

The Relationship Between Folic Acid Intake and the Birth Weight of Newborns in the Service Area of the BLUD UPTD Poasia Community Health Center in Kendari City

Hubungan Asupan Asam Folat Dengan Berat Badan Bayi Baru Lahir di Wilayah Kerja BLUD UPTD Puskesmas Poasia Kota Kendari

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ABSTRACT

The nutritional status of pregnant women is an important indicator of the nutritional status of a community. If their nutritional needs are not properly met, it will result in deficiencies. Therefore, their energy and nutrient needs must be properly met so that fetal growth can be optimal. This study aimed to determine the relationship between folic acid intake and newborn weight in the BLUD UPTD Poasia Health Centre working area in Kendari City. This study employed an observational survey with a cross-sectional design. The study population comprised 305 individuals, of whom 173 were selected at random for the sample. Purposive sampling was used to select the sample. A Food Frequency Questionnaire (FFQ) was used to measure food intake during the third trimester of pregnancy. Using the Fisher Exact Test, the results obtained a p value of 0.000 ($p < 0.05$), indicating a significant relationship between the folic acid intake of pregnant women and the weight of their newborn babies. This study concludes that there is a relationship between the folic acid intake of pregnant women and the weight of newborn babies in the BLUD UPTD Poasia Health Centre working area in Kendari City in 2024. Nutritional education for pregnant women should be increased, especially with regard to the importance of micronutrient intake (iron and folic acid), as this affects birth weight.

Keywords: Dietary intake, infant weight, LBW, folic acid

ABSTRAK

Status gizi ibu hamil merupakan salah satu indikator dalam mengukur status gizi masyarakat. Apabila asupan gizi ibu hamil tidak terpenuhi dengan baik, maka akan terjadi defisiensi zat gizi. Oleh karena itu, kebutuhan energi dan zat gizi harus terpenuhi dengan baik agar pertumbuhan janin dapat berkembang dengan sempurna. Tujuan dari penelitian ini adalah untuk mengetahui hubungan antara asupan asam folat dengan berat badan bayi baru lahir di Wilayah Kerja BLUD UPTD Puskesmas Poasia Kota Kendari. Jenis penelitian menggunakan survei observasional dengan desain *cross-sectional*. Populasi penelitian sebanyak 305 orang dan sampel sebanyak 173 orang. Teknik *sampling* yang digunakan adalah *purposive sampling*. Instrumen yang digunakan adalah kuesioner *Food Frequency Questionnaire (FFQ)* untuk mengukur asupan makanan pada masa kehamilan trimester III. Hasil penelitian dengan menggunakan *Fisher Exact Test* diperoleh nilai $p=0,000$ ($p < 0,05$), menunjukkan bahwa ada hubungan yang signifikan antara asupan asam folat ibu hamil dengan berat badan bayi baru lahir. Kesimpulan dari penelitian ini adalah ada hubungan antara asupan asam folat ibu hamil dengan berat badan bayi baru lahir di wilayah kerja BLUD UPTD Puskesmas Poasia Kota Kendari tahun 2024. Meningkatkan edukasi gizi bagi ibu hamil, terutama mengenai pentingnya asupan mikronutrien (zat besi, asam folat) yang berpengaruh terhadap berat lahir bayi.

Kata Kunci: Asupan Makan, Berat Badan Bayi, BBLR, Asam Folad

Article Info:

Received: 20 April 2026 | Revised form: 08 May 2026 | Accepted: 19 May 2026 | Published online: June 2026



INTRODUCTION

Low Birth Weight (LBW) remains a significant public health issue because it contributes to increased rates of neonatal morbidity and mortality. Infants with LBW are at higher risk of growth and developmental disorders, as well as chronic diseases later in life. Therefore, effective preventive measures are needed to identify modifiable risk factors.¹

One factor that plays a crucial role in fetal growth and development is folic acid intake during pregnancy. Folic acid is an essential micronutrient involved in DNA synthesis, cell division, and placental tissue formation. Folic acid deficiency during pregnancy can lead to fetal growth restriction, which may increase the risk of LBW. Recent studies indicate that iron and folic acid supplementation during pregnancy is associated with improved pregnancy outcomes, including a reduced risk of LBW.¹

Recent studies indicate that iron and folic acid supplementation during pregnancy plays a crucial role in reducing the risk of LBW. A study by Khanal et al. (2024) found that the combination of antenatal care visits and the consumption of iron and folic acid supplements was significantly associated with a reduction in the incidence of LBW. Other studies also indicate that these interventions have a synergistic effect on improving pregnancy outcomes. Additionally, various maternal factors, including nutritional status and anemia, have been shown to contribute to the incidence of LBW.¹

The nutritional status of pregnant women is one of the indicators used to assess community

nutritional status. If a pregnant woman's nutritional intake is not adequately met, nutrient deficiencies will occur. Therefore, energy and nutrient requirements must be adequately met to ensure optimal fetal growth and development.

Adequate nutritional intake significantly influences a mother's food choices, enabling her to select nutritious foods and plan a balanced diet tailored to her body's needs during pregnancy.³ To meet these needs, sufficient calories, high-biological-value protein, vitamins, minerals, and fluids are required to support the mother, fetus, and placenta throughout pregnancy.⁴

If a mother experiences malnutrition during pregnancy, it can lead to problems for both the mother and the fetus she is carrying, including: anemia, severe bleeding, and abnormal maternal weight gain; malnutrition can affect the labor process, potentially leading to difficult and prolonged labor, preterm birth, and postpartum hemorrhage; malnutrition can also affect fetal growth and may result in miscarriage, abortion, congenital defects, and low birth weight⁴. Therefore, the nutritional needs of pregnant women are a critically important component of pregnancy and must be emphasized throughout the pregnancy.⁵

The Indonesian Ministry of Health recorded 4.005 maternal deaths in 2022, rising to 4.129 in 2023. Meanwhile, infant deaths totaled 20.882 in 2022 and 29.945 in 2023.

A report from the Southeast Sulawesi Provincial Health Office indicates that the number of pregnant women and Low Birth Weight (LBW) infants in Southeast Sulawesi Province fluctuates;



in 2021, 48.020 babies were born, with 1.572 classified as LBW (3.2%). In 2022, the number of births was 49.901, with 1.865 cases (3.7%) classified as LBW.

A report from the Poasia Community Health Center (UPTD Puskesmas) in Kendari City indicates that the 2021 target for the percentage of low birth weight infants was 4.6%, with an achievement of 1.3%. In 2022, the target coverage percentage for low birth weight infants was 3.8%, with an achievement of 2.2%, and in 2023, the target coverage percentage for low birth weight infants was 3%, with an achievement of 4.2%. Meanwhile, there were 6 infant deaths.

According to a study conducted by Sri (2021), the health status of a country can be assessed through indicators such as the maternal mortality rate and the infant mortality rate. Low Birth Weight (LBW) is one of the leading causes of neonatal mortality and also a major cause of perinatal mortality. LBW refers to a newborn with a birth weight <2,500 grams, regardless of the mother's gestational age, as measured 1 hour after birth.⁸

Pregnant women require additional intake of food, macronutrients, and micronutrients, as well as nutrients from the placenta and other maternal tissues.⁹ Protein deficiency in pregnant women significantly impacts the length and weight of the newborn. Low protein intake also affects the total energy intake of pregnant women.

Unmet nutritional needs in pregnant women can have adverse effects on both the mother and the fetus. The fetus may experience birth defects, low birth weight (LBW), infant anemia, miscarriage,

and neonatal death. Pregnant women with malnutrition will suffer from Chronic Energy Deficiency (CED), leading to physical weakness, anemia, bleeding, abnormal maternal weight gain, and gestational diabetes that endangers the mother's life. Pregnant women with poor nutritional status face a 2 to 3-times higher risk of giving birth to low birth weight infants compared to those with good nutritional status, in addition to a 1.5 times higher risk of infant mortality.²

The nutritional quality of food is a measure used to determine whether a food is nutritious or not, based on the food's nutrient content relative to the body's needs and bioavailability levels. Indonesia has implemented various prenatal supplementary feeding programs to reduce protein-energy malnutrition, as well as supplementation and fortification initiatives to address micronutrient deficiencies. However, malnutrition remains a persistent issue. This situation highlights the importance of reviewing nutritional guidelines and the nutritional needs of Indonesian women to provide data on dietary intake during pregnancy.¹²

Inadequate nutritional intake during pregnancy can affect fetal growth and development, resulting in babies born with low birth weight and an increased risk of low Apgar scores, which reflect vital signs at birth. Pregnancy-related issues in expectant mothers are a highly latent nutritional problem that can arise at any time if left unaddressed. Negative impacts are prevalent in endemic areas where pregnancy-related issues are suspected to be linked to the quality of newborns, particularly in cases of Low Birth Weight (LBW),



which is one of the causes of Infant Mortality Rate (IMR).

Therefore, the objective of this study is to analyze the relationship between folic acid intake and the birth weight of newborns in the service area of the BLUD UPTD Poasia Community Health Center in Kendari City in 2024.

MATERIALS AND METHODS

This study employed an observational survey with a cross-sectional design. The study was conducted in the service area of the BLUD UPTD Poasia Community Health Center in Kendari City, and the research period was July–August 2024. The study population consisted of 305 individuals, and the sample size was 173. The sampling technique used was purposive sampling, employing the Slovin formula ($n = N/(1+Ne^2)$). Inclusion criteria included pregnant women with a gestational age of ≥ 37 weeks, giving birth to a single baby, and having no chronic conditions such as diabetes or hypertension. Exclusion criteria included babies born with congenital abnormalities and incomplete data.

Data collection involved conducting interviews with pregnant women in the Poasia District of Kendari City using a Food Frequency Questionnaire (FFQ). The data were then analyzed using the Nutri survey application to determine folic acid intake. Data analysis was performed using univariate and bivariate methods and presented in tabular form.

RESULTS

The characteristics of the respondents based on the mother’s age, highest level of education, occupation, method of delivery, and the baby’s sex in the service area of the BLUD UPTD Poasia Community Health Center in Kendari City in 2024 are presented in Table 1 below:

Table 1. Characteristics of Respondents by Mother’s Age, Highest Level of Education, Mother’s Occupation, Delivery Method, and Baby’s Sex in the Service Area of the BLUD UPTD Poasia Community Health Center, Kendari City, in 2024

Karateristik Responden		
Mother's Age	n	%
15-19 years old	6	(3.5)
20-24 years old	25	(14.5)
25-29 years old	66	(38.2)
30-34 years old	48	(27.7)
>35 years old	28	(16.2)
Final Education		
SD	1	(0.6)
SMA	113	(65.3)
SMP	12	(6.9)
S1	47	(27.2)
Mother's Work		
IRT	153	(88.4)
PNS	3	(1.7)
PRIVATE	17	(9.8)
Delivery Method		
Normal	138	(79.8)
<i>Sectio Caesarea</i> (SC)	35	(20.2)
Baby Sex		
Male	87	(50.3)
Women	86	(49.7)

Source: Primary Data, 2024

Age is a unit of time that measures the existence of an object or being, whether living or dead. A person’s age is measured from the time of birth until the time the age is calculated. A mother’s age typically refers to a woman’s age at the time she becomes pregnant or gives birth.



Table 1 shows that of the 173 respondents (100%), the largest age group was 25–29 years old, comprising 66 people (38.2%), and the smallest age group was 15–19 years old, comprising 6 people (3.5%).

Education is the process of developing the knowledge and personality of the workforce. Fundamentally, education is intended to increase theoretical knowledge. Educational level is measured by the highest educational certificate or diploma a person holds^{14,15}.

Based on Table 1, it shows that out of 173 respondents (100%), the majority of mothers had a high school education, totaling 113 people (65.3%), while the smallest educational level was elementary school, with 1 person (0.6%).

Employment refers to specific activities performed on a continuous basis, particularly for the purpose of earning a living¹⁶.

Table 1 shows that of the 173 respondents (100%), the most common occupation among mothers was homemaker (153 people, 88.4%), followed by civil servant (3 people, 1.7%).

Vaginal delivery is the process of giving birth to a baby through the mother’s natural birth canal (vagina). This is the ideal and most common method if there are no medical complications. Meanwhile, a cesarean section (CS) is a surgical procedure to deliver a baby through an incision made in the mother’s abdomen and uterus.

Based on Table 1, it shows that out of 173 respondents (100%), 138 (79.8%) gave birth via normal delivery, and 35 (20.2%) via Cesarean section (CS).

Sex denotes the biological differences between males and females. The biological differences and functions of males and females are not interchangeable between the two, and these functions remain distinct for males and females on Earth. Sex often serves as a distinguishing factor for roles and responsibilities in daily life as well as in the workplace.³

Based on Table 1, it shows that out of 173 respondents (100%), there were more males, namely 87 people (50.3%), compared to females, who numbered 86 people (49.7%).

The distribution of respondents based on folic acid intake in the service area of the BLUD UPTD Poasia Community Health Center in Kendari City in 2024 is presented in Table 2 below:

Table 2. Distribution of Respondents by Folate Intake in the Service Area of the BLUD UPTD Poasia Community Health Center in Kendari City in 2024

Folic Acid Intake	n	%
Enough	154	(89.0)
Less	19	(11.0)

Source: Primary Data, 2024

Folic acid, or vitamin B9, is one of the most important nutrients for pregnant women, especially during the early stages of pregnancy. Its role is crucial in preventing serious birth defects in the fetus. Folic acid plays a vital role in DNA synthesis and rapid cell division. It has two main functions during pregnancy. Folic acid is typically included in iron supplements along with iron, or found in prenatal vitamins (multivitamins).¹⁸

Table 2 shows that out of 173 respondents (100%), 154 (89.0%) had adequate folic acid intake, and 19 (11.0%) had insufficient folic acid intake.



Table 2. Distribution of Respondents Based on Folic Acid Intake in the Working Area of BLUD UPTD Poasia Health Center in Kendari City in 2024

Folic Acid Intake of Pregnant Women	Birth Weight of a Baby				Total		P-Value
	BBLR		Normal		N	%	
	n	%	n	%			
Enough	6	3.9	148	96.1	154	100	0.000
Less	6	31.6	13	68.4	19	100	
Total	12	6.9	161	93.1	173	100	

Source: Primary Data, 2025

Table 3 shows that of the 154 respondents (100%) with adequate folic acid intake, a greater number had newborns with normal birth weight, 148 respondents (96.1%), compared to those with adequate folic acid intake who had low birth weight infants (LBW), 6 respondents (3.9%). Meanwhile, among the 19 respondents (100%) with insufficient folic acid intake, there were more respondents with newborns in the normal weight category (13, or 68.4%) compared to those with insufficient folic acid intake and Low Birth Weight (LBW) newborns (6 respondents, or 31.6%).

Based on the results of the Chi-Square test, one frequency cell (25%) exceeded 20% of the data, which did not align with the expected values using a 2x2 table. Therefore, the alternative test that can be used if the results of the Chi-Square test do not meet the requirements is Fisher's Exact Test. The results of the Fisher Exact Test yielded a p-value of 0.000 ($p < 0.05$), meaning H_0 is rejected. This indicates that there is an association between maternal folic acid intake and newborn birth weight in the service area of the BLUD UPTD Poasia Community Health Center in Kendari City in 2024.

DISCUSSION

Folic acid plays a role in DNA synthesis, cell proliferation, and placental tissue formation. Folic

acid deficiency leads to impaired placental and fetal growth 19.

Research findings indicate a significant association between a pregnant woman's folic acid intake and the birth weight of her newborn. This suggests that adequate folic acid intake can reduce the risk of low birth weight. These results indicate that adequate folic acid intake during pregnancy plays a crucial role in supporting fetal growth, particularly through cell division, DNA synthesis, and the formation of new tissues.

These study findings demonstrate a significant association between a pregnant woman's folic acid intake and the birth weight of her newborn. These findings illustrate that adequate folic acid plays a vital role in supporting fetal growth through DNA synthesis, cell division, and optimal placental development. A recent cohort study by *Frontiers in Public Health* (2022) also reported that mothers who took folic acid supplements during pregnancy had a lower risk of giving birth to infants with low birth weight, thereby demonstrating folic acid's protective effect on fetal growth²⁰.

Theoretically, folic acid is one of the most important micronutrients during pregnancy, playing a role in DNA and RNA synthesis, cell proliferation and differentiation, red blood cell



formation, and the growth and development of placental tissue. Folic acid deficiency can impair the placenta's function in delivering oxygen and nutrients to the fetus, leading to IUGR (Intrauterine Growth Restriction), which results in LBW19.

Additionally, folate plays a role in preventing megaloblastic anemia, which can also affect a baby's birth weight through tissue oxygenation mechanisms.

CONCLUSIONS AND SUGGESTIONS

The conclusion of this study is that there is a relationship between folic acid intake in pregnant women and the birth weight of newborns in the service area of the BLUD UPTD Poasia Community Health Center in Kendari City in 2024.

A recommended course of action is to enhance nutrition education for pregnant women, particularly regarding the importance of macronutrient (energy and protein) and micronutrient (iron, folic acid) intake, which influence infant birth weight. Education can be delivered through prenatal classes, individual counseling, or simple educational materials.

ACKNOWLEDGMENTS

We extend our gratitude to the BLUD UPTD Poasia Community Health Center for providing the opportunity to conduct this research, as well as to all parties who assisted in the research process.

CONFLICT OF INTEREST

This published article is an authentic manuscript that has been approved and does not pose a conflict of interest with any parties.

REFERENCES

1. Khanal V, Bista S, Mishra SR. Synergistic Associations Of Antenatal Care Visits And Iron-Folic Acid Supplementation With Low Birth Weight: A Pooled Analysis Of National Surveys From Six South Asian Countries. *BMC Public Health*. 2024;24(1):835.
2. Milah AS. Gambaran Pengetahuan Ibu Hamil Tentang Asupan Nutrisi Di Desa Pawindan Kecamatan Ciamis Kabupaten Ciamis. *Media Inform*. 2018;14(2):95-109. DOI:10.37160/bmi.v14i2.211
3. Sabillah ZA. Asuhan Kebidanan Neonatus Pada Bayi Ny. E Neonatus Cukup Bulan Sesuai Masa Kehamilan Di RS PMI Kota Bogor [skripsi]. Bandung: Poltekkes Kemenkes Bandung; 2021.
4. Lestaluhu SA. Pengetahuan Dan Asupan Zat Gizi Ibu Hamil (Energi, Protein Dan Zat Besi). *J Kebidanan*. 2021;1(2):104-113. doi:10.32695/jbd.v1i2.328
5. Ariendha DSR, Setyawati I, Utami K, Hardaniyati H, Zulfiana Y. Peningkatan Pengetahuan Tentang Kebutuhan Nutrisi Pada Ibu Hamil. *J Pengabdian Pada Masyarakat Indonesia*. 2022;1(6):75-81. doi:10.55542/jppmi.v1i6.408
6. Kemenkes. Angka Kematian Ibu Dan Bayi Di Indonesia [Internet]. Jakarta: Kemenkes RI; 2024 [cited 2024 Jan 25]. Available from: <https://sehatnegeriku.kemkes.go.id>
7. Fitriani F, Andriyani A, Anoluthfa A. Hubungan Ibu Hamil Kekurangan Energi Kronik (KEK) Dengan Kejadian Bayi Berat Lahir Rendah (BBLR) Di BLUD UPTD



- Puskesmas Abeli Kota Kendari. *J Pelita Sains Kesehatan*. 2023;3(3):106-112.
8. Sri Utami NL. Kebijakan Dan Ketersediaan Garam Beriodium Di Rumah Tangga [skripsi]. Denpasar: Poltekkes Kemenkes Denpasar; 2021.
 9. Kurniati NKS, Astiti NKE, Cintari L. Status Gizi Ibu Hamil Dengan Berat Bayi Lahir (BBL). *J Midwifery Update (MU)*. 2022;4(2):68-76. doi:10.32807/jmu.v4i2.134
 10. Helfina R. Hubungan Healthy Eating Index Dengan Kenaikan Berat Badan Ibu Selama Kehamilan Di Sumatera Barat. *Maj Kedokteran Andalas*. 2024;46(4):662-71. doi:10.25077/mka.v48.i2.p138-147.2025
 11. Amrang M, Nurmadilla N, Pramono SD, Ananda F, Rasfayanah R. Hubungan Asupan Protein Ibu Hamil Trimester III Dengan BB Lahir Bayi RSIA Kota Makassar. *Wal'afiat Hospital J*. 2020;1(2):91-9. doi:10.33096/whj.v1i2.48
 12. Octavia L, Agustina R, Sartika AN, Utami AD, Dewi YA, Hayuningtyas A, et al. Associations Of Maternal Diet Quality With Weight Gain During Pregnancy And Obesity At Three-Year Postpartum In Jakarta. *PloS one*. 2020;15(12):e0244449. doi:10.1371/journal.pone.024444
 13. Hartoko Y. Pengaruh Pendidikan, Pelatihan, Jenis Kelamin, Umur, Status Perkawinan, Dan Daerah Tempat Tinggal Terhadap Lama Mencari Kerja Tenaga Kerja Terdidik Di Indonesia. *J Pendidik Ekon*. 2019;8(3):201-7.
 14. Putu CA. Hubungan Status Gizi Ibu Saat Hamil Dengan Kejadian Stunting Di Wilayah Kerja Unit Pelaksana Teknis Puskesmas Kintamani VI Tahun 2022 [skripsi]. Denpasar: Poltekkes Kemenkes Denpasar; 2022.
 15. Tifani IP. Gambaran Pengetahuan Gizi Dan Asupan Zat Gizi Makro Pada Ibu Hamil Di Wilayah Kerja Puskesmas Langsung Kecamatan Sukajadi Kota Pekanbaru [skripsi]. Pekanbaru: Poltekkes Kemenkes Riau; 2020.
 16. Apriliany V. Pola Makan Dan Penambahan Berat Badan Kaitannya Dengan Kekurangan Energi Kronik Ibu Hamil Di Desa Wukirsari Imogiri Bantul [skripsi]. Yogyakarta: Poltekkes Kemenkes Yogyakarta; 2021.
 17. Pratiwi D. Hubungan Status Gizi (LILA Dan Pertambahan BB) Pada Ibu Hamil Trimester III Dengan Taksiran Berat Janin Di Puskesmas Pantai Labu Kecamatan Pantai Labu Kabupaten Deli Serdang [skripsi]. Medan; 2019.
 18. Prayitno FF, Angraini DI, Himayani R, Grahati R. Hubungan Pendidikan Dan Pengetahuan Gizi Dengan Status Gizi Ibu Hamil Pada Keluarga Dengan Pendapatan Rendah Di Kota Bandar Lampung. *Medula*. 2019;8(2):225-9.
 19. Scholl TO, Johnson WG. Folic acid: Influence On The Outcome Of Pregnancy. *Am J Clin Nutr*. 2020;71(5):1295S-303S. doi:10.1093/ajcn/71.5.1295s
 20. Yang L, Wang W, Mao B, Qiu J, Guo H, Yi B, et al. Maternal Folic Acid Supplementation, Dietary Folate Intake, And Low Birth Weight: A Birth Cohort Study. *Front Public Health*. 2022;10:844150. doi:10.3389/fpubh.2022.844150



21. Lail NH. Pemberian Tablet Fe Dan Jus Jambu Biji Merah Terhadap Kadar Hemoglobin Pada Ibu Hamil Trimester III Di Banten. *J Kreativitas Pengabdian Kpd Masyarakat*. 2023;6(12):5496-508. doi:10.33024/jkpm.v6i12.12540

