

Case Report: Chronic Energy Deficiency and Its Impact on Pregnancy Outcomes

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ABSTRACT

Chronic Energy Deficiency (CED) in pregnancy may occur despite good appetite and regular eating habits when maternal nutritional reserves before pregnancy are low and energy expenditure is high. This case report aimed to describe midwifery care for a pregnant woman with CED and good appetite and to evaluate changes during follow-up. A descriptive case report was conducted in the working area of Panekan Public Health Center, Magetan Regency. The subject was Mrs. "N", 22 years old, primigravida (G1P0000), at 20 weeks and 1 day of gestation, with pre-pregnancy BMI 16.4 kg/m² and MUAC 20 cm. Data were obtained through history taking, physical examination, anthropometric assessment, supporting examinations, and documentation. Follow-up consisted of four home visits on 31 January, 7 February, 14 February, and 21 February 2026. The participant reported good appetite and three meals daily without excessive nausea or vomiting. Her pre-pregnancy weight was 37 kg, previous recorded weight was 39.1 kg, and weight at the first case assessment was 41.0 kg. During follow-up, weight remained 41.0 kg at the second visit, increased to 41.2 kg at the third visit, and reached 41.3 kg at the fourth visit. MUAC remained 20 cm. The participant improved meal variety, added snacks, reduced heavy market activities, maintained MMS intake, and remained clinically stable. CED can occur despite good appetite. Objective assessment using pre-pregnancy BMI, MUAC, serial weight, dietary history, and activity assessment is important. Nutrition counselling, activity modification, family support, MMS adherence, and regular ANC monitoring should be continued, because the unchanged MUAC indicates that CED had not fully resolved during the one-month observation period.

Keywords: chronic energy deficiency; pregnancy; good appetite; MUAC; nutritional status; case report

INTRODUCTION

Chronic Energy Deficiency (CED) in pregnant women remains an important nutritional problem because inadequate energy and nutrient reserves may affect maternal and fetal health. The LTA defines CED as a long-term deficiency of energy and protein and uses MUAC below 23.5 cm as an indicator of CED risk. The LTA reports that the prevalence of CED among pregnant women in Indonesia was 17.3% according to Riskesdas 2018 and 16.9% according to the Indonesian Health Survey (SKI) 2023, indicating that the national target of 10% had not yet been achieved.^(1,2)

Maternal nutritional status is influenced by more than appetite alone. A woman may report eating regularly while the quantity, quality, or energy density of food remains insufficient for pregnancy. The LTA specifically highlights the discrepancy between good appetite and objective indicators of nutritional deficiency. In the present case, the mother reported eating three times daily with rice, vegetables, tofu, tempeh, eggs, fish, occasional chicken, fruit, and pregnancy milk, yet her pre-pregnancy BMI was 16.4 kg/m² and MUAC was 20 cm. These findings demonstrate why objective anthropometric assessment is necessary in antenatal care.

Pregnancy increases nutritional requirements to support maternal physiological adaptation, placental development, fetal growth, and increased metabolic demands. WHO recommends counselling on healthy eating and physical activity during pregnancy and, in undernourished populations, nutrition education to increase daily energy and protein intake. Balanced energy-protein supplementation may also be recommended in undernourished populations where appropriate.^(3,4)

The participant in this case was a 22-year-old primigravida with a pre-pregnancy weight of 37 kg and height of 150 cm. Her pre-pregnancy BMI was 16.4 kg/m², categorized as underweight, and MUAC was 20 cm. At the first assessment on 31 January 2026, her gestational age was 20 weeks and 1 day and her weight was 41 kg. She also worked as a vegetable trader in the market from approximately 01.00 to 05.00 and continued household

activities. The LTA identifies low pre-pregnancy nutritional status and relatively heavy physical activity as important contributing factors.

CED may be associated with adverse maternal and fetal outcomes, including anemia, impaired fetal growth, low birth weight, and preterm birth.⁽⁵⁻⁷⁾ These risks make early identification and appropriate management important even when the mother appears clinically well. In this case, maternal vital signs and fetal heart rate remained clinically stable during the four documented visits, but the MUAC did not change from 20 cm.

The uniqueness of the case lies in the combination of good appetite, regular food intake, low pre-pregnancy BMI, MUAC 20 cm, and high daily activity. The case therefore provides a practical illustration that maternal nutritional assessment should combine subjective dietary history with objective anthropometry and assessment of physical workload. This case report aimed to describe the clinical findings, contributing factors, midwifery interventions, and short-term outcomes in a pregnant woman with CED and good appetite. It also describes the later pregnancy outcome documented in the LTA, namely delivery at 34–35 weeks on 11 May 2026, while distinguishing this later outcome from the one-month period of direct follow-up.

METHODS

This study employed a descriptive case report design to describe one clinically distinctive case of Chronic Energy Deficiency (CED) in a pregnant woman who reported having a good appetite. The purpose of the case report was to describe the condition and care provided rather than to estimate treatment effectiveness or establish causal relationships. The participant was Mrs. “N,” a 22-year-old primigravida (G1P0000) with CED and a good appetite. The case was managed within the working area of Panekan Public Health Center, Magetan Regency, Indonesia. The initial assessment was conducted at the participant’s home on January 31, 2026, when her gestational age was 20 weeks and 1 day. The LTA documented a pre-pregnancy weight of 37 kg, a height of 150 cm, a pre-pregnancy body mass index (BMI) of 16.4 kg/m², and a mid-upper arm circumference (MUAC) of 20 cm.

Data were obtained through structured history taking, direct clinical observation, physical and obstetric examinations, anthropometric measurements, review of supporting laboratory results, and documentation using the SOAP (Subjective, Objective, Assessment, and Plan) approach. The LTA documented four visits conducted at one-week intervals, namely on January 31, February 7, February 14, and February 21, 2026. The interventions provided included counselling on CED and balanced nutrition, recommendations to consume three main meals with two to three nutritious snacks, increased intake of energy- and protein-rich foods, use of the recommended menu examples, continued multiple micronutrient supplementation (MMS) intake, reduction of heavy market activities, adequate rest, family support, education regarding danger signs, and regular antenatal care (ANC). The participant was also advised to attend maternal classes and maintain regular ANC visits.

Short-term outcomes were assessed based on maternal weight, MUAC, vital signs, complaints, dietary practices, physical activity, fundal height, and fetal heart rate. The subsequent delivery outcome documented in the LTA was reported separately from the four-visit intervention period. The findings were analyzed descriptively and chronologically by comparing the participant’s condition across the four visits. No inferential statistical analysis was performed because this study involved a single case. Regarding ethical considerations, the LTA documented that informed consent was obtained from the participant. To maintain confidentiality, the participant was identified using the pseudonym Mrs. “N,” and direct identifying information was not reproduced in the article.

RESULTS

At the first visit on 31 January 2026, Mrs. “N” was 22 years old, G1P0000, at 20 weeks and 1 day of gestation. She reported no major complaint but occasionally experienced lower abdominal pain. She reported a good appetite and ate three times daily. Her diet included rice, vegetables, tofu, tempeh, eggs, fish, occasional chicken, fruit, and one glass of pregnancy milk daily. She drank approximately 8–9 glasses of water per day. She worked at the market from 01.00 to 05.00, preparing, lifting and arranging merchandise and serving customers, followed by household work. Her pre-pregnancy weight was 37 kg, height 150 cm, BMI 16.4 kg/m², previous recorded weight 39.1 kg, current weight 41 kg, and MUAC 20 cm. Vital signs were BP 110/70 mmHg, pulse 84/minute, temperature 36.5°C, and respiratory rate 22/minute. The LTA recorded Hb 12.9 g/dL, HIV non-reactive, syphilis negative, HBsAg negative, random blood glucose 109 mg/dL, urine protein negative, and blood group A Rh-positive.

The initial assessment was G1P0000 at 20 weeks and 1 day with good general condition and CED despite good appetite. The management focused on explaining CED, advising three meals plus 2–3 snacks, increasing

energy- and protein-containing foods, continuing MMS once daily after meals, reducing heavy physical activity, increasing rest, recognizing pregnancy danger signs, maintaining ANC, and involving the husband and family.

At the second visit on 7 February 2026, the participant reported no dizziness, fatigue, or lower abdominal pain. She had started applying the recommended menu and reported foods including rice, fish, vegetables, tofu, tempeh, mung-bean porridge, boiled tubers, and snacks such as bread and banana. She also received additional milk. Her weight remained 41.0 kg and MUAC remained 20 cm. BP was 110/70 mmHg, pulse 79/minute, temperature 36°C, respiratory rate 20/minute, fundal height one finger above the umbilicus, and fetal heart rate 147/minute.

At the third visit on 14 February 2026, the participant reported no complaints. She continued three meals daily, consumed vegetables, tempeh, chicken, fruit and avocado, drank 9–10 glasses of water and one glass of pregnancy milk daily, and used the recommended menu. She no longer lifted or arranged market goods and only continued selling. Weight increased to 41.2 kg and MUAC remained 20 cm. BP was 99/64 mmHg, pulse 79/minute, temperature 36°C, respiratory rate 21/minute, fundal height two fingers above the umbilicus, and fetal heart rate 145/minute.

At the fourth visit on 21 February 2026, the participant had no complaints and continued eating regularly. Her reported meal consisted of rice, bobor vegetables, tempeh, tofu and fish. She drank 9–11 glasses of water and one glass of pregnancy milk daily. She continued selling at the market but no longer lifted goods. Weight increased to 41.3 kg, while MUAC remained 20 cm. BP was 110/70 mmHg, pulse 82/minute, temperature 36.5°C, respiratory rate 21/minute, and fetal heart rate 144/minute. She agreed to continue MMS, try menu variations, attend the maternal class, and maintain routine ANC.

During the four documented visits, maternal weight increased by 0.3 kg from 41.0 to 41.3 kg, while MUAC remained unchanged at 20 cm. Dietary variety and snack intake improved and heavy physical activity was reduced. The LTA subsequently records that the participant delivered on 11 May 2026 at 34–35 weeks of gestation. This later outcome is important because the LTA interprets it as demonstrating the continuing risk of preterm birth associated with CED; however, the article should not imply that the four-visit intervention caused or prevented the outcome.

Table 1. Maternal and fetal findings across four documented visits

Visit Date	GA (weeks)	Weight (kg)	MUAC (cm)	BP (mmHg)	FHR (x/min)	Key development
31 Jan 2026	20+1	41.0	20	110/70	—	Initial care; good appetite; heavy market activity
7 Feb 2026	21+1	41.0	20	110/70	147	Began dietary adjustments; continued market work
14 Feb 2026	22+1	41.2	20	99/64	145	Avoided lifting/arranging goods; improved diet
21 Feb 2026	23+1	41.3	20	110/70	144	No complaints; reduced heavy activity maintained

DISCUSSION

Subjectively, the participant reported good appetite and regular meals three times daily. However, objective findings showed a pre-pregnancy BMI of 16.4 kg/m² and a MUAC of 20 cm. The LTA therefore identifies CED despite good appetite. This finding is consistent with the concept that nutritional adequacy depends on the quantity and quality of intake relative to requirements, not appetite alone. WHO recommends objective nutrition-focused antenatal care and counselling to promote adequate energy and protein intake in undernourished populations.⁽³⁾

The LTA identifies two important contributing factors: low nutritional status before pregnancy and heavy daily activity as a market trader. The participant entered pregnancy at 37 kg and 150 cm, giving a BMI of 16.4 kg/m². Her market work began at approximately 01.00 and included lifting and arranging goods, followed by household tasks. In this context, good appetite did not necessarily mean that energy intake exceeded total expenditure. The interpretation should remain cautious because this case did not quantify actual caloric intake or energy expenditure.

MUAC was 20 cm throughout the four visits, remaining below the LTA's CED threshold of 23.5 cm. Pre-pregnancy BMI was also below 18.5 kg/m². The stable MUAC means that the article should describe the outcome as improved dietary practice and modest weight gain rather than complete nutritional recovery. The LTA itself retains the diagnosis of CED at the fourth visit.

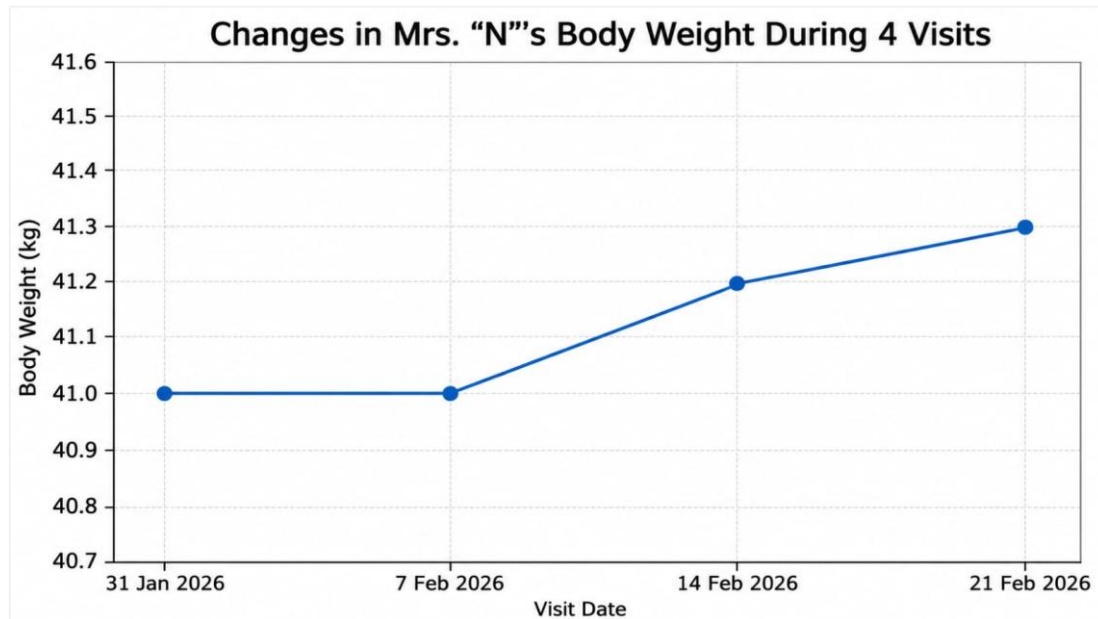


Figure 1. Weight change during four case visits

The intervention emphasized three main meals plus 2–3 snacks and increased sources of energy and protein such as rice, eggs, fish, chicken, tempeh, tofu, legumes, vegetables and fruit. The participant reported implementing the suggested menus. WHO states that nutrition counselling can promote dietary diversity, adequate protein and energy intake, and appropriate gestational weight gain; in undernourished populations, balanced energy-protein supplementation may also be beneficial.^(3,4)

The LTA documents daily MMS use as part of the antenatal care plan. In discussing this intervention, the article should avoid claiming that MMS alone improved maternal weight because multiple interventions were delivered simultaneously. WHO's current guidance notes that multiple micronutrient supplementation during pregnancy remains an area with context-specific recommendations, while iron and folic acid supplementation remains an established antenatal intervention.^(8,9)

The participant progressively reduced heavy work. By the third and fourth visits she no longer lifted or arranged goods and continued only selling. The husband and family were also encouraged to help with heavy work, meals and supplementation. This approach is consistent with the LTA's focus on reducing energy expenditure while improving dietary intake. The intervention was individualized to the participant's actual daily activities.

Weight increased from 41.0 kg at the first visit to 41.3 kg at the fourth visit, a total increase of 0.3 kg during the one-month observation. The increase was gradual but modest, while MUAC remained 20 cm. The LTA subsequently records delivery on 11 May 2026 at 34–35 weeks. CED has been associated with adverse pregnancy outcomes including low birth weight and preterm birth.^(6,7,10) Nevertheless, because this is a single case with several possible contributing factors and no comparison group, the preterm birth cannot be attributed solely to CED or to the effectiveness/failure of the intervention.⁽¹¹⁾

The main clinical implication is that a good appetite should not lead to reassurance without objective assessment. Pregnant women with low pre-pregnancy BMI or MUAC below the local CED threshold require continued anthropometric monitoring, dietary assessment, activity assessment, nutrition counselling, supplementation adherence, family support and routine ANC.⁽¹²⁻¹⁴⁾ WHO likewise emphasizes healthy eating counselling and increased energy-protein intake in undernourished populations.⁽³⁾

The case has several limitations. It describes one participant, the observation period for direct intervention was only one month, dietary intake was based on self-report rather than weighed food records, and energy expenditure was not quantitatively measured. The later delivery outcome was documented in the LTA but was not observed within the four scheduled visits. Therefore, the case is useful for clinical description and hypothesis generation rather than establishing causal effectiveness.

CONCLUSION

Mrs. “N”, a 22-year-old primigravida, had CED despite good appetite and regular meals. The condition was objectively indicated by a pre-pregnancy BMI of 16.4 kg/m² and MUAC of 20 cm. The LTA identified low pre-pregnancy nutritional status and heavy physical activity as important contributing factors. During four visits from 31 January to 21 February 2026, weight increased from 41.0 to 41.3 kg, dietary practices improved, heavy market activities were reduced, and MMS adherence was maintained, but MUAC remained 20 cm. The LTA subsequently records delivery at 34–35 weeks on 11 May 2026. The case emphasizes that appetite alone is insufficient to assess maternal nutritional adequacy and that comprehensive objective assessment and continued nutrition-focused ANC

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