Socio-demographic and lifestyle factors associated with folate status among non-supplement-consuming Canadian women of childbearing age

Yipu Shi, MD, PhD,[1] Margaret de Groh, PhD,[1] Amanda J. MacFarlane, PhD[2]

ABSTRACT

OBJECTIVE: Mandatory folic acid fortification was implemented in Canada in 1998 to reduce the risk of neural tube defects (NTD). Our objective was to assess the relationship between socio-demographic factors and folate status in non-supplement-consuming Canadian women of childbearing age.

METHODS: Data on demographic factors, lifestyle factors, physical measures and red blood cell (RBC) folate concentration were collected from 1,008 non-supplement-consuming women aged 15-49 years in the Canadian Health Measures Survey (2007–2009). RBC folate ≥906 nmol/L was used as a cut-off for optimal folate status for protection from NTD.

RESULTS: Approximately 75% of non-supplement consuming women had an RBC folate concentration ≥906 nmol/L. Young age (15-19 years), White ethnicity, less than secondary education, lowest income adequacy, smoking and high body mass index were associated with a higher prevalence of lower folate status. After adjustment, only young age (adjusted odds ratio [OR] 1.99–95% confidence interval [CI]: 1.25–3.18) was associated with lower folate status. Less than secondary education (adjusted OR 5.66, 95% CI: 1.10–29.04) and lowest income adequacy (adjusted OR 4.77, 95% CI: 1.06–21.49) were associated with lower folate status in women aged 15-24 and 25-49 years, respectively.

CONCLUSIONS: Many risk factors for lower folate status identified before food fortification was implemented were not associated with folate status in our representative sample of non-supplement-consuming Canadian women. However, younger women, women aged 15-24 with less than secondary education and women aged 25-49 with low income adequacy remain at risk of lower folate status, supporting the continued promotion of folic acid supplement use to women of childbearing age.

KEY WORDS: Folate; folic acid; fortification; neural tube defects; Canadian Health Measures Survey

La traduction du résumé se trouve à la fin de l'article.

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The risk of a woman having a child affected by a neural tube defect (NTD) is partially dependent on her folate status.[1-3] Clinical trials have clearly demonstrated that folic acid supplementation during the periconceptional period contributes to the prevention of NTDs, presumably by increasing folate status.[4,5] The Canadian government mandated folic acid fortification of white flour and other select cereal products in 1998 to increase the intake of folic acid by an average of 0.1-0.15 mg/day in women of childbearing age and reduce the incidence of NTDs. The fortification of a staple food in the Canadian diet was also intended to mitigate the association of socio-demographic and lifestyle factors with low folate intake and/or folate status, such as race/ethnicity, young age, low income, low education, smoking and other characteristics,[6,7] many of which were also associated with low rates of use of folic acid supplements.[8,9]

Since fortification was implemented, the folate status of Canadian women has increased and the NTD rate has decreased significantly.[10] However, among non-supplement-consuming Canadian women, it is estimated that <1% consume ≥0.4 mg folic acid per day from dietary sources,[11] which is the recommended daily intake of folic acid for the prevention of NTDs.[12] Studies from the US indicate that, while folate status has proportionally increased among women with characteristics associated with low folate status or intake,[13] absolute differences in status remain among specific groups of women.[14] The Canadian Health Measures Survey (CHMS), cycle 1 (2007-2009), a nationally representative survey, provided the opportunity to examine the association of factors which were previously associated with lower folate status in the pre-fortification period with folate status in Canadian women of childbearing age who consume folic acid fortified foods but do not use folic acid supplements.

METHODS

Ethics

All processes of cycle 1 of the CHMS were reviewed and approved by the Health Canada Research Ethics Board. Participation in the survey was voluntary, and written informed consent was obtained from individual participants.

Survey design and study population

The CHMS, Cycle 1, was a comprehensive direct health measures survey that collected information on socio-demographic characteristics, health risk factors and outcomes, and included

Author Affiliations

1. Social Determinants and Science Integration Directorate, Public Health Agency of Canada, Ottawa, ON
2. Nutrition Research Division, Health Canada, Ottawa, ON

Correspondence: Amanda J. MacFarlane, Nutrition Research Division, 251 Sir Frederick Banting Dr, AL2203E, Ottawa, ON K1A 0K9, Tel: 613-957-0933, E-mail: amanda.macfarlane@hc-sc.gc.ca

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blood, urine and anthropometric measures.[15] It represented 96.3% of the Canadian population aged 6 to 79 living at home and residing in the 10 provinces and 3 territories but excluded people living on reserves or other Aboriginal settlements, certain remote areas and institutions, and full-time members of the Canadian Forces. Data were collected from approximately 5,600 participants over a two-year period (2007-2009) at 15 sites with a minimum of 500 respondents for each sex from five age groups (6 to 11, 12 to 19, 20 to 39, 40 to 59 and 60 to 79 years). Collection sites were stratified into five regions to achieve national representation. A household interview was conducted to obtain general demographic information and to administer an in-depth health questionnaire. A visit to a mobile examination centre (MEC) included physical measure tests and the collection of blood and urine samples. The study population for this analysis included women of childbearing age (15-49 years, n=1,369) with a valid red blood cell (RBC) folate value (n=1,320) who were not consuming a folic-acid-containing supplement (n=1,008) (Figure 1).

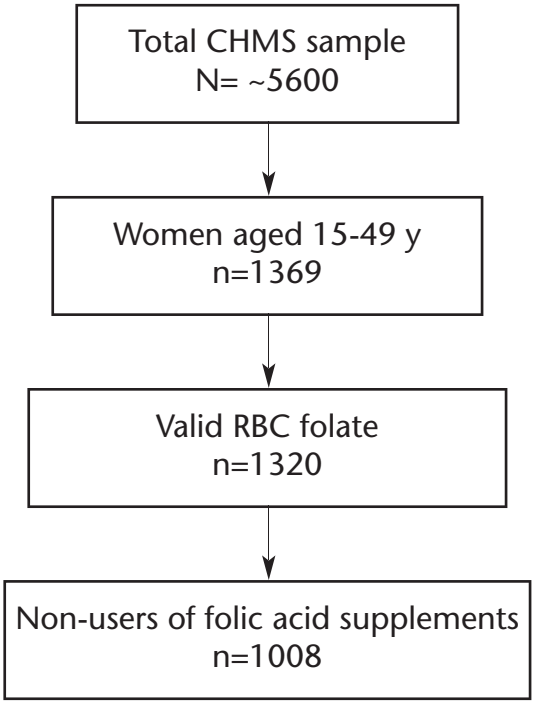

Figure 1. Study population. Of approximately 5,600 participants in the Canadian Health Measures Survey, cycle 1, 1,008 women of childbearing age (15-49 y) did not consume folic-acid-containing supplements and had a valid RBC folate value.

Identification of non-users of folic acid supplements

Study participants were queried about drugs and supplements used in the 30 days before the date of the interview at the MEC. Drug Identification Numbers (DIN) and Natural Health Product Identification Numbers (NPN) were collected. The Anatomical Therapeutic Chemical (ATC) codes A11A, A11B, A11E, A11GB, A11J, B03AD, B03AE, B03BB and V03AF were used to identify potential folic-acid-containing supplements in the CHMS shared file database. The ATC codes were cross-referenced to the associated DINs and NPNs in the CHMS database by Statistics Canada. The list of DINs and NPNs was used to query the Drug Product Database[16] and the Licensed Natural Health Products Database[17] to determine the folic acid content of products used by CHMS participants.

Blood analyses

Hematocrit was measured in whole blood at the MEC. Whole blood was collected, processed and frozen; frozen blood samples were shipped to the Nutrition Research Division, Health Canada (Ottawa, ON), and stored at -20°C. Frozen whole-blood samples were thawed and diluted 1:26 with 0.5% ascorbic acid solution. Hemolysates stood for 180 minutes at room temperature. Folate was analyzed using the Immulite 2000 immunoassay (Siemens Canada, Mississauga), as described by the manufacturer. RBC folate was normalized to hematocrit. The cut-off for NTD protective folate status (906 nmol/L) was based on the relationship between RBC folate and NTD risk, as determined by the analysis of Daly et al.[3]

Demographic and lifestyle factors

Age groups for the analysis were 15-19, 20-39 and 40-49 years, or 15-24 and 25-49 years for the age-stratified multivariate analysis. Marital status was defined as currently in a relationship (married or common-law) or currently single (separated, divorced, widowed or single–never married). Education was defined as less than secondary, secondary education or some post-secondary, or completion of post-secondary education. Individuals with diabetes diagnosed by a physician (self-reported) or with glycated hemoglobin (HbA1C) ≥5.7% were identified as being at increased risk of hyperglycemia.[18,16] Ethnicity, income adequacy, smoking and body mass index (BMI) were all derived variables in the CHMS dataset, which means that data from one variable were collapsed into categorical groupings (ethnicity, income adequacy, smoking) or were calculated using data from other variables (income adequacy, BMI). Ethnicity was defined as White or non-White, which included Aboriginals living off-reserve. Household income adequacy was calculated on the basis of both total family income from all sources and total number of household members, and defined as lowest, lower-middle or upper middle/highest income, with a fourth income category for individuals with missing data. Smoking status was defined as current non-smoker (combined former daily or occasional smoker and never-smoker) or current smoker (combined current daily or occasional smoker). Height and weight were measured at the MEC and used to calculate BMI. The BMI categories were defined as <18.5 (underweight), 18.5-24.99 (normal), 25-29.99 (overweight) and ≥30 (obese). Underweight and normal BMI categories were combined for analysis. Missing values for a given variable were excluded from calculations, except for income adequacy. Missing values for income adequacy represented nearly 10% of the sample and were therefore included as an additional category.

Statistics

The CHMS used a complex sampling design that allowed for nationally representative estimates. Because of the limited number of primary sampling units, Statistics Canada recommends that 11 degrees of freedom (df) be applied to all statistical analyses.[19] The 11 df result from the stratification of the

Table 1. Median and geometric mean red blood cell (RBC) folate concentration and prevalence of lower folate status in non-supplement-consuming Canadian women of childbearing age by selected socio-demographic factors

Variable	Group	N	RBC folate concentration (nmol/L)		Prevalence of RBC folate <906 nmol/L % (95% CI)*	Prevalence of RBC folate ≥906 nmol/L % (95% CI)*
			Median (95% CI)	Geometric mean (95% CI)*		
Age range	15-49 y	1008	1162 (1077–1247)	1142 (1053–1239)	23.6 (15.2–31.9)	76.4 (68.1–84.8)
Age	15-19 y	250	1159 (1056–1262)	1101 (999–1212)[a]	30.9 (19.9–41.9)[a]	69.1 (58.1–80.1)
	20-39 y	488	1109 (1009–1209)	1103 (1013–1202)[a]	23.7 (12.8–34.5)[a,b†]	76.3 (65.5–87.2)
	40-49 y	270	1255 (1114–1396)	1235 (1123–1358)[b]	19.9 (13.4–26.5)[b]	80.1 (73.5–86.6)
Marital status	Married/common-law	492	1206 (1101–1311)	1187 (1076–1311)[a]	21.7 (14.3–29.0)	78.3 (71.0–85.7)
	Separated/divorced/widowed/single	514	1124 (1028–1220)	1093 (1013–1180)[a]	26.2 (15.6–36.7)[†]	73.8 (63.3–84.4)
Ethnicity	White	815	1150 (1050–1250)	1125 (1034–1225)[a]	25.2 (17.2–33.3)[a]	74.8 (66.7–82.8)
	Non-White	193	1206 (1052–1360)	1202 (1089–1326)[b‡]	17.6 (6.0–29.1)[b†]	82.4 (70.9–94.0)
Education	<Secondary	206	1080 (875–1285)	1068 (901–1265)[a]	35.6 (17.1–54.2)[a†]	64.4 (45.8–82.9)
	Secondary/some post-secondary	276	1136 (1040–1232)	1099 (998–1210)[b‡]	26.0 (15.0–37.0)[a,b†]	74.0 (63.0–85.0)
	Post-secondary	523	1206 (1102–1310)	1188 (1104–1279)[c‡]	19.2 (11.3–27.0)[b]	80.8 (73.0–88.7)
Household income adequacy	Lowest	84	944 (738–1150)	969 (827–1137)[a]	41.5 (15.5–67.5)[a†]	58.5 (32.5–84.5)
	Lower middle	142	1240 (1049–1431)	1191 (997–1424)[a,b]	24.3 (9.6–39.1)[b†]	75.7 (60.9–80.4)
	Upper middle/highest	692	1159 (1081–1237)	1154 (1067–1248)[b]	21.5 (14.1–28.9)[b]	78.5 (71.1–85.9)
	Missing	90	1138 (905–1371)	1147 (975–1348)	21.8 (7.8–35.8)[†]	78.1 (64.2–92.1)
Smoking	Current smoker	221	1062 (941–1183)	1052 (941–1176)[a]	32.5 (17.0–48.0)[a†]	67.5 (52.0–83.0)
	Current non-smoker	787	1191 (1118–1264)	1171 (1077–1273)[b‡]	20.8 (13.3–28.3)[b]	79.1 (71.1–86.6)
BMI	Normal and under	549	1138 (1050–1226)	1117 (1030–1211)[a]	22.7 (13.8–31.6)[a†]	77.3 (68.4–86.2)
	Overweight	247	1199 (1120–1278)	1192 (1090–1303)[b‡]	22.6 (11.7–33.4)[a†]	77.4 (66.5–88.3)
	Obese	195	1182 (985–1379)	1130 (965–1323)[b‡]	27.0 (14.2–39.8)[b†]	73.0 (60.1–85.8)
Hyperglycemia risk	HbA1C <5.7%	819	1146 (1055–1237)	1126 (1036–1224)[a]	23.2 (14.2–32.3)[†]	76.7 (67.7–85.8)
	HbA1C >5.7% or known diabetes	165	1237 (1005–1468)	1208 (987–1479)[a]	26.4 (14.0–38.9)[†]	73.6 (61.1–86.0)

* Statistical significance was determined using Student's t test. Estimates that do not share a letter within a variable are considered significantly different, $p \leq 0.05$.
† Coefficient of variation for estimates between 16.6% and 33.3%, interpret with caution.
‡ Significant difference, $p \leq 0.05$, coefficient of variation between 16.6% and 33.3%, interpret with caution.
CI=confidence interval; BMI=body mass index; HbA1C=glycated hemoglobin.

15 primary sampling sites into 4 regions (Atlantic region was collapsed into the Quebec region for analysis). Prevalence estimates were calculated using data weighted to represent the Canadian population aged 6 to 79 years. Bootstrap weights and the 11 df were applied to all variance estimations of geometric means, proportions and regression parameters according to Statistics Canada protocols. As a result of the *t* distribution, Statistics Canada recommends the use of a *t* test to assess differences between means and proportions.

Multivariate logistic regression models were employed to assess adjusted odds ratios (ORs) for the independent association of socio-demographic and lifestyle factors with lower folate status. Marital status and hyperglycemia risk were not included in the age-stratified models because of the 11 df restriction on the number of parameters that could be included in a regression model and because of their non-significant association with lower folate status in the univariate analysis. The full model included age group, ethnicity, income adequacy, smoking and BMI. Education was not included in the full model because educational attainment is dependent on age in younger women. Two models stratified by age (15-24 and 25-49 years) included the same variables and education with age adjusted continuously. Statistical significance was defined as a *p* value ≤0.05. Analyses were performed using SAS Enterprise Guide 4 software (SAS Institute Inc., Cary, NC), BOOTVAR 3.2-SAS version (Statistics Canada, Ottawa, ON; available at http://www.statcan.gc.ca/rdc-cdr/bootvar_sas-eng.htm) and SUDAAN 10.0.1 (RTI International, Research Triangle Park, NC).

RESULTS

Of the Canadian women aged 15-49 sampled for the CHMS, cycle 1 (2007-2009), 75.2% (95% CI: 71.6–78.9) did not consume folic-acid-containing supplements. These women had a geometric mean RBC folate of 1142 nmol/L (95% CI: 1053–1239) and a prevalence of RBC folate ≥906 nmol/L of 76.4% (95% CI: 68.1–84.8; Table 1). Univariate analysis indicated that women aged 15-19 years, of White ethnicity, with less than a secondary education, in the lowest income adequacy category, and with current smoker status had lower RBC folate concentrations and were more likely to have an RBC folate concentration <906 nmol/L (Table 1). Obese women were also more likely to have an RBC folate <906 nmol/L. Marital status and hyperglycemia risk were not associated with lower folate status.

Multivariate logistic regression models were employed to assess the independent associations of factors associated with an RBC folate <906 nmol/L (Table 2). In the full model, the adjusted OR for lower folate status tended to increase with decreasing age and income; however, only young age (adjusted OR 1.99, 95% CI: 1.25–3.18; $p<0.01$) was significantly associated with lower folate status. We also considered models stratified by age that included women aged 15-24 or women aged 25-49 years (Table 2). For women aged 15-24, less than a secondary education was significantly associated with RBC folate <906 nmol/L (adjusted OR 5.66, 95% CI: 1.10–29.04). Among women aged 25-49, lowest income adequacy was significantly associated with lower folate status (adjusted OR: 4.77, 95% CI: 1.06–21.49).

DISCUSSION

Low folate status is a risk factor for NTDs.[3] A number of socio-demographic and lifestyle factors have been associated with low folate status or inadequate folic acid intake. The CHMS, cycle 1, provided an opportunity to identify socio-demographic and lifestyle factors associated with lower folate status in a nationally representative sample of Canadian women exposed to foods fortified with folic acid. We specifically excluded women taking folic-acid-containing supplements, 24.8% of the CHMS sample of

Table 2. Adjusted odds ratio (OR) for lower folate status in non-supplement-consuming Canadian women of childbearing age with risk factors associated with low folate status

Variable	Group	Full model*	Age-stratified models†	
		Ages 15-49 y adjusted OR (95% CI)	Ages 15-24 y adjusted OR (95% CI)	Ages 25-49 y adjusted OR (95% CI)
Age	15-19 y	1.99 (1.25–3.18)‡	–	–
	20-39 y	1.26 (0.75–2.13)	–	–
	40-49 y	1	–	–
Age	–	–	1.04 (0.76–1.43)	0.98 (0.94–1.03)
Ethnicity	White	1.77 (0.94–3.35)	2.08 (0.63–6.90)	1.98 (0.87–4.48)
	Non-White	1	1	1
Education	<Secondary	–	5.66 (1.10–29.04)	1.73 (0.64–4.68)
	Secondary/some post-secondary	–	2.70 (0.57–12.69)	1.50 (0.68–3.34)
	Post-secondary	–	1	1
Household income adequacy	Lowest	2.54 (0.86–7.44)	0.58 (0.08–4.18)	4.77 (1.06–21.49)
	Lower middle	1.27 (0.53–3.05)	0.64 (0.05–9.05)	1.53 (0.61–3.81)
	Upper middle/highest	1	1	1
	Missing	0.94 (0.41–2.17)	0.70 (0.15–3.37)	1.25 (0.27–5.73)
Smoking	Current smoker	1.70 (0.91–3.17)	1.48 (0.34–6.40)	1.63 (0.79–3.36)
	Current non-smoker	1	1	1
BMI	Normal or below	1	1	1
	Overweight	1.11 (0.61–2.00)	0.66 (0.20–2.13)	1.13 (0.52–2.44)
	Obese	1.26 (0.72–2.22)	1.52 (0.22–10.49)	0.97 (0.42–2.26)

* Adjusted for age, ethnicity, household income adequacy, smoking and BMI.
† Adjusted for ethnicity, education, household income adequacy, smoking and BMI. Respondents' age was used as a covariate and controlled continuously in stratified models.
‡ Boldface indicates a significant difference, $p \leq 0.05$, in comparison to the reference group.
CI=confidence interval; BMI=body mass index.

women aged 15-49 years, as supplement use strongly influences folate status.[20] This allowed us to focus on women exposed only to natural or synthetic food-derived folate.

We found that the majority of Canadian women, 76.4%, have an RBC folate value greater than 906 nmol/L. Univariate analysis identified numerous factors associated with RBC folate <906 nmol/L in non-supplement-consuming women, including age, ethnicity, education, income adequacy, smoking and BMI. Interestingly, we did not observe an association between hyperglycemia risk and folate status. Maternal hyperglycemia and diabetes during pregnancy have been associated with increased risk of NTDs,[21] and it has been suggested that women with these conditions may benefit from high-dose folic acid supplementation.[22] Our data indicate that the folate status of women at risk for hyperglycemia, as indicated by high HbA1c or self-reported diabetes, does not differ from that of women with normal HbA1c or that did not report diabetes; however, it is not clear whether folate metabolism may be altered or folate requirements increased in the diabetic state.

Multivariate logistic regression analysis found that after adjustment for ethnicity, income adequacy, smoking and BMI, only young age (15-19 years), which has previously been associated with increased NTD risk,[23] was significantly associated with lower folate status. Using two age-stratified models, we observed an association between having less than a secondary education and lower folate status among young women aged 15-24. One potential caveat to this finding is that some women in the 15-24 year age group may not have completed secondary school simply because of their younger age. While we controlled for age continuously to mitigate the effect of age on education, this finding may remain difficult to interpret. Among women aged 25-49, we found that lowest household income adequacy was associated with lower folate status, whereas education was not. Low socio-economic status has previously been associated with an increased NTD risk.[23,24] These data indicate that not all women benefit equally from mandatory folic acid fortification and that specific subgroups of women remain at higher risk of lower folate status and NTDs. The different age-associated risk profiles for lower folate status may depend on a number of factors. For instance, there may be fundamental differences in folate requirements or dietary patterns among younger and older women: younger Canadian women score lower on the Healthy Eating Index and are more likely to consume food prepared in fast-food outlets than older Canadian women.[25] In women aged 25-49 years, the association of lowest income adequacy with increased risk of lower folate status suggests that these women are vulnerable to lower folate status despite fortification. They may have a poorer diet resulting in a lower consumption of food that is naturally rich in folate, such as fresh vegetables, or less folic acid enriched foods than women of higher income adequacy. It is known that Canadians with low household income and education have lower scores for the Healthy Eating Index, and fewer of them eat the recommended number of vegetables and fruit.[25] These differences could be due to economic limitations or food insecurity in women with low income adequacy.

The strengths of this study include the nationally representative sample and a population-based sampling strategy. Limitations of the analysis are the lack of reliable estimates for dietary folate intake, low power to detect associations between folate status and some factors and the use of a dichotomous cut-off for assessing folate-dependent NTD risk. While the 906 nmol/L value has been used extensively in the literature to assess NTD risk, it is not a recognized cut-off. Daly et al. demonstrated that women with an RBC folate value of ≥906 mol/L had the lowest NTD risk in their study population.[3] However, the relationship between RBC folate and NTD risk demonstrated a non-linear negative association.[3] The prevalence of folate deficiency among Canadian women is <1%,[26] and >90% have an RBC folate >680 nmol/L,[27] a value that was associated with a ~75% lower NTD risk compared with the NTD risk of women with an RBC value ≤339 nmol/L in the Daly model.[3] Finally, RBC folate values can be assay dependent.[28,29] To date, a

direct comparison between the Immulite assay and the microbiological assay used by Daly et al. has not been published, therefore a correction factor has not been calculated to allow for direct comparisons between data produced by one or the other assay.

CONCLUSIONS

Overall, our data indicate that the association of many socio-demographic and lifestyle factors with lower folate status in the pre-fortification period has been mitigated in a population exposed to folic acid through fortified foods. Nevertheless, nearly 25% of non-supplement-consuming Canadian women have a folate status that may not provide optimal NTD protection, and specific groups of women remain at increased risk of NTDs despite exposure to a fortified food supply. Health Canada and the Public Health Agency of Canada recommend that women who could become pregnant take a daily multivitamin supplement containing 0.4 mg folic acid to decrease their NTD risk. Modelling has shown that folic acid supplement consumption at this dose does not pose a risk of folic acid intakes above the Tolerable Upper Intake Level, in contrast to doses greater than 0.4-0.6 mg.[11,30] It seems prudent to continue to promote this recommendation with the acknowledgement that the Canadian women at increased risk of lower folate status are also those who are less likely to consume folic acid supplements in the periconceptional period.[31-33] Our data present a challenge to public health officials to craft folic acid supplementation recommendations that specifically target these consistently vulnerable groups.

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RÉSUMÉ

OBJECTIF : Appliqué au Canada depuis 1998, l'enrichissement obligatoire en acide folique vise à réduire le risque d'anomalies du tube neural (ATN). Notre objectif était d'évaluer la relation entre les facteurs sociodémographiques et le statut en folates chez les Canadiennes en âge de procréer ne consommant pas de suppléments.

MÉTHODE : Des données sur les facteurs démographiques, les facteurs liés au mode de vie, les indicateurs physiques et la concentration en folates érythrocytaires ont été recueillies auprès de 1 008 femmes de 15 à 49 ans ne consommant pas de suppléments et ayant participé à l'Enquête canadienne sur les mesures de la santé (2007–2009). Un seuil de folates érythrocytaires ≥906 nmol/L a servi à délimiter le statut optimal en folates qui protège contre les ATN.

RÉSULTATS : Environ 75 % des femmes ne consommant pas de suppléments avaient une concentration en folates érythrocytaires ≥906 nmol/L. La jeunesse (15-19 ans), l'ethnicité blanche, le fait d'avoir

moins qu'un diplôme d'études secondaires, la catégorie inférieure de revenu adéquat, le tabagisme et un indice de masse corporelle élevé étaient associés à une prévalence accrue du faible statut en folates. Après correction, seule la jeunesse (rapport de cotes ajusté [RC] 1,99, intervalle de confiance de 95 % [IC] : 1,25–3,18) était associée au faible statut en folates. Le fait d'avoir moins qu'un diplôme d'études secondaires (RC ajusté 5,66, IC de 95 % : 1,10–29,04) et la catégorie inférieure de revenu adéquat (RC ajusté 4,77, IC de 95 % : 1,06–21,49) étaient associés au faible statut en folates chez les femmes de 15 à 24 ans et de 25 à 49 ans, respectivement.

CONCLUSIONS : De nombreux facteurs de risque de faible statut en folates, identifiés avant la mise en œuvre de l'enrichissement des aliments, n'étaient pas associés au statut en folates dans notre échantillon représentatif de Canadiennes ne consommant pas de suppléments. Toutefois, les jeunes femmes, les femmes de 15 à 24 ans n'ayant pas terminé leurs études secondaires et les femmes de 25 à 49 ans dans la catégorie inférieure de revenu adéquat courent encore le risque d'avoir un faible statut en folates, ce qui justifie que l'on continue à promouvoir la supplémentation en acide folique chez les femmes en âge de procréer.

MOTS CLÉS : folates; acide folique; aliments enrichis; anomalies du tube neural; Enquête canadienne sur les mesures de la santé