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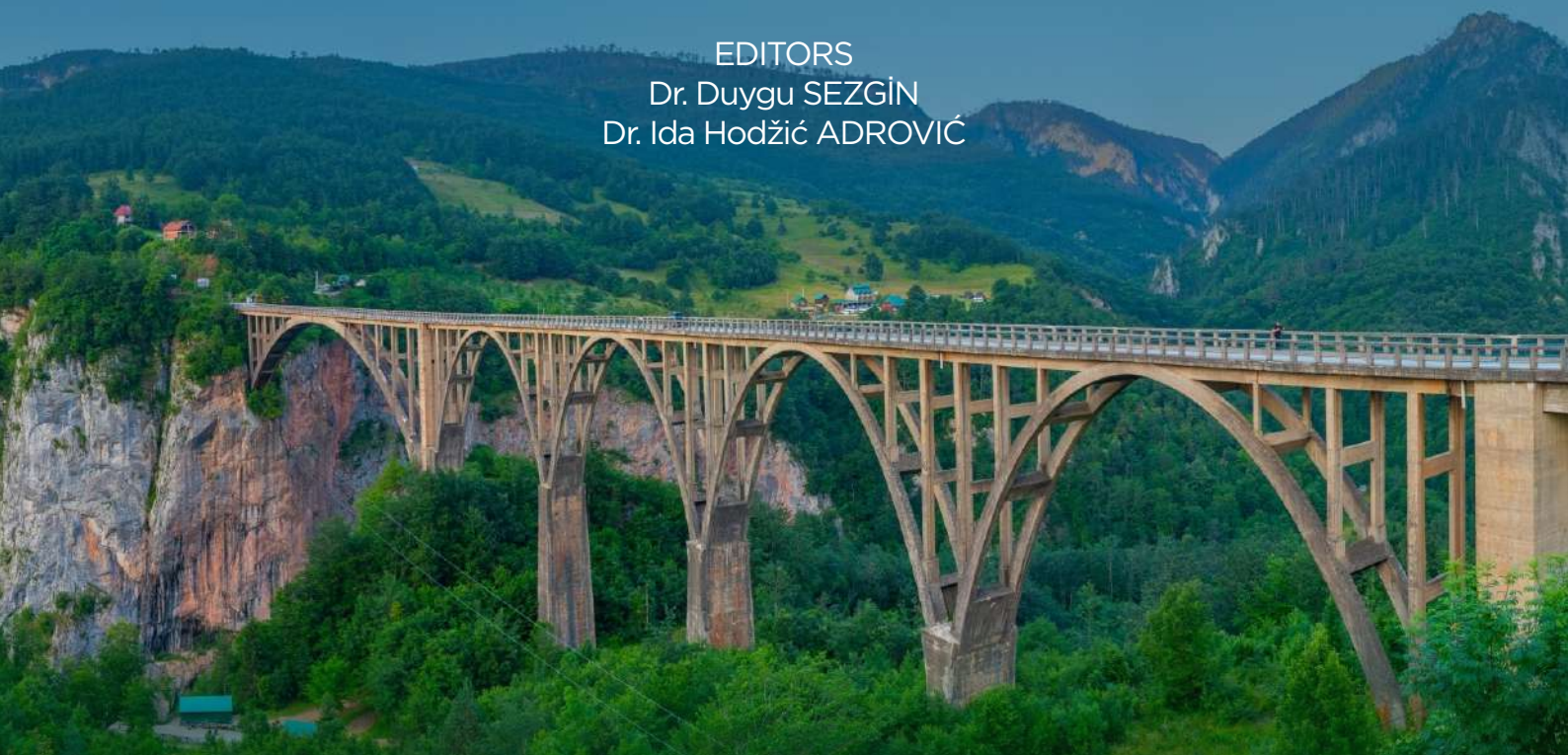
PROCEEDINGS BOOK

August 21-25, 2026
Podgarica / MONTENEGRO

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EDITORS
Dr. Duygu SEZGİN
Dr. Ida Hodžić ADROVIĆ



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August 21–23, 2026

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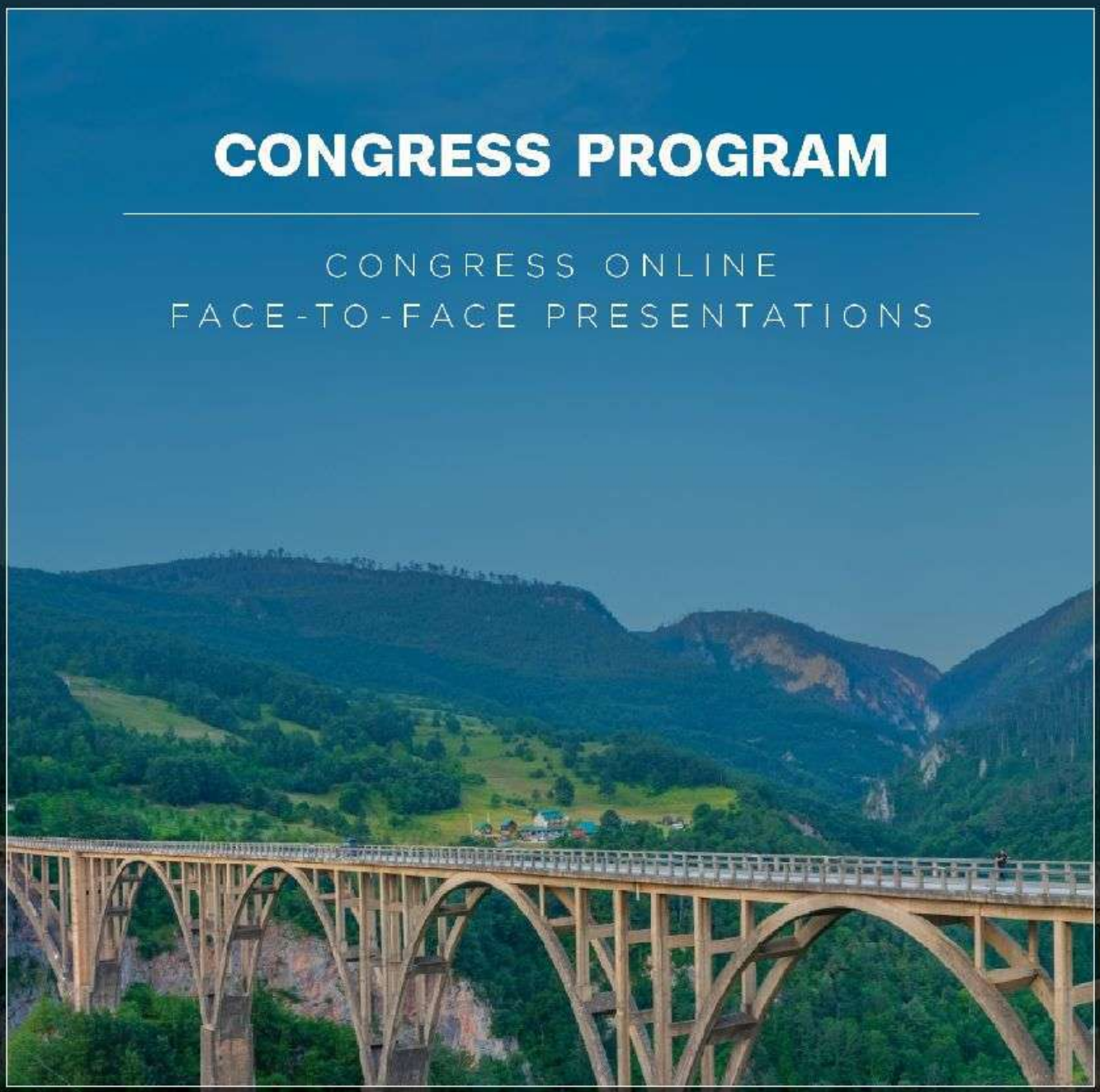
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ABOUT THE CONGRESS

The International European Science Congress is an international scientific event dedicated to the dissemination and exchange of current, original, and high-quality academic research conducted across a wide range of disciplines. The congress aims to bring together research from diverse academic fields, including the social sciences, natural sciences, engineering, health sciences, education, and cultural studies, on a common international scientific platform.

The studies presented at the congress are discussed through both in-person and online sessions, providing participants with opportunities to engage in academic exchange with experts in their respective fields and to receive valuable feedback. In this respect, the congress serves not only as a platform for academic presentations but also as a dynamic environment for knowledge sharing and academic development.

All papers submitted to the congress have been evaluated through a double-blind peer-review process in accordance with international academic publishing standards and the principles of scientific ethics. During the evaluation process, the originality, methodological rigor, contribution to the existing literature, and overall scientific quality of each study were carefully examined. Following this comprehensive academic evaluation process, a total of 142 papers from 28 different countries, including 53 papers from Türkiye, were accepted.

The accepted papers will be included in the conference proceedings book, which will be published with ISBN and DOI numbers. In this way, the studies will become internationally accessible, permanently archived, and citable academic resources.

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Aug 21, 2026 SESSION1 | HALL4

ANKARA TIME
09:30 - 11:30

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Ayşe ÇEVİRME

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Assoc. Prof. Hilal YILDIRIM Lisansüstü Öğrenci Melisa ÖNER Assist. Prof. Dr. Charlene Esteban Ronquillo	Inonu University (Türkiye) University of British Columbia Okanagan (Canada)	OLDER ADULTS' PERCEPTIONS OF USABILITY AND ACCEPTABILITY OF REMOTE MONITORING SYSTEMS TO MANAGE BLOOD PRESSURE: INVESTIGATION OF POST-EARTHQUAKE TEMPORARY LIVING CENTERS
Prof. Dr. Zeynep Güngörmüş Prof. Dr. Ayşe Çevirme	Gaziantep Islamic Science and Technology University (Türkiye) Sakarya University (Türkiye)	NURSING APPROACHES TO BUILDING DISASTER-RESILIENT COMMUNITIES
Prof. Dr. Zeynep GÜNGÖRMÜŞ Prof. Dr. Ayşe ÇEVİRME	Gaziantep Islam Science and Technology University (Türkiye) Sakarya University (Türkiye)	THE TRANSFORMATIVE ROLE OF PUBLIC HEALTH NURSING IN COMMUNITY-BASED DISASTER MANAGEMENT
MSc İlayda AKKAYA Dr. Şeyma SÜNBÜL Prof. Dr. Alev KESER	Ankara University (Türkiye)	DIET QUALITY AND ADEQUACY OF NUTRIENT INTAKES RELATIVE TO REFERENCE VALUES AMONG WOMEN IN THE THIRD TRIMESTER OF PREGNANCY
Dr. Şeyma SÜNBÜL MSc İlayda AKKAYA Prof. Dr. Alev KESER	Ankara University (Türkiye)	THE ASSOCIATION OF EMOTIONAL EATING DIMENSIONS WITH HEDONIC HUNGER AND BODY MASS INDEX AMONG UNIVERSITY STUDENTS
Dr. Zehra Meliha TENGİZ	Yozgat Bozok University (Türkiye)	STRUCTURAL CHANGE IN WOMEN'S EMPLOYMENT IN AGRICULTURE IN TÜRKİYE

HALL4 – CONTINUED ON THE NEXT PAGE

DIET QUALITY AND ADEQUACY OF NUTRIENT INTAKES RELATIVE TO REFERENCE VALUES AMONG WOMEN IN THE THIRD TRIMESTER OF PREGNANCY

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ABSTRACT

Meeting the increased energy and nutrient requirements of pregnancy through an adequate and balanced diet is essential for maintaining maternal health and supporting fetal growth and development. This study aimed to evaluate diet quality and the extent to which energy and selected nutrient intakes met reference intake levels among women in the third trimester of pregnancy.This cross-sectional study included 359 women between 28 and 41 weeks of gestation. Dietary intake was assessed using a 24-hour dietary recall, and energy and nutrient intakes were analyzed using the Nutrition Information System software. Diet quality was evaluated using the Healthy Eating Index-2010 (HEI-2010). Selected nutrient intakes were compared with the Recommended Dietary Allowances (RDAs), and the percentages of the RDAs met were calculated.

The mean age of the participants was 27.57±4.99 years, and the mean total HEI-2010 score was 50.75±11.34. Of the pregnant women, 53.2% had poor diet quality, 46.2% had diet quality that needed improvement, and only 0.6% had good diet quality. Among the HEI-2010 components, the lowest scores were observed for greens and beans, fatty acids, whole grains, refined grains, and sodium. The median percentages of the reference values met were 77.8% for energy, 62.6% for carbohydrate, 96.7% for protein, and 91.9% for fat. The proportions of the reference values met were also low for fiber (53.0%) and, among the micronutrients, particularly for iron (27.6%), folate (40.5%), and calcium (61.0%).

Nearly all women in the third trimester of pregnancy (99.4%) had suboptimal diet quality, whereas only 0.6% had good diet quality. In addition, dietary intakes of fiber, iron, folate, and calcium met relatively low proportions of the corresponding RDAs. These findings emphasize the importance of nutritional approaches aimed at improving overall diet quality and increasing the consumption of nutrient-dense foods during the third trimester of pregnancy.

Keywords: Pregnancy, Diet Quality, Healthy Eating Index-2010, Nutrient Intake

INTRODUCTION

Pregnancy is a critical physiological period characterized by increased energy and nutrient requirements to support maternal tissues and sustain fetal growth and development. Adequate and balanced nutrition is particularly important during the third trimester, when fetal growth accelerates, because it contributes to the maintenance of maternal health, the prevention of pregnancy-related nutritional problems, and the support of fetal development (Aparicio et al., 2020; Hinkle et al., 2021). However, assessing nutrition during pregnancy solely on the basis of energy intake and the amounts of specific nutrients consumed may be insufficient. Diet quality, which collectively reflects dietary diversity, the consumption of different food groups, and overall adherence to dietary recommendations, should also be evaluated (Castro-Barquero et al., 2023; Guenther et al., 2013).

Although findings from different populations indicate that poor diet quality and inadequate nutrient intakes may be common during pregnancy (Aparicio et al., 2020; Dubois et al., 2017; Hinkle et al., 2021; Savard et al., 2019), dietary patterns may vary according to the cultural, economic, and environmental characteristics of populations (Deierlein et al., 2021; Han et al., 2015; Yu et al., 2022). Therefore, evaluating overall diet quality together with energy and nutrient intakes among women in the third trimester may contribute to identifying priority nutrition-related problems. Accordingly, this study aimed to assess diet quality and the extent to which energy and selected nutrient intakes met reference intake levels among women in the third trimester of pregnancy.

LITERATURE REVIEW

Studies conducted in different countries have shown that overall diet quality during pregnancy is generally suboptimal. The mean Healthy Eating Index score among women in the third trimester of pregnancy was reported to be 62.9 in Canada (Savard et al., 2019), whereas the mean third-trimester Healthy Eating Index-2010 score was 51.5 in the NICHD cohort conducted in the United States (Hinkle et al., 2021). In a study conducted during mid-pregnancy in Singapore, the mean diet quality score was 52.4 (Han et al., 2015). Previous studies have reported particularly low adherence to recommendations for fruits and vegetables, leafy green vegetables and legumes, whole grains, and dietary fat quality. High intakes of sodium and refined grains have also been identified as major components adversely affecting overall diet quality (Deierlein et al., 2021; Dubois et al., 2017; Hinkle et al., 2021).

Poor diet quality during pregnancy may also be accompanied by inadequate intakes of several nutrients. Studies evaluating dietary intake have identified substantial inadequacies, particularly in iron, folate, calcium, vitamin D, and dietary fiber intake. In the ECLIPSES study conducted in Spain, the proportions of pregnant women meeting the recommended intake levels throughout pregnancy were reported to be 28.3% for iron, 33.8% for folate, and 12.3% for vitamin D (Aparicio et al., 2020). Studies conducted in Canada have similarly shown that dietary intakes of iron, folate, and vitamin D were below requirements among a large proportion of pregnant women and that more than 80% of participants failed to achieve an adequate dietary fiber intake (Dubois et al., 2017; St-Laurent et al., 2025). Findings from Australia, Lebanon, and various Mediterranean countries also suggest that it may be difficult to meet adequate intake levels for several nutrients—particularly iron, folate, and calcium—through diet alone during pregnancy (Castro-Barquero et al., 2023; Mahfouz et al., 2024; Slater et al., 2020).

Diet quality and nutrient adequacy are closely interrelated. Higher diet quality and dietary diversity have been associated with greater nutrient adequacy, whereas poor diet quality has been observed in conjunction with characteristics such as younger age, lower educational and income levels, higher

prepregnancy body mass index, and lower levels of physical activity (Castro-Barquero et al., 2023; Han et al., 2015; Hinkle et al., 2021; Savard et al., 2019). Therefore, the nutritional status of pregnant women should be evaluated by considering overall dietary patterns and the adequacy of critical nutrient intakes together, rather than focusing solely on energy intake.

The conceptual approach adopted in this study is based on evaluating nutrition during pregnancy through two complementary dimensions. The first is diet quality, which reflects the consumption of different food groups and overall adherence to dietary recommendations. The second is the extent to which energy and selected nutrient intakes meet pregnancy-specific reference values. The Healthy Eating Index-2010 evaluates both the adequacy and moderation components of the overall dietary pattern, whereas the percentages of reference intake levels achieved indicate the extent to which energy and critical macro- and micronutrients are provided through the diet. The combined use of these two assessment approaches enables a comprehensive examination of the nutritional status of women in the third trimester by considering not only total energy and individual nutrient intakes but also the overall dietary pattern.

METHODOLOGY

This cross-sectional study was conducted at Ankara Etlik City Hospital between June and September 2025. The study population consisted of pregnant women aged 19 years or older who were in the third trimester of pregnancy and had signed the written informed consent form. For the purposes of the present study, data from 359 women who were between 28 and 41 weeks of gestation were evaluated. Women diagnosed with psychiatric disorders (depression, anxiety, or obsessive-compulsive disorder), those with metabolic diseases such as hypertension, gestational diabetes, or thyroid disease, and those following a special dietary program were excluded from the study. Data were collected through face-to-face interviews with pregnant women who had been informed by the researchers about the purpose and scope of the study, met the inclusion criteria, voluntarily agreed to participate, and signed the written informed consent form.

The participants' sociodemographic and obstetric characteristics were assessed using a structured questionnaire developed by the researchers based on the relevant literature. Dietary intake was evaluated using a 24-hour dietary recall. Participants were asked to report all foods and beverages consumed on the previous day, together with the amounts consumed. Daily energy and nutrient intakes were analyzed using the Nutrition Information Systems (BeBIS) software. Energy, carbohydrate, protein, fat, dietary fiber, vitamin B12, folate, vitamin C, iron, and calcium intakes were evaluated. The participants' energy and selected nutrient intakes were compared with the Recommended Dietary Allowances (RDAs) established for pregnancy. The percentage of the reference intake level met was calculated by dividing the daily energy or nutrient intake by the corresponding RDA value and multiplying the result by 100.

The participants' diet quality was assessed according to the Healthy Eating Index-2010 criteria developed by Guenther et al. (2013). The Healthy Eating Index-2010 (HEI-2010) consists of 12 components: total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and empty calories. The total score ranges from 0 to 100, with a higher score indicating better diet quality. Based on their total HEI-2010 scores, participants were classified into three groups: poor diet quality (<51 points), diet quality that needs improvement (51–80 points), and good diet quality (>80 points).

Data were analyzed using IBM SPSS Statistics version 26.0. The normality of continuous variables was evaluated by examining histograms and skewness and kurtosis coefficients. Normally distributed continuous variables were presented as the mean and standard deviation, whereas non-normally

distributed continuous variables were presented as the median and interquartile range (25th–75th percentiles). Categorical variables were expressed as numbers (n) and percentages (%).

The study protocol was approved by the Ankara University Clinical Research Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki, and written informed consent was obtained from all participants before data collection.

FINDINGS

A total of 359 women in the third trimester of pregnancy were included in the study. The mean age of the participants was 27.57 ± 4.99 years. Of the participants, %5.3 had completed primary school, %15.6 middle school, %45.1 high school, %32.9 undergraduate education, and %1.1 postgraduate education. Regarding their spouses' educational attainment, 5.0% had completed primary school, 14.5% middle school, %48.7 high school, %29.0 undergraduate education, and %2.8 postgraduate education. It was determined that %80.2 of the pregnant women were not employed and that %65.2 had an income equal to their expenses. Furthermore, %82.2 of the participants reported that they did not smoke, and %99.2 reported that they did not consume alcohol (Table 1).

Table 1. Sociodemographic Characteristics of the Participants

Variable	**x±SD (N=359)**
Age (years)	27.57±4.99
Educational level, n (%)	**n (%)**
Primary school	19 (5.3)
Middle school	56 (1.6)
High school	162 (45.1)
Undergraduate	118 (32.9)
Postgraduate	4 (1.1)
Spouse's educational level, n (%)	
Primary school	18 (5.0)
Middle school	52 (14.5)
High school	175 (48.7)
Undergraduate	104 (29.0)
Postgraduate	10 (2.8)
Employment status, n (%)	
Not employed	288 (80.2)
Employed	71 (19.8)
Income status, n (%)	
Income lower than expenses	58 (16.2)
Income equal to expenses	234 (65.2)
Income higher than expenses	67 (18.7)
Smoking status, n (%)	
Never smoker	295 (82.2)
Current smoker	40 (11.1)
Former smoker	24 (6.7)
Alcohol consumption status, n (%)	
Does not consume alcohol	356 (99.2)
Former alcohol consumer	3 (0.8)

The participants' mean total HEI-2010 score was 50.75±11.34. According to the diet quality classification, %53.2 of the pregnant women had poor diet quality, %46.2 had diet quality that needed improvement, and only %0.6 had good diet quality. Accordingly, the diet quality of %99.4 of the participants was not at an optimal level (Table 2).

An examination of the HEI-2010 components showed that the mean total fruit score was 3.54±1.98. the mean whole fruit score was 3.70±2.06, and the mean total vegetable score was 2.86±1.66. The mean score for the greens and beans component was 1.11±1.83, the mean score for the whole grains component was 2.59±3.96, and the mean score for the dairy component was 4.75±3.20. The mean scores for the total protein foods and seafood and plant proteins components were 2.61±0.65 and 2.15±1.77, respectively. The mean scores for the fatty acids, refined grains, sodium, and empty calories components were 2.21±3.01, 2.82±3.76, 3.58±3.74, and 18.83±3.01, respectively. Considering the maximum attainable score for each component, the lowest levels of adherence were observed for greens and beans, fatty acids, whole grains, refined grains, and sodium (Table 2).

Table 2. Healthy Eating Index-2010 Component and Total Scores and Diet Quality Classification of the Participants

HEI-2010 component	**Score range**	**x±SD (N=359)**
HEI-2010 component and total scores		
Total fruit	0–5	3.54±1.98
Whole fruit	0–5	3.70±2.06
Total vegetables	0–5	2.86±1.66
Greens and beans	0–5	1.11±1.83
Whole grains	0–10	2.59±3.96
Dairy	0–10	4.75±3.20
Total protein foods	0–5	2.61±0.65
Seafood and plant proteins	0–5	2.15±1.77
Fatty acids	0–10	2.21±3.01
Refined grains	0–10	2.82±3.76
Sodium	0–10	3.58±3.74
Empty calories	0–20	18.83±3.01
HEI-2010 total score	**0–100**	**50.75±11.34**
Diet quality classification	**n (%)**	
Poor diet quality (<51 points)	191 (53.2)	
Diet quality that needs improvement (51–80 points)	166 (46.2)	
Good diet quality (>80 points)	2 (0.6)	

The median percentages of the reference intake levels met by the participants were %77.8 (60.0–99.2) for energy, %62.6 (46.3–83.1) for carbohydrate, %96.7 (73.3–124.8) for protein, and %91.9 (67.8–119.8) for fat. Among energy and macronutrients, protein had the value closest to the reference intake level, whereas carbohydrate had the lowest percentage of reference intake achieved (Table 3).

The median percentage of the reference intake level met for dietary fiber was %53.0 (38.9–71.4). For micronutrients, the corresponding values were %93.8 (59.0–139.5) for vitamin B12, %40.5 (31.3–54.5) for folate, %82.9 (53.1–125.6) for vitamin C, %27.6 (20.4–35.1) for iron, and %61.0 (44.5–80.9) for

calcium. Among the nutrients evaluated, iron had the lowest percentage of reference intake achieved, followed by folate, dietary fiber, and calcium (Table 3).

Table 3. Percentages of Reference Intake Levels Met for Energy and Selected Nutrients Among the Participants

Energy/nutrient	Reference intake level met (%) Median (IQR)
Energy	77.8 (60.0–99.2)
Carbohydrate	62.6 (46.3–83.1)
Protein	96.7 (73.3–124.8)
Fat	91.9 (67.8–119.8)
Dietary fiber	53.0 (38.9–71.4)
Vitamin B12	93.8 (59.0–139.5)
Folate	40.5 (31.3–54.5)
Vitamin C	82.9 (53.1–125.6)
Iron	27.6 (20.4–35.1)
Calcium	61.0 (44.5–80.9)

Data are presented as median (25th–75th percentiles). IQR: interquartile range.

DISCUSSION

This study evaluated the overall diet quality of women in the third trimester of pregnancy and the extent to which their energy and selected nutrient intakes met reference values. The participants' mean total HEI-2010 score was 50.75±11.34, and only %0.6 had good diet quality. Furthermore, the percentages of the reference values met for energy and carbohydrate were low, while the most substantial shortfalls among the nutrients evaluated were observed for iron, folate, dietary fiber, and calcium. These findings indicate that, despite the increased nutritional requirements of the third trimester, most participants did not achieve the desired levels in terms of either overall diet quality or the dietary intake of several essential nutrients.

The participants' mean age was 27.57±4.99 years; approximately half were high school graduates, and the great majority were not employed. Previous studies have reported that younger age, lower educational and income levels, higher prepregnancy BMI, lower physical activity, and limited nutritional knowledge may be associated with poorer diet quality during pregnancy (Deierlein et al., 2021; Han et al., 2015; Hinkle et al., 2021; Savard et al., 2019). However, because the relationships between sociodemographic characteristics and HEI-2010 scores were not examined in the present study, no direct inference can be made regarding the effects of the participants' educational attainment, employment status, or income level on diet quality. Nevertheless, these characteristics are important for describing the study population and understanding the social context in which the findings were evaluated.

The mean HEI-2010 score of 50.75 identified in this study is generally consistent with the findings of studies conducted among pregnant women in different countries. In the US-based NICHD Fetal Growth Studies–Singleton cohort, the mean third-trimester HEI-2010 score was reported to be 51.5, indicating that pregnant women generally did not adequately meet dietary recommendations (Hinkle et al., 2021). A study conducted in Singapore reported a mean diet quality score of 52.4 during mid-pregnancy (Han et al., 2015). In contrast, a Canadian study reported a mean diet quality score of 62.9 during the third trimester (Savard et al., 2019). The mean score obtained in the present study was very similar to those

reported in the US and Singaporean studies but lower than the value reported in Canada. Differences among studies may be attributable to the diet quality indices used, dietary assessment methods, the number of repeated dietary records, dietary habits across populations, and sociodemographic characteristics. Nevertheless, a common finding across countries and assessment methods is that overall diet quality during pregnancy is generally suboptimal.

In this study, %53.2 of the pregnant women had poor diet quality, %46.2 had diet quality that needed improvement, and only %0.6 had good diet quality. Accordingly, %99.4 of the participants failed to achieve an optimal level of diet quality. Hinkle et al. (2021) similarly demonstrated that most pregnant women did not meet dietary guideline recommendations during pregnancy. Although a marked decline in the total diet quality score is not always observed throughout pregnancy, certain components, such as fruit and vegetable intake, adequacy components, and fat quality, have been reported to decline during the later stages of pregnancy (Savard et al., 2019). Therefore, although pregnancy may be regarded as an appropriate period for improving dietary behaviors, the onset of pregnancy alone may not result in the adoption of a healthier dietary pattern. These findings suggest that nutrition counseling, particularly during the third trimester, should address overall diet quality rather than focusing solely on energy intake and gestational weight gain.

An examination of the HEI-2010 components showed that the lowest levels of adherence were observed for greens and beans, fatty acids, whole grains, refined grains, and sodium. These findings are consistent with previous studies reporting low intakes of whole grains, leafy green vegetables, and legumes among pregnant women (Hinkle et al., 2021; Yu et al., 2022). Similarly, high intakes of sodium and refined grains and inadequate consumption of foods rich in unsaturated fatty acids have been reported among the principal factors limiting diet quality in different groups of pregnant women (Deierlein et al., 2021; Dubois et al., 2017; Mahfouz et al., 2024). Leafy green vegetables, legumes, and whole grains are also important sources of dietary fiber, folate, iron, and various micronutrients. The low scores obtained for these components and the low percentages of reference intake levels met for dietary fiber, folate, and iron may therefore represent different consequences of the same dietary pattern.

The median percentages of the reference intake levels met were %77.8 for energy, %62.6 for carbohydrate, %96.7 for protein, and %91.9 for fat. Accordingly, protein and fat intakes were closer to the reference values, whereas the percentages achieved for energy and particularly carbohydrate were lower. In the ECLIPSES study, the percentages of the reference intake levels met during pregnancy were reported to be %82.6 for energy, %80.6 for protein, and %99.5 for carbohydrate (Aparicio et al., 2020). Although the percentage achieved for energy in the present study was similar to that reported in the ECLIPSES study, the percentage achieved for carbohydrate was lower and that for protein was higher. However, the ECLIPSES study evaluated different stages of pregnancy collectively and used different dietary assessment methods. The fact that a single-day dietary recall reflects day-to-day variability and that self-reported energy intake may be affected by underreporting may also explain the differences in the findings concerning energy and macronutrients.

One of the most notable findings of this study was that the percentages of the RDAs met were %27.6 for iron and %40.5 for folate. These results were largely similar to the values reported for iron (%28.3) and folate (%33.8) in the ECLIPSES study (Aparicio et al., 2020). In the 3D Cohort Study conducted in Québec, when intake from foods alone was considered, %97 of pregnant women had iron intakes below the Estimated Average Requirement (EAR), while %70 had folate intakes and %96 had vitamin D intakes below the EAR (Dubois et al., 2017). Because the prevalence of inadequate intake in that study was determined using the EAR, whereas the present study calculated the median percentages of the

RDAs met, the results cannot be compared directly. Nevertheless, both assessment approaches indicate that the amounts of iron and folate obtained from the diet alone may be low during pregnancy. Given the increased requirements for iron and folate during pregnancy, the low percentages achieved for these nutrients should be regarded as an important nutritional concern.

The percentage of the reference intake level met for dietary fiber was %53.0. St-Laurent et al. (2025) reported that although dietary fiber intake increased throughout pregnancy, more than %80 of participants remained below the adequate intake level. When considered together with the low HEI-2010 scores obtained for whole grains, leafy green vegetables, and legumes, the low dietary fiber intake identified in the present study indicates a consistent dietary pattern. This finding suggests that recommendations for increasing dietary fiber intake should focus not only on the total amount of dietary fiber consumed but also on collectively increasing the consumption of whole grains, vegetables, fruits, and legumes.

Previous studies have reported that a substantial proportion of pregnant women were unable to meet their calcium requirements through diet (Mahfouz et al., 2024). Moreover, high adherence to the Mediterranean diet has been associated with lower rates of inadequate intake of several micronutrients, including calcium (Castro-Barquero et al., 2023). In the present study, the mean dairy component score was 4.75±3.20, corresponding to approximately half of the maximum attainable score. This finding may indicate a dietary pattern that could partly explain the low percentage of the calcium reference intake achieved.

The percentages of the RDAs met for vitamin B12 and vitamin C were %93.8 and %82.9, respectively, and were closer to the reference values than those for iron, folate, dietary fiber, and calcium. The ECLIPSES study also reported that vitamin B12 and vitamin C intakes were relatively adequate during pregnancy (Aparicio et al., 2020). These differences among nutrients demonstrate that not all nutrients are affected to the same extent, even when total energy intake is low. Therefore, an assessment based solely on energy or total macronutrient intake may not provide sufficient information about the micronutrient density of the diet.

Overall, the findings of this study indicate that poor diet quality and low percentages of the reference intake levels met for iron, folate, dietary fiber, and calcium coexisted within the same study population. Studies reporting that higher diet quality is associated with greater nutrient density and lower rates of inadequate nutrient intake support this interpretation (Castro-Barquero et al., 2023).

The focus on women in the third trimester and the evaluation of diet quality and selected nutrient intakes within the same sample are strengths of this study. However, its cross-sectional design precludes causal inference. Assessing dietary intake using a single 24-hour dietary recall may not fully reflect participants' usual dietary intake or day-to-day variability. Moreover, evaluating the percentages of the RDAs met on the basis of group medians does not indicate the prevalence of individual nutrient inadequacy or clinical deficiency. Despite these limitations, the findings highlight the need for nutritional approaches aimed at improving overall diet quality and promoting the consumption of foods rich in iron, folate, dietary fiber, and calcium among women in the third trimester of pregnancy.

CONCLUSION

This study found that nearly all women in the third trimester of pregnancy failed to achieve optimal diet quality. Particularly low adherence was observed for the greens and beans, whole grains, and fatty acids components, while adherence to the recommendations for refined grains and sodium was also limited. Furthermore, the percentages of the reference intake levels achieved for iron, folate, dietary fiber, and calcium were low. These findings demonstrate that assessing the nutritional status of pregnant women

solely on the basis of energy and macronutrient intakes is insufficient and that overall diet quality and the intake of critical nutrients should be considered together.

As part of routine prenatal care, particularly during the third trimester, priority should be given to individualized nutrition counseling that promotes the consumption of leafy green vegetables, legumes, whole grains, dairy products, and sources of high-quality dietary fats while limiting refined grain and sodium intake. However, the percentages of the reference values achieved in this study should not be interpreted as the prevalence of individual or clinical nutrient inadequacy. Future longitudinal studies conducted across different centers and incorporating repeated dietary assessments and biochemical markers would contribute to a more comprehensive evaluation of diet quality and nutrient adequacy throughout pregnancy.

REFERENCES

Aparicio, E., Jardí, C., Bedmar, C., Pallejà, M., Basora, J., Arija, V., & ECLIPSES Study Group. (2020). Nutrient intake during pregnancy and post-partum: ECLIPSES study. *Nutrients, 12*(5), 1325. https://doi.org/10.3390/nu12051325

Castro-Barquero, S., Larroya, M., Crispi, F., Estruch, R., Nakaki, A., Paules, C., Ruiz-León, A. M., Sacanella, E., Freitas, T., Youssef, L., Benitez, L., Casas, I., Generó, M., Gomez, S., Casanovas-Garriga, F., Gratacós, E., Casas, R., & Crovetto, F. (2023). Diet quality and nutrient density in pregnant women according to adherence to Mediterranean diet. Frontiers in Public Health, 11, 1144942. https://doi.org/10.3389/fpubh.2023.1144942

Deierlein, A. L., Ghassabian, A., Kahn, L. G., Afanasyeva, Y., Mehta-Lee, S. S., Brubaker, S. G., & Trasande, L. (2021). Dietary quality and sociodemographic and health behavior characteristics among pregnant women participating in the New York University Children's Health and Environment Study. Frontiers in Nutrition, 8, 639425. https://doi.org/10.3389/fnut.2021.639425

Dubois, L., Diasparra, M., Bédard, B., Colapinto, C. K., Fontaine-Bisson, B., Morisset, A.-S., Tremblay, R. E., & Fraser, W. D. (2017). Adequacy of nutritional intake from food and supplements in a cohort of pregnant women in Québec, Canada: The 3D Cohort Study (Design, Develop, Discover). The American Journal of Clinical Nutrition, 106(2), 541–548. https://doi.org/10.3945/ajcn.117.155499

Guenther, P. M., Casavale, K. O., Reedy, J., Kirkpatrick, S. I., Hiza, H. A. B., Kuczynski, K. J., Kahle, L. L., & Krebs-Smith, S. M. (2013). Update of the Healthy Eating Index: HEI-2010. Journal of the Academy of Nutrition and Dietetics, 113(4), 569–580. https://doi.org/10.1016/j.jand.2012.12.016

Han, C. Y., Colega, M., Quah, E. P. L., Chan, Y. H., Godfrey, K. M., Kwek, K., Saw, S.-M., Gluckman, P. D., Chong, Y.-S., & Chong, M. F.-F. (2015). A healthy eating index to measure diet quality in pregnant women in Singapore: A cross-sectional study. BMC Nutrition, 1, Article 39. https://doi.org/10.1186/s40795-015-0029-3

Hinkle, S. N., Zhang, C., Grantz, K. L., Sciscione, A., Wing, D. A., Grobman, W. A., Newman, R. B., D'Alton, M. E., Skupski, D., Nageotte, M. P., Ranzini, A. C., Owen, J., Chein, E. K., Craigo, S., Yisahak, S. F., Liu, A., Albert, P. S., Buck Louis, G. M., & Grewal, J. (2021). Nutrition during pregnancy: Findings from the National Institute of Child Health and Human Development (NICHD) Fetal Growth Studies–Singleton Cohort. Current Developments in Nutrition, 5(1), nzaa182. https://doi.org/10.1093/cdn/nzaa182

Mahfouz, R., Akiki, M.-T., Ndayra, V., El Khoury, R., Chawi, M., Hatem, M., Hanna-Wakim, L., Sacre, Y., & Hoteit, M. (2024). Energy, macronutrients and micronutrients intake among pregnant women in Lebanon: Findings from the updated Lebanese National Food Consumption Survey (LEBANON-FCS). Nutrients, 16(23), 4059. https://doi.org/10.3390/nu16234059

Savard, C., Lemieux, S., Carbonneau, É., Provencher, V., Gagnon, C., Robitaille, J., & Morisset, A.-S. (2019). Trimester-specific assessment of diet quality in a sample of Canadian pregnant women. International Journal of Environmental Research and Public Health, 16(3), 311. https://doi.org/10.3390/ijerph16030311

Slater, K., Rollo, M. E., Szewczyk, Z., Ashton, L., Schumacher, T., & Collins, C. E. (2020). Do the dietary intakes of pregnant women attending public hospital antenatal clinics align with Australian Guide to Healthy Eating recommendations? Nutrients, 12(8), 2438. https://doi.org/10.3390/nu12082438

St-Laurent, A., Plante, A.-S., Harrison, S., Lemieux, S., Robitaille, J., Ruchat, S.-M., & Morisset, A.-S. (2025). Dietary intakes, diet quality and physical activity levels from preconception to late pregnancy: Prospective assessment of changes and adherence to recommendations. Women's Health, 21, 17455057251341999. https://doi.org/10.1177/17455057251341999

Yu, Y., Feng, C., Bédard, B., Fraser, W. D., & Dubois, L. (2022). Diet quality during pregnancy and its association with social factors: 3D Cohort Study (Design, Develop, Discover). Maternal & Child Nutrition, 18(4), e13403. https://doi.org/10.1111/mcn.13403

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