

The Effect of Pregnancy Exercise on the Sleep Quality of Pregnant Women in the Third Trimester in the Working Area of Siotapina Public Health Center in Buton Regency

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Abstract

Introduction: Sleep disorders in pregnant women are often caused by elevated fetal weight, maternal dyspnea, noticeable fetal movements, frequent urination, and back pain. Pregnancy exercises are believed to enhance sleep quality, particularly in the third trimester. This study aims to assess the impact of pregnancy exercise on the sleep quality of third-trimester pregnant women within the jurisdiction of the Siotapina Public Health Center. **Methods:** A pre-experimental design with a one-group pre-test and post-test method was used in this study. The population comprised 148 third-trimester pregnant women, and a purposive sampling technique was applied to select 44 participants. The Wilcoxon Signed Rank Test was employed to analyse the results. **Results:** Before the pregnancy exercise intervention, 16 (36.4%) respondents had good sleep quality, while 28 (63.6%) had poor sleep quality. After the intervention, the number of respondents with good sleep quality increased to 30 (68.2%), while 14 (31.8%) continued to experience poor sleep quality. **Conclusion:** Pregnancy exercises significantly improve the sleep quality of third-trimester pregnant women. Future research should explore further pregnancy exercise interventions to enhance sleep quality among pregnant women in their third trimester.

Keywords: Pregnancy Exercise; Sleep Quality; Third-Trimester Pregnant Women

Introduction

Pregnancy is a very important life experience for a mother. Pregnancy starts with the fertilization process, where the sperm meets the ovum, followed by the implantation of the fertilised egg. The duration of pregnancy, counted from fertilisation to childbirth, typically spans around 40 weeks or approximately 9 months. Pregnancy is categorised into three trimesters: the first lasts until the 12th week, the second spans from the 13th to the 27th week, and the third covers the period from the 28th to the 40th week (WHO, 2019). Pregnancy is commonly divided into three trimesters based on gestational age: the first trimester extends up to the 12th week, the second trimester ranges from the 13th to the 27th week, and the third trimester spans from the 28th to the 40th week of gestation (Abebe & Debelew, 2025)

Sleep is vital for health and well-being in children, adolescents, and adults. Sleep is one of the essential needs, consistently getting less than 7 hours of sleep per night can lead to negative health effects. Conversely, adequate sleep duration has been widely associated with positive outcomes in cardiovascular health, cognitive function, mental well-being, physical health, and chronic conditions such as obesity (Kember et al., 2023). Healthy sleep is critical for cognitive function, mood, physical and mental health, and the prevention of chronic diseases (Ramar et al., 2021). Insomnia is the inability

Received: 8th April 2025; Revised version received on: 14th May 2025; Accepted: 30th May 2025

to fall or stay asleep, even when one has the opportunity to do so (Pusparani, 2022). The sleep loss the mother is suffering during pregnancy is associated with fetus intrauterine growth retardation, preterm delivery, a longer duration of the delivery, and cesarean section (Wolynczyk-Gmaj et al., 2017). Insomnia in the first trimester is often caused by nausea, vomiting, frequent urination, back pain, and fetal movements, while in the second and third trimesters, sleep is commonly disrupted by heartburn, leg cramps or restless legs, and shortness of breath (Guducu, Şolt Kırca & Kanza Gul, 2023).

Sleep disorders in pregnant women are due to increased fetal weight, shortness of breath, fetal movement, frequent waking up due to urination, and back pain. Various factors contribute to the decline in sleep quality among pregnant women. Natural physiological changes during pregnancy, including the enlargement of the uterus, physical discomfort, and elevated progesterone levels, play a role in disrupting sleep, especially in the third trimester. The rise in progesterone levels causes muscle relaxation, including in the bladder, which can lead to frequent nighttime urination and consequently disrupt sleep quality. The incidence of sleep disorders among pregnant women in Indonesia remains relatively high, reaching 64% (Ismiyati & Faruq, 2020).

Poor sleep triggers sympathetic and HPA-axis hyperactivation, leading to "irritability and low mood" and behavioral disinhibition (Isayeva, Shalimova & Buriakovska, 2022). Poor sleep quality can also result in explosive emotional conditions, hypertension, and motor disorders. If depression, stress, and hypertension occur in pregnant women, it can have bad consequences for the mother and her fetus. This can cause preeclampsia in pregnant women and can even cause abortion, premature birth, and LBW, which are causes of death in babies (Jannah, Catur Leny & Irawan, 2023). A study by Farrell et al., (2024) found that poor sleep impairs executive function such as impulse control and emotional regulation due to dysregulation of the amygdala and prefrontal circuitry.

The total number of pregnant women in the working area of the Siotapina Public Health Center, Buton Regency, was recorded at 220 in 2021, decreased to 189 in 2022, and further declined to 154 in 2023. Meanwhile, from January to March 2024, there were 148 pregnant women recorded.

The results of previous research and interviews conducted with the Siotapina Public Health Center's coordinating midwife in February 2024 stated that the Siotapina Public Health Center had a pregnancy class program held once a month with activities such as examining pregnant women, counseling, and pregnancy exercises. According to Liu et al., (2025) exercise during pregnancy improves sleep quality during pregnancy.

Interviews were carried out over five days with 21 pregnant women who visited the Siotapina Public Health Center area. The results showed that 13 of them had never participated in pregnancy exercises, while 8 had attended such exercises once. Those who had never joined pregnancy exercises frequently experienced sleep disturbances, such as difficulty falling asleep and feeling tired and drowsy during daily activities. Meanwhile, those who had participated still reported waking up frequently at night and having poor sleep quality. Referring to the explanation above, the researchers are interested in studying the impact of pregnancy exercises on the sleep quality of women in the third trimester, therefore this study is entitled "The effect of pregnancy exercise on the sleep quality of pregnant women in the third trimester in the working area of Siotapina Public Health Center in Buton Regency."

Methodology

This research employed a quantitative approach with a pre-experimental design. The design utilised was a one-group pre-test and post-test to determine the effect of pregnancy exercise on the sleep quality of pregnant women. The sample included all pregnant women in the working area of Siotapina Public Health Center, Buton Regency, from January to March 2024, totaling 44 individuals.

Study Design

This study employed a quantitative approach with a pre-experimental design, specifically the one-group pre-test and post-test design. This design was chosen to evaluate the effect of pregnancy exercise on the sleep quality of pregnant women without the use of a control group.

Sample

The population in this study consisted of all pregnant women within the working area of Siotapina Public Health Center, Buton Regency, during the period of January to March 2024. The sample was selected using a total sampling technique, resulting in a total of 44 participants who met the inclusion criteria and agreed to participate in the study.

Instruments

The primary instrument used to measure sleep quality was the Pittsburgh Sleep Quality Index (PSQI) questionnaire. This validated tool consists of several components that assess different aspects of sleep, including duration, disturbances, latency, and overall sleep quality. The PSQI was administered before and after the pregnancy exercise intervention.

Procedure

Pre-test: Participants completed the PSQI questionnaire before the intervention to assess their baseline sleep quality.

Intervention: All participants took part in a structured pregnancy exercise program, conducted over several sessions in accordance with guidelines for safe physical activity during pregnancy. The exercise sessions included stretching, breathing techniques, and light aerobic activities tailored to pregnant women.

Post-test: Upon completion of the intervention period, participants were asked to complete the PSQI questionnaire again to measure any changes in sleep quality.

Data were then collected, coded, and analysed using appropriate statistical methods to determine the effectiveness of the intervention.

Result

Characteristics of Respondents

Based on the data in Table 1, it shows that of the 44 respondents, the largest age group is in the 26-32 years old category, totaling 22 (50.0%) respondents, and the smallest number of respondents is in the 33-39 years old category, totaling 5 respondents (11.4%).

Table 1: Based on Age

No	Age	n	%
1	19 – 25	17	38.6
2	26 – 32	22	50.0
3	33 – 39	5	11.4
Total		44	100.0

Result of Univariate Analysis

Univariate analysis is an analysis of dependent variables and independent variables. This analysis examines only a single variable, whether it is dependent or independent variable, where each variable is assessed individually using univariate analysis. The results of the univariate analysis in this study are presented as follows:

Table 2: Descriptive Statistics of Pre-Experiment and Post-Experiment

	Max.	Min.	Mean	Std Deviation
Pre-test	2	1	1.64	0.487
Post-test	2	1	1.32	0.471

The table above (Table 2) indicates that in the pre-test with 44 participants, the highest score was 2 and the lowest was 1, with a mean value of 1.64 and a standard deviation of 0.487. This suggests that, on average, respondents experienced an increase in sleep quality disturbances before participating in pregnancy exercises. Meanwhile, in the post-test, the highest score remained at 2 and the lowest at 1, with an average of 1.32 and a standard deviation of 0.471. This means that after pregnancy exercise,

respondents experience a decrease in sleep quality disorders. For more details, see the frequency distribution table below.

Table 3: The Distribution of Sleep Quality Among Pregnant Women Before and After Participating in Pregnancy Exercises at the Siotapina Public Health Center in 2024

Sleep Quality	Criteria			
	Pre-test		Post-test	
	N	%	n	%
Good	16	36.4	30	68.2
Poor	28	63.6	14	31.8
Total	44	100	44	100

The table above (Table 3) is based on the quality of sleep-in pregnant women from 44 respondents in the working area of Siotapina Public Health Center, which shows that the quality of sleep before pregnancy exercise has good sleep quality of 16 (36.4%) respondents and poor sleep quality 28 (63.6%) respondents. After pregnancy exercise, respondents with good sleep quality are 30 (68.2%) respondents and poor sleep quality are 14 (31.8%) respondents.

Results of Bivariate Analysis

This hypothesis test aims to determine whether there is an improvement in sleep quality among third-trimester pregnant women was observed before and after participating in pregnancy exercise. The data were analysed using the Wilcoxon Signed Rank Test, with the results presented in the table below:

Table 4: The Results of the Wilcoxon Rank Test Outputs

		n	Mean Ranks	Sum of Ranks
Post-test- Pre Test	Negative Ranks	14	7.50	105.00
	Positive Ranks	0	0.00	.00
	Ties	30		
	Total	44		

Based on Table 4 output rank Wilcoxon signed rank test, there are 14 negative ranks between the pre-test and post-test. This value indicates that 14 samples experience a decrease in sleep quality disorders after pregnancy exercise. Then, 0 for positive ranks, meaning there is no increase in sleep quality disorders after pregnancy exercise. The tie value is 30, which means there is the same value in sleep quality before and after pregnancy exercise.

Table 5: The results of the Wilcoxon Signed Rank Test

	Pretest-Posttest
Z	-3.742
Asymp. Sig. (2-tailed)	0.000

Referring to the table above, the Wilcoxon Signed Rank Test shows a Z-value of -3.742 and an Asymp. Sig. (2-tailed) value of 0.000, which is below 0.05, indicating that H_a is accepted. Therefore, it can be concluded that pregnancy exercise is effective in alleviating sleep quality disturbances in pregnant women (Table 5).

Discussion

Based on the results of the study in Table 11, out of 44 respondents before being given prenatal exercise have a good sleep quality, namely 16 (36.4%) respondents, and 28 (63.6%) respondents with poor sleep quality. Pregnant women with multiparous pregnancies have previously experienced sleep disorders, but sleep pattern disorders have decreased because the pregnant woman's body is accustomed to the physical changes that occur during pregnancy. This adjustment can help mothers feel more comfortable when sleeping if they have found a comfortable sleeping position. Moreover, out of 44 respondents after being given prenatal exercise have good sleep quality, namely 30 (68.2%) respondents, and 14 (31.8%) respondents with poor sleep quality. Prenatal exercise affects the sleep quality of pregnant women because of the relaxation movements. These relaxation movements trigger a calming response by activating the parasympathetic nerves within the central nervous system. This process helps suppress adrenaline hormone production, leading to reduced anxiety and tension in

pregnant women, making them feel more relaxed and at ease. It can be concluded that there is an increase in sleep quality after doing prenatal exercise. Physical activity reduced sleep disorders. According to Azward et al., (2021) in third-trimester women, prenatal yoga four sessions over 2 weeks significantly enhanced sleep quality based on Pittsburgh Sleep Quality Index scores. Regular exercise improves sleep quality, sleep architecture, and reduces insomnia symptoms (Wang & Boros, 2021).

This is consistent with the study by Yuniarti, Wulandari & Ruslinawati (2023), involving 30 pregnant women in their second and third trimesters, found that pregnancy exercise significantly improved sleep quality; prior to the intervention, 25 out of 30 participants were classified as poor sleepers based on their PSQI scores, which decreased to only 11 out of 30 after routine pregnancy exercise, with statistical analysis using the Wilcoxon Signed-Rank Test yielding a p-value of 0.000. The sleep quality of pregnant women improves following four consecutive weeks of pregnancy exercise (Nurherliyany et al., 2025).

The results of this study are reinforced by research conducted by Nurherliyany et al., (2025) which reported a significant improvement in the sleep quality of third-trimester pregnant women following regular pregnancy exercise, as evidenced by a p-value of 0.000 (<0.05). In Table 11, there are 14 (31.8%) respondents with poor sleep quality. This is because pressure on the bladder from the enlarged uterus often causes pregnant women to wake up at night, leg cramps or lower back pain can occur even after exercising, and this can interfere with sleep and significant hormonal changes during pregnancy can affect sleep patterns and cause disturbances. Recent studies report by Mislu et al. (2024) that approximately 37% of pregnant individuals experience poor sleep quality in the first trimester, increasing to nearly 60% by the third trimester. Overall, about 46% to 60% of pregnant women suffer from poor sleep quality during pregnancy. Daytime sleepiness affects more than 40%, and insufficient nighttime sleep is reported by a similar proportion, significantly influenced by hormonal changes and increased bladder pressure. Physiological discomforts such as frequent urination, leg cramps, heartburn, back pain, and fetal movements become more pronounced as pregnancy advances, contributing to progressive sleep disruption. Although prenatal exercise is generally believed to improve sleep quality, it may not be sufficient to specifically alleviate insomnia symptoms in pregnant women (Yang et al., 2020). Regular exercise during pregnancy has not statistically significant improvement was found for insomnia symptoms specifically (Yang et al., 2020).

According to the assumption of researchers, the improvement in sleep quality after doing prenatal exercise helps relax muscles and reduce physical tension that often disturbs sleep. Physical activity from prenatal exercise increases blood circulation, which can reduce discomfort and cramps that disturb sleep. In addition, physical activity can also reduce anxiety and stress, which are often the cause of sleep disorders in pregnant women. Therefore, it is necessary to improve further regarding prenatal exercise to improve the quality of sleep of pregnant women in the third trimester. In line with research by Marsh, Chien & Clark (2020) that physical activity reduces maternal stress and improves pregnancy outcomes, including sleep quality. Supervised physical activity can prevent and reduce anxiety symptoms during pregnancy (Sánchez-Polán et al., 2021). Exercise can reduce anxiety and stress during and after pregnancy (Marconcin et al., 2021). Apart from that higher physical activity during pregnancy correlates with better postpartum mental health, including lower anxiety and improved well-being (Hicks, Graf & Yeo, 2024).

Based on a meta-analysis of 16 randomised controlled trials conducted by Sanchez-Polan et al., (2024), it was found that pregnant women who engaged in physical activity during pregnancy experienced reduced pain intensity (SMD = -0.66), lower pain-related disability (SMD = -0.80), and less general pain (SMD = -0.56) compared to those who remained inactive. Apart from that a meta-analysis of 18 studies by Kołomańska, Zarawski and Mazur-Bialy (2019) with a total of 1,541 pregnant participants showed that engaging in physical activity significantly alleviated sleep disorders (Standardized Mean Difference = -1.48 , 95% Confidence Interval: -2.06 to -0.90 ; $P < 0.00001$), while also enhancing the duration and quality of nighttime sleep. The systematic review of 10 studies by Summer et al., (2023) reported that 8 of the 10 found a positive association between physical activity (including exercise) and better sleep during pregnancy

The nursing implications of this study are that prenatal exercise can be part of a care plan to help mothers manage stress and anxiety, which contributes to better sleep. Prenatal exercise provides a non-pharmacological alternative to improve sleep quality, reducing the need for sleep medication or supplements. Nurses can use prenatal exercise as an educational tool to teach mothers how to cope with discomfort and improve their sleep through safe physical activity.

Implications for pregnant women in this study are that pregnancy exercises can help pregnant women sleep better by relaxing muscles and reducing physical discomfort. This makes mothers feel fresher and more rested after a night's sleep. Pregnancy exercises can also help reduce back pain, leg cramps, and other discomforts that often occur in the third trimester. By reducing these, pregnant women can feel more comfortable while sleeping.

Conclusion

This study concludes that pregnancy exercise significantly improves the sleep quality of women in their third trimester. The implementation of regular and guided physical activity, such as prenatal exercise, can effectively reduce sleep disturbances commonly experienced during late pregnancy, likely by enhancing physical comfort, reducing stress, and promoting better physiological balance. Given the high prevalence of poor sleep quality among pregnant women, integrating pregnancy exercise into routine antenatal care is recommended to support maternal well-being. Future studies could explore the long-term benefits of pregnancy exercise on postpartum sleep quality and mental health outcomes. Additionally, research with larger, more diverse populations and comparisons between different types and intensities of exercise may provide deeper insights into optimal prenatal activity regimens.

Conflict of Interest

The authors declare that there has no conflict of interest.

Acknowledgement

The authors are thankful to the institutional authority for completion of the work.

References

- Abebe, T. A., & Debelew, G. T. (2025). Maternal Health Care Services Utilization and Associated Factors Among Pregnant Women in Kersa District, Jimma Zone, Southwest Ethiopia. *PLoS ONE*, 20(5), 1–16. <https://doi.org/10.1371/journal.pone.0323977>
- Azward, H., Ramadhany, S., Pelupessy, N., Usman, A. N., & Bara, F. T. (2021). Prenatal Yoga Exercise Improves Sleep Quality in The Third Trimester of Pregnant Women. *Gaceta Sanitaria*, 35. <https://doi.org/10.1016/j.gaceta.2021.10.030>
- Farrell III, B. J., Emmerton, R. W., Camilleri, C., & Sammut, S. (2024). Impulsivity mediates the relationship between sleep quality and interpersonal functioning: a cross-sectional study in a sample of university students. *Sleep Science and Practice*, 8(1), 16. <https://doi.org/10.1186/s41606-024-00113-8>
- Guducu, N., Şolt Kirca, A., & Kanza Gul, D. (2023). Insomnia During Pregnancy and Related Factors. *Journal of Turkish Sleep Medicine*, 10(2), 137–143. <https://doi.org/10.4274/jtsm.galenos.2022.81894>
- Hicks, L. E., Graf, M. D., & Yeo, S. (2024). Prenatal exercise and its effects on postpartum mental health: systematic review and meta-analysis. *Archives of Women's Mental Health*, 1-10. <https://doi.org/10.1007/s00737-024-01525-2>
- Isayeva, G., Shalimova, A., & Buriakovska, O. (2022). The Impact of Sleep Disorders in The Development of Hypertension. *Arterial Hypertension*, 26(4), 170–179. <https://doi.org/10.5603/AH.a2022.0014>
- Ismiyati, S., & Faruq, M. (2020). Gambaran Gangguan Tidur pada Ibu Hamil Trimester III di Puskesmas Jetis Kabupaten Bantul [Description of Sleep Disorders in Pregnant Women in the Third Trimester at the Jetis Health Center, Bantul Regency]. *Jurnal Kebidanan Dan Keperawatan Aisyiyah*, 16(2), 167–174. <https://doi.org/https://doi.org/10.31101/jkk.1379>

- Jannah, M., Catur Leny, R., & Irawan, Q. (2023). The Relationship Between Quality of Sleep in Pregnant Women with the Incidence of Preeclampsia. *Jurnal Program Mahasiswa Kreatif*, 7(1), 123–129. <https://doi.org/10.32832/pkm>
- Kember, A. J., Elangainesan, P., Ferraro, Z. M., Jones, C., & Hobson, S. R. (2023). Common Sleep Disorders in Pregnancy: A Review. *Frontiers in Medicine*, 10(August), 1–20. <https://doi.org/10.3389/fmed.2023.1235252>
- Kołomańska, D., Zarawski, M., & Mazur-Bialy, A. (2019). Physical Activity and Depressive Disorders in Pregnant Women-A Systematic Review. *Medicina (Lithuania)*, 55(5). <https://doi.org/10.3390/medicina55050212>
- Liu, D., Liu, K., Xie, L., He, M., & Liu, X. (2025). The Effect of Physical Activity on Sleep Disorders in Pregnant People: A Meta-Analysis of Randomized Controlled Trials. *BMC Pregnancy and Childbirth*, 25(1). <https://doi.org/10.1186/s12884-024-07129-z>
- Marconcin, P., Peralta, M., Gouveia, É. R., Ferrari, G., Carraça, E., Ihle, A., & Marques, A. (2021). Effects of Exercise During Pregnancy on Postpartum Depression: A Systematic Review of Meta-Analyses. *Biology*, 10(12). <https://doi.org/10.3390/biology10121331>
- Marsh, M., Chien, P., & Clark, J. (2020). Issue Information. *BJOG: An International Journal of Obstetrics & Gynaecology*, 127(4). <https://doi.org/10.1111/1471-0528.16052>
- Mislu, E., Kumsa, H., Tadesse, S., Arage, M. W., Susu, B., Ayele, M., & Chane, F. (2024). Sleep Quality Disparities in Different Pregnancy Trimesters in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. *BMC Pregnancy and Childbirth*, 24(1), 627. <https://doi.org/10.1186/s12884-024-06830-3>
- Nurherliyany, M., Novianti, A. R., Srinayanti, Y., & Heryani, H. (2025). The Effect of Pregnancy Exercises on the Quality of Sleep of Third Trimester Pregnant Women in Sindangrasa Village Ciamis District. *Nurul Ilmi: Journal of Health Sciences and Midwifery*, 3(1), 38-48. <https://doi.org/10.52221/nuri>
- Pusparani, A. (2022). A Review on Insomnia: The Sleep Disorder. *Scientia Psychiatrica*, 3(2), 233-237. <https://doi.org/10.37275/scipsy.v3i2.53>
- Ramar, K., Malhotra, R. K., Carden, K. A., Martin, J. L., Abbasi-Feinberg, F., Aurora, R. N., Kapur, V. K., Olson, E. J., Rosen, C. L., Rowley, J. A., Shelgikar, A. V., & Trotti, L. M. (2021). Sleep is Essential to Health: An American Academy of Sleep Medicine Position Statement. *Journal of Clinical Sleep Medicine*, 17(10), 2115–2119. <https://doi.org/10.5664/jcsm.9476>
- Sanchez-Polan, M., Nagpal, T. S., Zhang, D., Silva-Jose, C., Montejo, R., & Barakat, R. (2024). The Influence of Physical Activity during Pregnancy on Maternal Pain and Discomfort: A Meta-Analysis. *Journal of Personalized Medicine*, 14(1). <https://doi.org/10.3390/jpm14010044>
- Sánchez-Polán, M., Silva-Jose, C., Franco, E., Nagpal, T. S., Gil-Ares, J., Lili, Q., Barakat, R., & Refoyo, I. (2021). Prenatal Anxiety and Exercise. Systematic Review and Meta-Analysis. *Journal of Clinical Medicine*, 10(23). <https://doi.org/10.3390/jcm10235501>
- Summer S Cannon, Michele Lastella, Kelly REvenson, M. J. H. (2023). The Association Between Physical Activity and Sleep During Pregnancy: A Systematic Review. *Behavioral Sleep Medicine*, 21(4), 513–528. <https://doi.org/https://doi.org/10.1080/15402002.2022.2124258>
- Wang, F., & Boros, S. (2021). The Effect of Physical Activity on Sleep Quality: A Systematic Review. *European Journal of Physiotherapy*, 23(1), 11–18. <https://doi.org/10.1080/21679169.2019.1623314>
- Wolynczyk-Gmaj, D., Różanska-Waledziak, A., Ziemka, S., Ufnal, M., Brzezicka, A., Gmaj, B., Januszko, P., Fudalej, S., Czajkowski, K., & Wojnar, M. (2017). Insomnia in pregnancy is associated with depressive symptoms and eating at night. *Journal of Clinical Sleep Medicine*, 13(10), 1171–1176. <https://doi.org/10.5664/jcsm.6764>
- World Health Organization (WHO). (2019). *WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience*. Retrieved from: <https://www.who.int/publications/i/item/9789241549912>. Accessed on 19th August 2024.
- Yang, S. Y., Lan, S. J., Yen, Y. Y., Hsieh, Y. P., Kung, P. T., & Lan, S. H. (2020). Effects of Exercise on Sleep Quality in Pregnant Women: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *Asian Nursing Research*, 14(1), 1–10. <https://doi.org/10.1016/j.anr.2020.01.003>
- Yuniarti, K., Wulandari, A. P., & Ruslinawati, R. (2023). The Effect of Pregnancy Exercise on The Sleep Quality of Trimester II and III Pregnant Women at the Pelambuan Community Health Center, Banjarmasin City in

2023. *Journal of Midwifery and Reproduction*, 7(1), 1-4.
<https://doi.org/http://dx.doi.org/10.35747/jmr.v7i1.730>