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École de nutrition

A French Canadian Perspective to Diet Assessment during Pregnancy

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Table of Contents

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01

Tools used to assess dietary intakes

24-h dietary recall and supplements questionnaire

Web-Based 24-h Dietary Recall for a French-Canadian Population

INAF
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Its development

- Developed in French, translated in English
- Inspired by the USDA automated multiple-pass method
- Designed as a meal-based approach
- Includes a list of 2865 food items, distributed into 16 categories and 98 subcategories, and 687 recipes (Canadian Nutrient File)
- Presents an acceptable relative validity for estimating usual dietary intake when compared with the food record
- Valid to evaluate adherence to Canadian dietary guidelines

nutrients

MDPI

Article

Development of a Web-Based 24-h Dietary Recall for a French-Canadian Population

Simon Jacques [1,2], Simone Lemieux [1,2,*], Benoît Lamarche [1,2], Catherine Laramée [1], Louise Corneau [1], Annie Lapointe [1], Maude Tessier-Grenier [1,2] and Julie Robitaille [1,2]

Public Health Nutrition: 21(15), 2744–2752 doi:10.1017/S1368980018001611

Assessing the relative validity of a new, web-based, self-administered 24 h dietary recall in a French-Canadian population

Jacynthe Lafrenière, Catherine Laramée, Julie Robitaille, Benoît Lamarche and Simone Lemieux*
School of Nutrition, Institute of Nutrition and Functional Foods, Laval University, 2440 Hochelaga Blvd, Québec, QC G1V 0A6, Canada

Contents lists available at ScienceDirect
Nutrition
journal homepage: www.nutritionjrnl.com
ELSEVIER
NUTRITION

Applied nutritional investigation

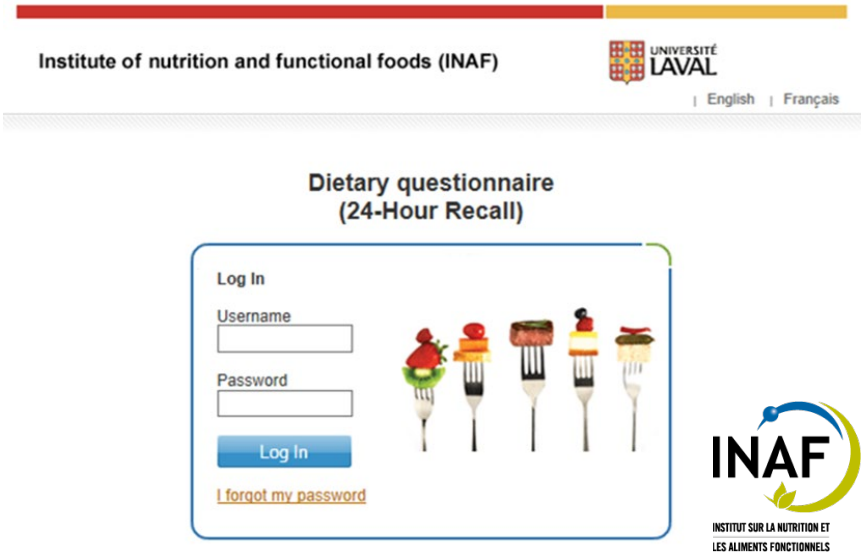
Relative validity of a web-based, self-administered, 24-h dietary recall to evaluate adherence to Canadian dietary guidelines

Jacynthe Lafrenière M.Sc., Catherine Laramée M.Sc., Julie Robitaille Ph.D., Benoit Lamarche Ph.D., Simone Lemieux Ph.D. *
Institute of Nutrition and Functional Foods, Laval University, Quebec, Canada

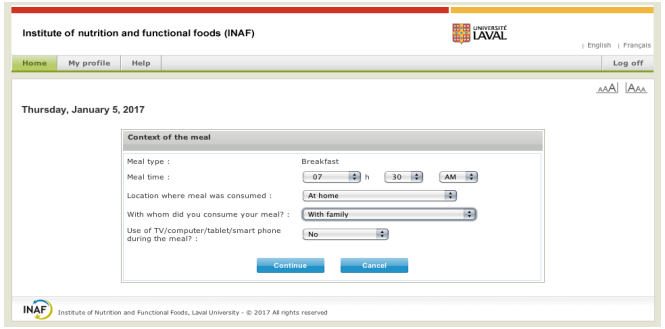
Web-Based 24-h Dietary Recall for a French-Canadian Population

How does it work ?

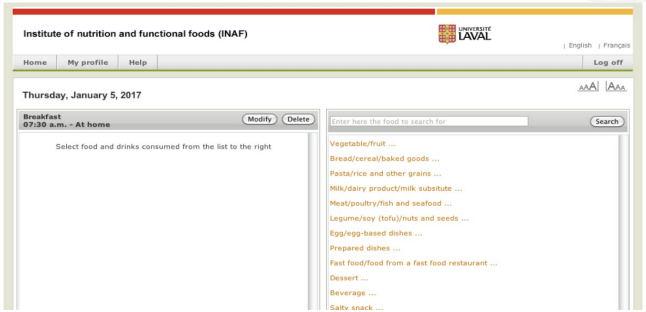
- E-mails automatically sent to the participants
- 24 hours to enter the food and drinks they consumed the day before
- Completion 20-30 minutes
- Ideally for 3 days (2 week days + 1 weekend day)
- If the participant does not complete the recall within 24 hours, a new date is automatically set by the system until all recalls are completed



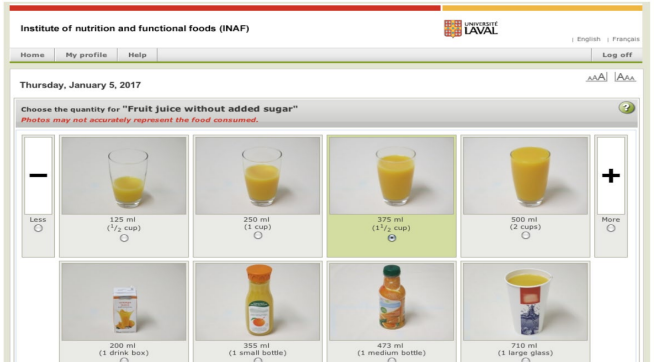
Web-Based 24-h Dietary Recall for a French-Canadian Population



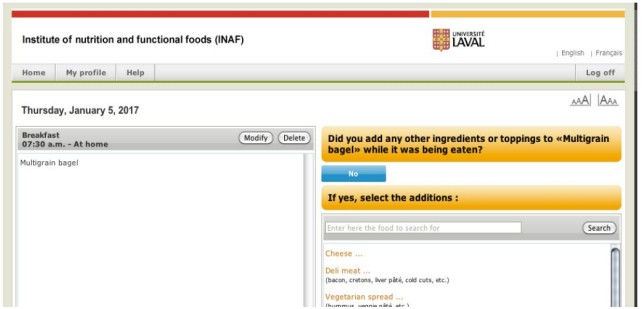
Questions about the meal context



Food and drink selection with structured food list

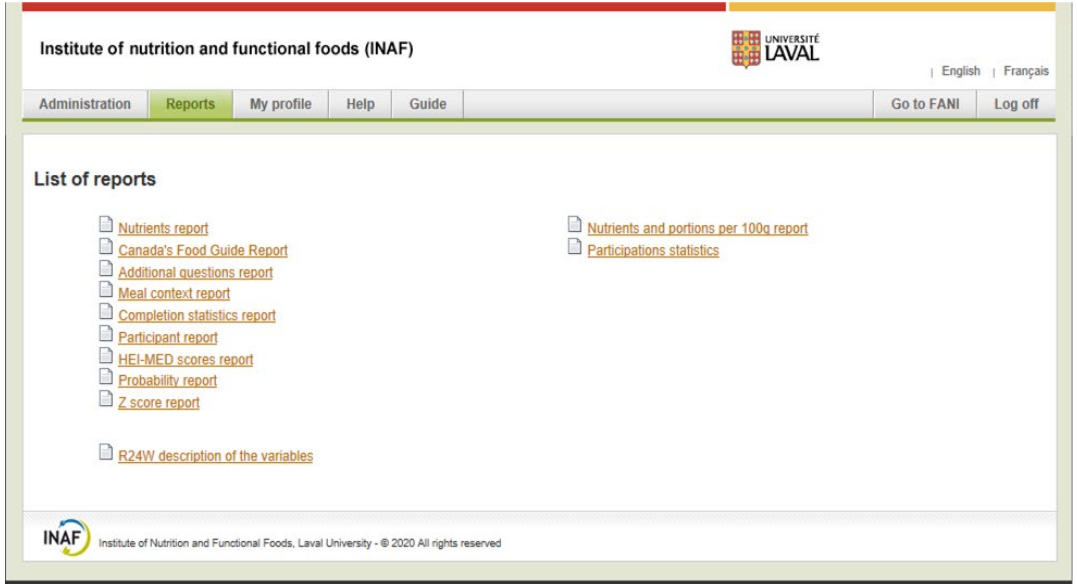


Portions selection



Selection of additions

Web-Based 24-h Dietary Recall for a French-Canadian Population



Data report

- Nutrients (macro, %, micro)
- Canada's Food Guide servings (2007)
- Diet quality (e.g. Healthy Eating Index

  - Total per day
  - Average per participation
  - Total per meals and foods

Dietary supplements questionnaire

Canada's food guide

Healthy eating when pregnant and breastfeeding

You need a multivitamin with 0.4 mg folic acid everyday if you:

- are pregnant
- could become pregnant

This can reduce the risk of your baby developing a neural tube defect.

While you are pregnant, make sure your daily multivitamin also contains 16 to 20 mg of iron.

A health care provider can help you find the multivitamin that is right for you.

Government of Canada / Gouvernement du Canada

https://food-guide.canada.ca/en/tips-for-healthy-eating/pregnant-breastfeeding/

Dietary supplements questionnaire

What is asked to the participant?

1. **In the last month, have you taken a dietary supplement (vitamin/mineral)?**
   Note: Also consider dietary supplements sold in the form of oils (e.g. cod liver oil).

2. **Enter the name and identification number of this supplement (DIN).**

3. **In what unit of measure do you wish to report the dose of this supplement?**
   (mL, drop, tablet, capsule, tablespoon, teaspoon, other)

4. **Write the dose of your supplement in the unit of measure you chose in the previous**
   If it is a multivitamin, enter the number of tablets/capsules.

5. **How often do you take this dose?**
   (1 time a day, 2 times a day, 3 times a day, as needed, other)

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02

Context of diet assessment

The ANGE study

Objectives:

1. To validate a self-administered web-based 24-hour dietary recall among pregnant women.

2. To measure changes in dietary intakes throughout trimesters and to assess pregnant women's dietary intakes in comparison with current Canadian nutritional recommendations

ANGE

Apports Nutritionnels durant la GrossessE

Co-investigators

Simone Lemieux, RD, PhD
Julie Robitaille, RD, PhD
John Weisnagel, MD
Claudia Gagnon, MD
Véronique Provencher, RD, PhD
Emmanuel Bujold, MD
Bénédicte Fontaine-Bisson, RD, PhD

Study Timeline

n=86

Online questionnaires

1st trimester 7-14 weeks	2nd trimester 20-27 weeks	3rd trimester 31-37 weeks
3 x 24-hour dietary recalls + Food record (3 days)	3 x 24-hour dietary recalls + Food record (3 days)	3 x 24-hour dietary recalls + Food record (3 days)
Dietary supplement questionnaire	Dietary supplement questionnaire	Dietary supplement questionnaire
Other questionnaires: nausea & vomiting/ eating behaviors (TFEQ, IES-2)/physical activity	Other questionnaires: nausea & vomiting/ eating behaviors (TFEQ, IES-2)/physical activity	Other questionnaires: nausea & vomiting/ eating behaviors (TFEQ, IES-2)/physical activity

On-site visits

Blood samples, anthropometric measurements, ultrasound	Blood samples, anthropometric measurements	Blood samples, anthropometric measurements, ultrasound

*TFEQ = Three factors eating questionnaire, IES-2 = intuitive eating scale 2

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03

Results from diet assessment during pregnancy

Results

Savard et al. BMC Pregnancy and Childbirth (2018) 18:112
https://doi.org/10.1186/s12884-018-1741-1

BMC Pregnancy and Childbirth

RESEARCH ARTICLE Open Access

Validation of a self-administered web-based 24-hour dietary recall among pregnant women

Claudia Savard[1,2,3], Simone Lemieux[1,3], Jacynthe Lafrenière[1,3], Catherine Laramée[3], Julie Robitaille[1,2,3] and Anne-Sophie Morisset[1,2,3*]

- Final sample restricted to women who completed both the food record and three (3) 24-hour dietary recalls within each trimester(n=60)

Table 2 Completion statistics of the R24W

	Mean (SD)			*P* value
	1st trimester	2nd trimester	3rd trimester	
Completion time (minutes)	21.8 (7.5)	19.2 (6.8)	16.3 (5.1)	< 0.0001
Reported meals (N)	5.1 (0.9)	4.8 (1.1)	5.0 (1.2)	0.13
Reported items (N)	20.5 (4.0)	20.3 (4.1)	19.4 (4.0)	0.025

Results

Table 3 Differences between mean dietary intakes reported by the R24W and the FR in the 2nd trimester

	R24W (SD)	FR (SD)	% difference	Pearson correlation
Energy (kcal)	2357 (489)	2239 (506)	5.3*	0.68*
Carbohydrates (g)	286.7 (67.7)	279.1 (76.2)	2.7	0.76*

Table 4 Cross-classification of intakes by quartiles and weighted kappa coefficient in the 2nd trimester

	%				Weighed Kappa
	Same quartile	Adjacent quartiles	± 1 Quartile apart	Misclassification (quartile 1 vs 4)	
Energy	43.3	38.3	81.6	1.7	0.39
Carbohydrates	53.3	33.3	86.6	3.3	0.49
Fat	40.0	41.7	81.7	1.7	0.36

Table 5 Seven criteria validity analysis of the R24W in the 2nd trimester

	Individual level			Group level			Total of poor outcomes
	Association	Agreement		Agreement		Presence of bias	
	Pearson coefficient	Cross-classification	Kappa score	% difference	T-test	Bland- Altman	
Criteria for good (G) outcome	≥0.50	≥ 50% in same quartile; < 10% in opposite	≥0.61	0-10.9%	$P > 0.05$	P > 0.05	

Savard et al., BMC Pregnancy and Childbirth, 2018

Results

- 79 women for whom we have nutritional data at each trimesters
- Seventy-four (93.7%) of the women filled all nine dietary recalls.

nutrients

MDPI

Article

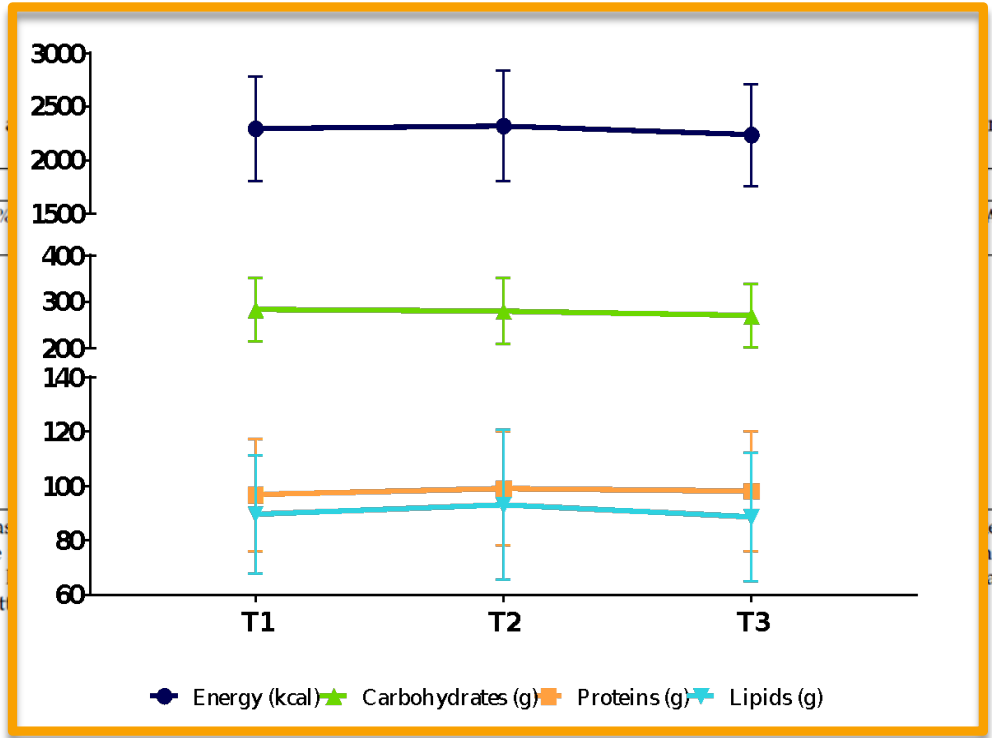
Trimester-Specific Dietary Intakes in a Sample of French-Canadian Pregnant Women in Comparison with National Nutritional Guidelines

Claudia Savard [1,2,3], Simone Lemieux [1,3], S. John Weisnagel [2,4], Bénédicte Fontaine-Bisson [5,6], Claudia Gagnon [2,3,4], Julie Robitaille [1,2,3] and Anne-Sophie Morisset [1,2,3,*]

Table 2. Trimester-specific energy intakes … nce intakes.

	First Trimester			Above AMDR or EER	*p*-Value [a]
	Mean ± SD or AMDR Range	%Below AMDR or EER	%		
EER (kcal/day)	2122.4 ± 265.9	-		-	
Energy intake (kcal/day)	2294.3 ± 487.2	36.7		29.1	0.09
AMDR protein, E%	10–35	-		-	-
Protein, E%	16.9 ± 2.5	0		0	0.14
AMDR carbohydrate, E%	45–65	-		-	-
Carbohydrate, E%	49.4 ± 4.7	20.3		0	0.27
AMDR total fat, E%	20–35	-		-	-
Total fat, E%	35.1 ± 4.0	0		57.0	0.53
SFA, E%	12.8 ± 2.1	-		-	0.047
MUFA, E%	12.3 ± 2.1	-		-	0.49
PUFA, E%	7.1 ± 1.9	-		-	0.03

[a] *p*-value for repeated measures ANOVA performed to as… e was established for a nutrient, the "-" is used instead of a 0. AMDR: acceptable …ula: 354 − (6.91 × age) + physical activity coefficient × [(9.36 × weight) + (726 × … ated fatty acids; MUFA: monounsaturated fatty acids; PUFA: polyunsaturated fat…



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Results

A large majority of women took at least one supplement (mainly a multivitamin)

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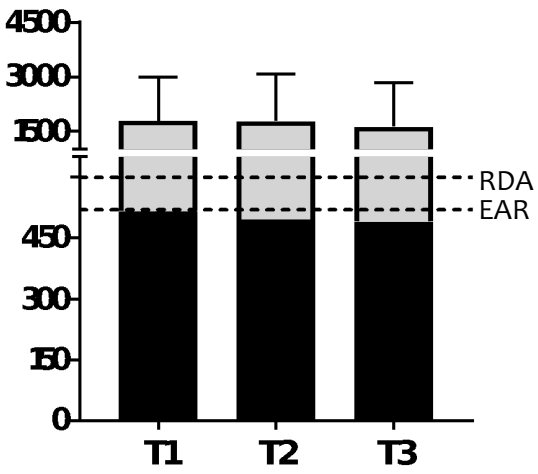
Article

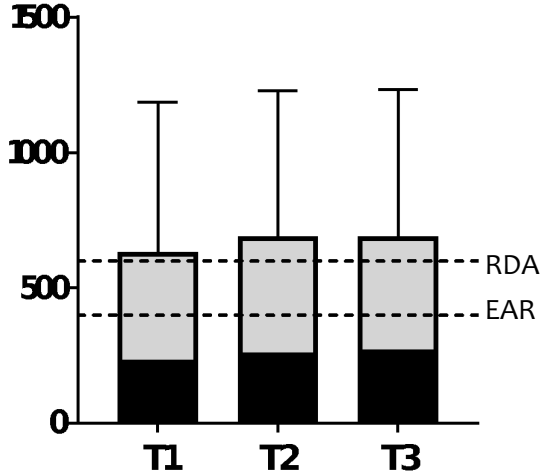
Trimester-Specific Dietary Intakes in a Sample of French-Canadian Pregnant Women in Comparison with National Nutritional Guidelines

Claudia Savard [1,2,3], Simone Lemieux [1,3], S. John Weisnagel [2,4], Bénédicte Fontaine-Bisson [5,6], Claudia Gagnon [2,3,4], Julie Robitaille [1,2,3] and Anne-Sophie Morisset [1,2,3,*]

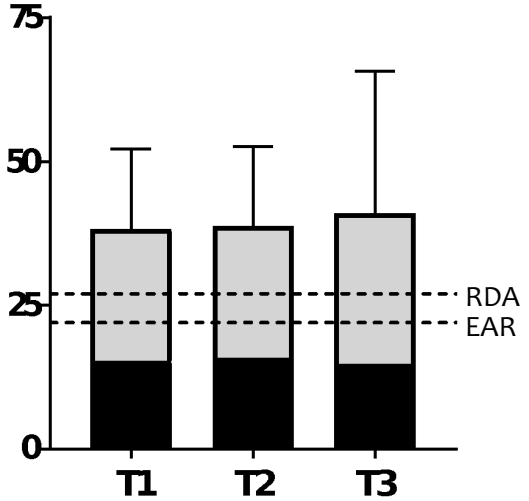
Folic acid
(g dietary folate equivalents)

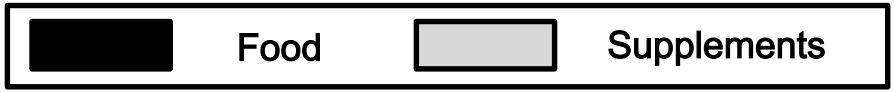


Vitamin D
(UI)



Iron
(mg)





ANGE
Apports Nutritionnels durant la GrossesseE

Results

- 2007 version of the Canadian Healthy Eating Index (GHEI)

International Journal of *Environmental Research and Public Health*

MDPI

Article

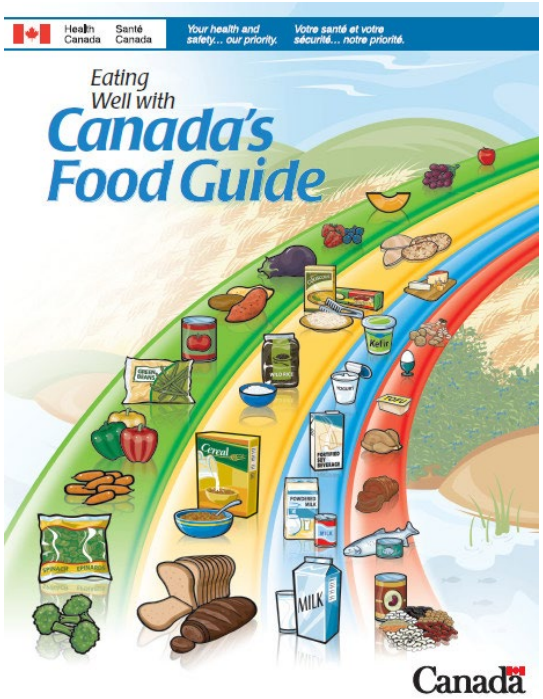
Trimester-Specific Assessment of Diet Quality in a Sample of Canadian Pregnant Women

Claudia Savard [1,2,3], Simone Lemieux [1,3], Élise Carbonneau [1,3], Véronique Provencher [1,3], Claudia Gagnon [2,3,4], Julie Robitaille [1,2,3] and Anne-Sophie Morisset [1,2,3,*]

Table 3. Healthy Eating Index total and subscores throughout pregnancy.

HEI	1st Trimester	2nd Trimester	3rd Trimester	*p*-Value *
Total	65.8 ± 10.8	65.0 ± 12.0	62.9 ± 12.6	0.075
Adequacy †	47.2 ± 7.4	46.4 ± 7.7	44.7 ± 8.2	**0.016**
Total vegetables and fruits	8.3 ± 2.0	7.7 ± 2.1	7.7 ± 2.2	**0.018**
Whole fruits	4.3 ± 1.5	4.1 ± 1.4	4.3 ± 1.4	0.778
Dark green and orange vegetables	3.5 ± 1.6	3.4 ± 1.6	3.0 ± 1.6	0.056
Total grain products	4.5 ± 0.7	4.4 ± 0.8	4.2 ± 0.9	0.123
Whole grains	2.4 ± 1.8	2.3 ± 1.7	2.4 ± 1.9	0.893
Milk and alternatives	8.9 ± 2.0	8.9 ± 2.1	9.1 ± 1.9	0.685
Meat and alternatives	8.7 ± 2.0	8.9 ± 1.9	8.6 ± 2.2	0.566
Unsaturated fats	6.6 ± 3.0	6.6 ± 3.4	5.4 ± 3.4	**0.008**
Moderation ‡	18.6 ± 7.2	18.6 ± 7.9	18.2 ± 8.1	0.894
Saturated fats	4.0 ± 2.7	3.6 ± 3.1	3.1 ± 2.8	**0.039**
Sodium	4.4 ± 2.6	4.7 ± 2.8	5.0 ± 2.7	0.173
Other foods	10.2 ± 5.1	10.3 ± 5.2	10.2 ± 5.7	0.970

* *p*-value of the repeated measures analyses of variance performed across trimesters, bold characters indicate significance of the analysis. † for adequacy components, 0 points for minimum intake or less, 5, 10 or 20 for maximum intake or more, and proportional for amounts between minimum and maximum. ‡ for moderation components, 10 or 20 points for minimum intake or less, 0 points for maximum intake or more, and proportional for amounts between minimum and maximum.



Results

Figure 1A. Age

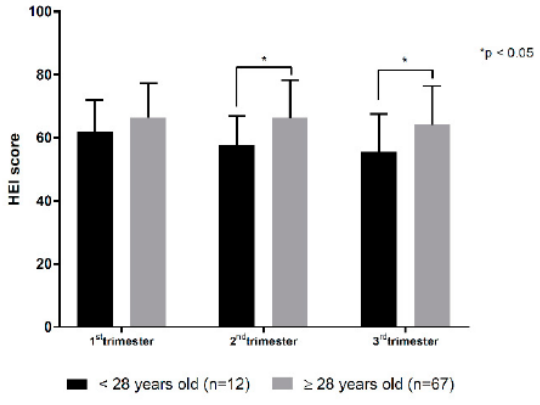


Figure 1B. BMI

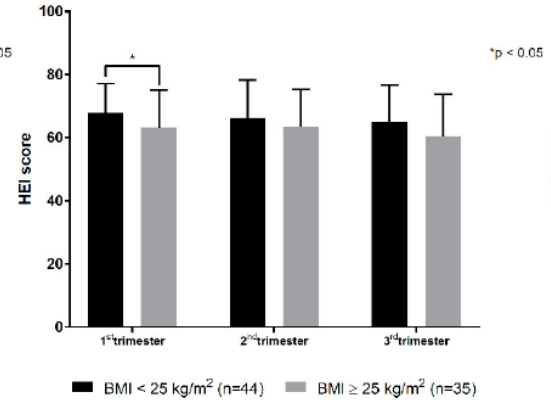


Figure 1C. Physical activity

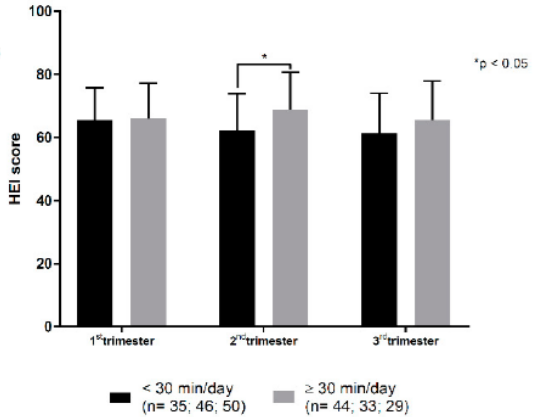


Figure 1D. Education

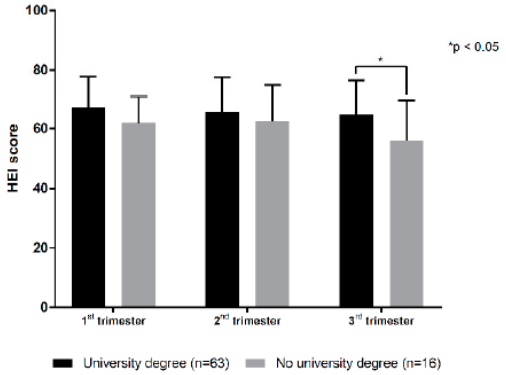
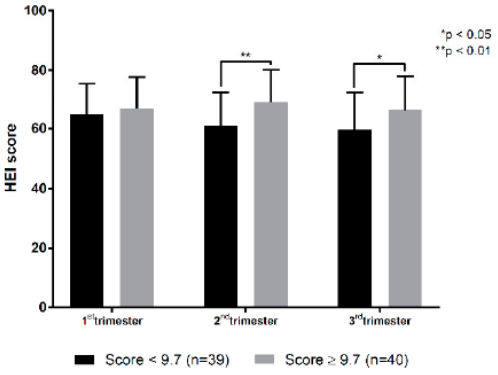


Figure 1E. Nutrition knowledge



Savard C. et al., Int J Environ Res Public Health, 2

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04

Lessons learned, challenges and perspectives

Lessons learned

- √ The use of a web-based dietary recall was informative and appreciated by the participants.
- √ Importance to have recruitment strategies to enroll women early.
- √ Importance to maintain on-site visits => creates a bond of trust.

- √ Longitudinal assessment of dietary intakes is still important, even if we observed no change for macro- and micronutrients : why is that?
- √ Relatively small sample => difficult to observe associations with pregnancy outcomes and gestational weight gain.

→ Further studies will help to understand.

Challenges and perspectives

- No diet assessment tool is perfect.
- Importance to combine traditional tools with objective measurement methods to get a better picture!

Longitudinal Assessment of Vitamin D Status across Trimesters of Pregnancy

Claudia Savard,[1,2,3] Agnieszka Bielecki,[4] Anne-Sophie Plante,[2,3] Simone Lemieux,[1,3] Claudia Gagnon,[2,5] Hope A Weiler,[4] and Anne-Sophie Morisset[1,2,3]

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Thanks!

Do you have any questions?

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Collaborators, participants and funding agencies!

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