of breastfeeding preparation education using animation videos on BSE in third-trimester pregnant women. **Method:** A quasi-experimental design with a pretest-posttest and control group was used. Seventy-four pregnant women (37 per group) at Tanah Kalikedinding Public Health Center Surabaya, in 2022, were selected through consecutive sampling and met inclusion criteria: gestational age 28–36 weeks, single healthy pregnancy, ability to use WhatsApp, Google Forms, and Zoom, and willingness to participate. Exclusion criteria included serious medical conditions or hearing/vision impairments. Data were analyzed using Mann-Whitney and Wilcoxon tests via SPSS25. **Result:** Results showed a significant increase in BSE in the intervention group (mean increase = 4.97) compared to a decrease in the control group (mean decrease = 2.49), with $p = 0.000$. **Conclusion:** In conclusion, animated video-based education effectively improves breastfeeding self-efficacy and may support the success of exclusive breastfeeding programs.

keyword: breastfeeding self-efficacy; educational video; breastfeeding preparation; pregnancy

## INTRODUCTION

Breastfeeding is an important decision in order to provide the best nutrition for the baby, especially during the first six months of life. (Safer and Organization, 2010) Breast milk contains nutrients that are ideal to support the growth and development of the baby.(Ballard and Morrow, 2013) However, the prevalence of low breastfeeding success rates is still a challenge in various countries.(Zong *et al.*, 2021) Based on WHO data, only about 44% of babies in the world get exclusive breastfeeding during the first six months.(World Health Organization, 2023) One

of the factors that affect the success of breastfeeding is *breastfeeding self-efficacy* (BSE) or a mother's self-confidence in her ability to breastfeed.(Ballesta-Castillejos *et al.*, 2020; Asimaki *et al.*, 2022) Research in Indonesia reported that about 56% of breastfeeding mothers had low levels of BSE, which is caused by a lack of education, lack of family support, and psychological constraints such as anxiety and fear of failure.(Titaley *et al.*, 2021)

Education during pregnancy plays a key role in preparing mothers to face the challenges of breastfeeding.(Kehinde, O'Donnell and Grealish, 2023) However, traditional educational methods such as lectures or the distribution of leaflets or posters are often less effective in providing in-depth understanding.(Hasanica *et al.*, 2020) The use of interactive educational media, such as animated videos, is becoming a more interesting and easy-to-understand alternative.(Knapp *et al.*, 2022) Animated videos allow the delivery of complex information to be simpler, visual, and easier to remember, so that it can increase the motivation and confidence of pregnant women.(Knapp *et al.*, 2022) A study shows that education with animated video media is effective in improving *sleep hygiene behavior* in pregnant women.(Asih, Pondaang and I'anah, 2024) Thus, animation-based education has great potential to increase the readiness of pregnant women in facing breastfeeding.

Studies show that *breastfeeding self-efficacy* has a direct relationship with breastfeeding success.(Morado Gonzales Jr, 2020; He, Yimyam and Namprom, 2022) Mothers with high levels of BSE tend to be better able to cope with challenges such as lactation difficulties, social pressure, or lack of support from family. In contrast, mothers with low levels of BSE often give up more quickly when faced with difficulties, leading to failure to provide exclusive breastfeeding.(Morado Gonzales Jr, 2020; He, Yimyam and Namprom, 2022) Data from surveys in Indonesia show that the main determinant of low BSE is lack of knowledge and social support.(Titaley *et al.*, 2021; Annisa, Lestari and Amir, 2022) Therefore, significant efforts are needed to increase pregnant women's self-confidence to breastfeed, one of which is through an educational approach that is more innovative and relevant to their needs, especially during the Covid-19 pandemic due to social restrictions. In addition, based on a preliminary survey in August 2022, it was found that the provision of education about breastfeeding

preparation at the Tanah Kalikedinding Surabaya Health Center was carried out through counseling and counseling by students who were interns and had not yet utilized animated video media.

This study aims to determine the effectiveness of education through animated videos about breastfeeding preparation for *breastfeeding self-efficacy in pregnant* women in the third trimester at the Tanah Kalikedinding Health Center Surabaya. With a visual-based educational approach, it is hoped that pregnant women will not only get information in the midst of Covid-19, but also feel more confident in facing the challenges of breastfeeding. The results of this research are expected to make a significant contribution in facilitating more modern education to support exclusive breastfeeding programs, as well as improving the health status of mothers and babies in the community. In the end, the implementation of this innovative educational media can be one of the solutions in overcoming the low rate of exclusive breastfeeding at the national and global levels.

**METHOD**

This study used *a quasi-experiment* using *a control group pretest-posttest design* with an intervention group that was given breastfeeding preparation education using an animated video with the title "Manfaat ASI dan Persiapan Menyusui (Benefit of Breast Milk and Breastfeeding Preparation)" on the https://youtu.be/LWd1672hUUQ?si=AI2hEKwTmoGTPJsB link with the IPR registration number: 000438905 and control groups were given breastfeeding preparation education in accordance with *antenatal care* (ANC) standards based on maternal and child health books (KIA).

This research was conducted in the working area of the Tanah Kalikedinding Health Center in Surabaya in January 2023. The population in this study is all pregnant women in the third trimester at the Tanah Kalikedinding Health Center in Surabaya. The samples in the study were taken from research subjects who met the inclusion criteria (pregnant women with a gestational age of 28-36 weeks, single pregnancy, healthy, able to operate *the whatss app*, *google form* and *zoom meeting*, willing to be research respondents) and the sample size was determined based on

the sample size formula, which was 37 samples for each group. The sampling technique used is *non-probability sampling* using *the consecutive sampling* method.

This study was conducted by entering respondents who had filled out *informed consent*, questionnaires on characteristics of pregnant women and pretests into *the Whatss Apps* (WA) group by separating the intervention and control groups. In the intervention group, an animated video of breastfeeding preparation was shown. On the first day, a video was played about the definition of breast milk, the benefits of breast milk, exclusive breastfeeding, types of breast milk and IMD, on the second day about breastfeeding preparation during pregnancy, breastfeeding techniques, breastfeeding position, breastfeeding duration, how to increase breast milk, signs of babies getting enough breast milk, on the third day about breastfeeding for working mothers, breastfeeding support and important things in preventing breastfeeding problems and a question and answer session was held at the end of each video screening and after 3 days of intervention given a posttest. In the control group, on the first day they were given directions to read the KIA book (2020 print) on pages 27 and 28 about breastfeeding in postpartum mothers, on the second day on page 29 about the correct way to breastfeed and the correct position and attachment of breastfeeding, on the third day on page 30 about how to express and store breast milk and were given a posttest after treatment on the third day.

To obtain permission from prospective respondents at the Tanah Kali Kedinding Health Center in Surabaya, the researcher visited each respondent separately. The researcher explained the purpose and purpose of the study, assured respondents that watching an animated video about breastfeeding preparation would not have a negative impact, and gave an informed consent letter to pregnant women there to participate in the study.

Data collection was carried out using a questionnaire instrument in the form of a *Breastfeeding Self Efficacy Short Form* (BSE-SF) questionnaire with 14 questions about the mother's confidence or confidence in breastfeeding with five answer choices, namely a score of 5 for a very confident answer choice, a score of 4 for a confident answer choice, a score of 3 for an unsure answer choice, a score of 2 for an unsure answer choice and a score of 1 for an answer choice that is very not believe. with a score between 14 and 70.

Figure 1. Animated Video Captures Benefits of Breastfeeding and Breastfeeding
Preparation



Statistical tests were done using the SPSS 25 application. The data normality test used is the *Shapiro Wilk* test, the data is normally distributed if p > 0.05. Categorical data were analyzed using the chi-square or exact F*isher* test. To compare the differences before and after the intervention, the data were analyzed using the Wilcoxon test. To examine the effect of the animated video on the intervention and control groups, the data were analyzed using *the Mann-Whitney* test.

# RESULT AND DISCUSSION

The results of the analysis of respondents' characteristics based on maternal age, gestational age, education, occupation, income and parity can be seen in the table below:

**Table 1**. Characteristics of the Research Subject

| Characteristic | Intervention n=35 (%) | Control n=36 (%) | p-value |
|---|---|---|---|
| **Age (years)** | | | 0,778*** |
| <20 | 3 (8,6) | 3 (8,6) | |
| 20-35 | 28 (80,0) | 30 (83,3) | |
| >35 | 4 (11,4) | 3 (8,3) | |
| **Pregnancy age (weeks)** | | | 0,730* |
| 28-32 | 26 (74,3) | 28 (77,8) | |
| 33-36 | 9 (25,7) | 8 (22,8) | |
| **Education** | | | 0,858*** |
| Under High School | 7 (20,0) | 7 (19,4) | |
| High School | 25 (71,4) | 27 (75,0) | |
| College | 3 (8,6) | 2 (5,6) | |
| **Work** | | | 0,381* |
| Not Working | 23 (65,7) | 20 (55,6) | |
| Work | 12 (34,3) | 16 (44,4) | |
| **Income** | | | 0,357** |
| ≥ 4.300.000 | 32 (91,4) | 35 (97,2) | |
| < 4.300.000 | 3 (8,6) | 1 (2,8) | |
| **Parity** | | | 0,893*** |
| Primigravida | 15 (42,9) | 16 (44,4) | |
| Multigravida/ Grandemultigravida | 20 (57,1) | 20 (55,6) | |

Source: Primary data processed 2023
*Chi-Square, **Fisher Exact, ***Mann Whitney

Based on table 1, it is shown that the description of the characteristics of the study respondents between the intervention and control groups did not have a significant difference with the statistical test value of p>0.05 in terms of age, gestational age, education, occupation, income and parity. These results indicate the homogeneity of the characteristics of the study respondents so that it is worth comparing.

Table 2. Breastfeeding Self-Efficacy (BSE) in both groups

| Breastfeeding Self Efficacy (BSE) | Groups | | p-value |
|---|---|---|---|
| | Intervention n=35 (%) | Control n=36 (%) | |
| *Pre* | | | 0,231[*] |
| *Mean* (SD) | 45,03 (7,827) | 46,19 (11,081) | |
| *Median* | 45 | 48 | |
| *Range* | 28-60 | 13-59 | |
| *Post* | | | 0,011[*] |
| *Mean* (SD) | 50 (7,581) | 43,75 (11,284) | |
| *Median* | 50 | 47,5 | |
| *Range* | 30-60 | 13-58 | |
| *Pre and Post Compariosn* | 0,000[**] | 0,154[**] | |
| **Increased BSE** | 4,97 | -2,49 | |

Source: Primary data processed 2023
[*]Mann Whitney, [**]Wilcoxon
Description: SD = Standard Deviation

The results of this study show that providing breastfeeding preparation education using animated videos has an effect on *Breastfeeding Self Efficacy* in pregnant women in the third trimester. This result is strengthened by the results of Chan and Shafei's research which stated that there was an influence on education given during pregnancy on *Breastfeeding Self Efficacy* (p=0.01 in Chan's study and p=0.08 in Shafei's study).(Chan, Ip and Choi, 2016; Shafaei, Mirghafourvand and Havizari, 2020) Psychological or mental preparation is very important because the mother's positive attitude or decision to breastfeed must be instilled during pregnancy or before pregnancy as a process of carrying out a woman's nature.(Supeni, Jariyah and S, 2022) Information about the importance of breastfeeding from health workers increases the ability of mothers to fulfill their nature so that they are more confident in providing breast milk for their babies.(Hamnøy *et al.*, 2024)

Of the 100 pregnant women who have been involved since the recruitment of the study respondents, there are 26 pregnant women who refuse to be respondents with details of 9 respondents who do not have time to carry out research treatments, 7 respondents do not want to follow the procedures that will be carried out by researchers, 5 respondents do not have cellphones and WA numbers, 3 respondents will give birth by cesarean section and 2 respondents are not allowed by their husbands. So that in accordance with the calculation of the formula for the number

of samples to be studied, namely 74 respondents, there were 3 respondents who could not be contacted during the research treatment, namely 2 respondents from the intervention group and 1 respondent from the control group, so that there were 71 respondents who were correctly studied.

In the study conducted by Chan, there was a population of 223 pregnant women, only 118 were included in the inclusion criteria, but there were 47 respondents who refused to participate, including 31 respondents did not have time to participate in the study, 8 respondents refused to fill out questionnaires and 8 planned to give birth. So that there are 71 respondents who are correctly taken in this study. In the study conducted by Shafei, there was a population of 202 pregnant women, only 108 were included in the inclusion criteria, but at the time of the intervention, there were 2 respondents from the intervention group and 5 respondents from the control group were declared *dropout*, so that there were 101 respondents who participated in the study.(Chan, Ip and Choi, 2016)

The characteristics of the respondents in this study were almost the same as the study conducted by Chan and Shafei, with a gestational age of 28-36 weeks in this study, 28-38 weeks in the Chan study and a gestational age of the third trimester in Shafei's study. However, the difference is that in Shafei's study, the characteristics of the respondents came from the Middle East (Tabriz, Iran) and he only conducted research on mothers who had failed to breastfeed. Meanwhile, in this study and Chan's research, she came from Asia and did not include mothers who had failed to breastfeed in the inclusion criteria of the study.(Chan, Ip and Choi, 2016; Shafaei, Mirghafourvand and Havizari, 2020)

The duration of intervention in this study was much shorter than some other studies that have been conducted. This research intervention was carried out during pregnancy for 3 times in 3 days with a duration of 30-60 minutes using an animated video of breastfeeding preparation. In the study conducted by Chan, the intervention was carried out from the time of pregnancy to after childbirth by counseling during pregnancy together for 2.5 hours and counseling at 2 weeks postpartum (PP) by telephone. In the study conducted by Shafei, the intervention was carried out for 4 times during pregnancy with a span of 1 week for 60-90 minutes each session which was divided into several groups, namely 5-7

respondents for each group and in mothers who had problems while breastfeeding were given additional counseling interventions by telephone until they were consulted directly with a breastfeeding consultant until the fourth month postpartum. However, the provision of research treatment to the control group in the three studies was the same, namely given treatment in the form of routine treatment according to standards in health care facilities.(Chan, Ip and Choi, 2016)

This research step is clearer in terms of providing material to the intervention group. The animated video given to the intervention group in this study contains the definition of breast milk, the benefits of breast milk, exclusive breastfeeding, types of breast milk, IMD, breastfeeding preparation since pregnancy, breastfeeding techniques, breastfeeding position, breastfeeding duration, how to increase breast milk, signs of babies getting enough breast milk, breastfeeding in working mothers, breastfeeding support and important things in preventing breastfeeding problems and are given animated videos about the benefits of breastfeeding and breastfeeding preparations so that they can be played repeatedly by respondents. Meanwhile, in Chan's study, there was no explanation of the content of the counseling given to the intervention group and there was no material that could make the respondents remember the counseling.(Chan, Ip and Choi, 2016) The research conducted by Shafei also detailed the counseling materials provided to the intervention group, which included the benefits and combinations of breast milk, the psychological benefits of breastfeeding, breast structure and physiology, breastfeeding hormones, common reasons for breastfeeding termination and failure, common breast conditions and abnormalities, maternal nutrition during breastfeeding, and breast pumping tips and was given *an instructional booklet* at the end of the session.(Shafaei, Mirghafourvand and Havizari, 2020)

*The research instruments* used in this study are similar but modified by the inventor to be shorter. This study used *the Brestfeeding Self-Efficacy Short Form* (BSE-SF) questionnaire while the research conducted by Chan and Shafei used the *Brestfeeding Self-Efficacy Scale* (BSES) questionnaire.(Amini *et al.*, 2019) This was done in this study due to time limitations, but the results of this study are still valid and have a decent research strength because they were carried out using

questionnaires with the same form that have been simplified by the discoverer. Then in the research, Chan and Shafei added a secondary research instrument, namely about breastfeeding problems, while in this study it was not used because this research was carried out only until pregnancy.

The BSE-SF questionnaire used in this study has been translated into Indonesian. Even though it has been validated to be used in Indonesia, there is 1 statement that has a very uncertain answer (STY), among which the most is statement number 7 which reads "I still feel comfortable when breastfeeding even though there are family members or other people around me". This may be related to the culture in Indonesia that upholds shyness, but it needs to be educated that breastfeeding can also be done even if there are other people around by covering using an apron or *nursing cover* when breastfeeding.(Amini *et al.*, 2019)

This research step can be said to be more complete than the research conducted by Chan and Shafei. In this study, BSE *pre-test* data was taken before the intervention was carried out. In Chan's study, there was no *pre-test* BSE data taken before the intervention, so it is not known the increase in BSE that was carried out after the intervention. In the study conducted by Shafei, BSE *pre-test* data was also not taken before the intervention, but he took BSE scores 3 times after the intervention, namely on the 15th day *postpartum*, 2 months *postpartum* and 4 months *postpartum* so that the increase that occurred after the intervention could be known.(Chan, Ip and Choi, 2016; Shafaei, Mirghafourvand and Havizari, 2020)

Researchers argue that the provision of breastfeeding preparation education since pregnancy must be carried out by health workers, especially midwives. The provision of education can increase mothers' knowledge and insight about breastfeeding so that it can increase mothers' confidence in breastfeeding.(Awaliyah, Rachmawati and Rahmah, 2019) Increased BSE will also increase success in breastfeeding, IMD and even exclusive breastfeeding. With this, the achievement of IMD and exclusive breastfeeding can increase and the infant mortality rate (AKB) can also decrease.

## CONCLUSION AND SUGGESTION

To increase the achievement of more optimal exclusive breastfeeding, it is necessary to educate which is carried out during pregnancy online due to the limitation of direct contact due to the Covid-19 pandemic. The results of this study show that educational videos on breastfeeding preparation can increase maternal confidence in breastfeeding and increase breastfeeding success. Increased BSE will also increase success in breastfeeding, IMD and even exclusive breastfeeding. With this, the achievement of IMD and exclusive breastfeeding can increase and the infant mortality rate (AKB) can also decrease. So, providing education on breastfeeding preparation using animated videos during pregnancy can be a care plan in pregnancy midwifery services.

## DECLARATION

### Conflict of Interest

There is no conflict of interest in this research.

### Authors' Contribution

All authors contributed to research and writing of the manuscript. The first author contributed more to the preparation of the manuscript, data collection, data analysis, and preparation of the manuscript. The second author contributed more to the preparation of the manuscript and review of the manuscript. The third author contributed more in reviewing the preparation of the manuscript, data analysis, and finalizing the manuscript.

### Ethical Approval

Ethical approval of this research by ethics committee of STIKES Banyuwangi No. 027/01/KEPK-STIKESBWI/I/2023.

### Funding Source

This research was funded independently by the researcher.

**Data Availability**

If further study is conducted on this topic in the future, the researcher is open to being contacted, and we are prepared to assist with this.

## REFERENCE

Amini, P. *et al.* (2019) 'The Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF): a validation study in Iranian mothers', *BMC Research Notes*, 12(1), p. 622. Available at: https://doi.org/10.1186/s13104-019-4656-7.

Annisa, Z., Lestari, W. and Amir, Y. (2022) 'Hubungan Dukungan Keluarga Dengan Breastfeeding Self Efficacy (Bse) Pada Ibu Primigravida Untuk Menyusui Eksklusif', *Riau Nursing Journal*, 1(1), pp. 11–19. Available at: https://doi.org/10.31258/rnj.1.1.11-19.

Asih, F.R., Pondaang, M.F. and I'anah, F.C. (2024) 'Education with Animation Video and Flyer Improving Pregnant Women Behavior of Sleep Hygiene: Which One More Effective?', *Jurnal Kesehatan Masyarakat*, 19(3), pp. 456–461.

Asimaki, E. *et al.* (2022) 'Main Biopsychosocial Factors Influencing Breastfeeding: a Systematic Review.', *Maedica*, 17(4), pp. 955–962. Available at: https://doi.org/10.26574/maedica.2022.17.4.955.

Awaliyah, S.N., Rachmawati, I.N. and Rahmah, H. (2019) 'Breastfeeding self-efficacy as a dominant factor affecting maternal breastfeeding satisfaction', *BMC Nursing*, 18(S1), p. 30. Available at: https://doi.org/10.1186/s12912-019-0359-6.

Ballard, O. and Morrow, A.L. (2013) 'Human Milk Composition', *Pediatric Clinics of North America*, 60(1), pp. 49–74. Available at: https://doi.org/10.1016/j.pcl.2012.10.002.

Ballesta-Castillejos, A. *et al.* (2020) 'Factors that influence mothers' prenatal decision to breastfeed in Spain', *International Breastfeeding Journal*, 15(1), p. 97. Available at: https://doi.org/10.1186/s13006-020-00341-5.

Chan, M.Y., Ip, W.Y. and Choi, K.C. (2016) 'The effect of a self-efficacy-based educational programme on maternal breast feeding self-efficacy, breast feeding duration and exclusive breast feeding rates: A longitudinal study', *Midwifery*, 36, pp. 92–98.

Hamnøy, I.L. *et al.* (2024) 'Breastfeeding mother's experiences with breastfeeding counselling: a qualitative study', *International Breastfeeding Journal*, 19(1), p. 34. Available at: https://doi.org/10.1186/s13006-024-00636-x.

Hasanica, N. *et al.* (2020) 'The Effectiveness of Leaflets and Posters as a Health Education Method', *Materia Socio Medica*, 32(2), p. 135. Available at: https://doi.org/10.5455/msm.2020.32.135-139.

He, J., Yimyam, S. and Namprom, N. (2022) 'Breastfeeding self-efficacy, social support, and breastfeeding among Chinese mothers with late preterm infants', *Journal of Neonatal Nursing*, 28(1), pp. 21–25. Available at: https://doi.org/10.1016/j.jnn.2021.07.005.

Kehinde, J., O'Donnell, C. and Grealish, A. (2023) 'The effectiveness of prenatal breastfeeding education on breastfeeding uptake postpartum: A systematic review', *Midwifery*, 118, p. 103579. Available at: https://doi.org/10.1016/j.midw.2022.103579.

Knapp, P. *et al.* (2022) 'The effectiveness of video animations in the education of healthcare practitioners and student practitioners: a systematic review of trials', *Perspectives on Medical Education*, 11(6), pp. 309–315. Available at: https://doi.org/10.1007/s40037-022-00736-6.

Morado Gonzales Jr, A. (2020) 'Breastfeeding self-efficacy in Asia and Pacific: Scoping review', *Nursing Practice Today* [Preprint]. Available at: https://doi.org/10.18502/npt.v8i1.4489.

Safer, W.H.Organization.D. of M.P. and Organization, W.H. (2010) *Counselling for maternal and newborn health care: A handbook for building skills*. World Health Organization.

Shafaei, F.S., Mirghafourvand, M. and Havizari, S. (2020) 'The effect of prenatal counseling on breastfeeding self-efficacy and frequency of breastfeeding problems in mothers with previous unsuccessful breastfeeding: A randomized controlled clinical trial', *BMC Women's Health*, 20(1). Available at: https://doi.org/10.1186/s12905-020-00947-1.

Supeni, St., Jariyah, A. and S, H. (2022) 'Antenatal Class Increases Knowledge and Attitude of Pregnant Women in Succeeding Early Breastfeeding Initiation', *Journal of Asian Multicultural Research for Medical and Health Science Study*, 3(2), pp. 69–78. Available at: https://doi.org/10.47616/jamrmhss.v3i2.294.

Titaley, C.R. *et al.* (2021) 'Determinants of low breastfeeding self-efficacy amongst mothers of children aged less than six months: results from the BADUTA study in East Java, Indonesia', *International Breastfeeding Journal*, 16(1), p. 12. Available at: https://doi.org/10.1186/s13006-021-00357-5.

World Health Organization (2023) *Analytical Fact Sheet*. Available at: https://files.aho.afro.who.int/afahobckpcontainer/production/files/Breastfeeding_Regional_fact_sheet_2023.pdf (Accessed: 8 February 2025).

Zong, X. *et al.* (2021) 'Global prevalence of WHO infant feeding practices in 57 LMICs in 2010-2018 and time trends since 2000 for 44 LMICs.', *EClinicalMedicine*, 37, p. 100971. Available at: https://doi.org/10.1016/j.eclinm.2021.100971.