Household Income, Food Insecurity and Nutrition in Canadian Youth

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ABSTRACT

Objective: The contribution of nutrition to health inequalities is poorly understood, particularly with regard to children. The objective of this study was to examine the influence of income and the conjoint influence of low income and food insecurity on several dietary indicators in a representative sample of Canadian youth.

Methods: We used data from the Canadian Community Health Survey (CCHS) Cycle 2.2, a nationally representative population-based sample, to examine the diets of 8,938 youth aged 9-18 years. A single 24-hour recall was used to collect dietary information. Interviews were conducted in person, and anthropometric measurements were available for 71% of the sample. Estimates of variance were calculated using bootvar with weights specific to the CCHS. Generalized linear models were used to examine the associations between both low income and low-income food insecurity and anthropometric measures, food and nutrient intakes.

Results: Youth from low-income households had lower height percentiles than youth from higher-income households. Low-income girls (but not low-income boys) had a higher prevalence of BMI ≥85th percentile than their higher-income counterparts. Among low-income food-insecure households, there was a higher prevalence of BMI ≥85th percentile in boys than among the food-secure low-income boys. Calcium and vitamin D intakes were lower among boys and girls living in low-income households. Similarly, milk consumption was lower in low-income boys. Low-income food-insecure girls had lower milk intakes and higher intake of sweetened beverages.

Conclusions: We found some evidence of nutritional deprivation among Canadian youth from disadvantaged households. Longer-term indicators of nutritional status such as lower height and greater weight among disadvantaged households were consistent with these findings.

Key words: Children; adolescent; diet; household income; food insecurity

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

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There are important health disparities by income in Canada and the US.[1,2] Disadvantaged children are at greater risk of infant mortality, incidence of death from infectious diseases and accidental deaths.[3] Older youth in disadvantaged settings may be more exposed to smoking, poor diet and sedentary behaviour, contributing to an increased risk of chronic disease in adulthood.[4,5] Moreover, the contribution of these exposures to increased morbidity and mortality appears to be additive,[6] and clustering of risk behaviours is observed among Canadian youth from low-income households.[7] The contribution of diet to an increased risk of chronic disease in youth is not well understood.[8]

Among youth from low-income households, food insecurity may be associated with an additional level of deprivation.[9] Food insecurity is an inability to access, at all times, enough food for an active, healthy life.[10] A recent report from the Canadian Community Health Survey (CCHS, Cycle 2.2) found that teenage girls living in food-insecure households consumed fewer milk products, fruits and vegetables compared to food-secure girls.[9] Because food insecurity is observed in middle-income households,[9,11] the combined effect of low income and food insecurity should be assessed to determine if their association with dietary indicators and anthropometric measurements is additive.

We examined the influence of income and the conjoint influence of low income and food insecurity on several dietary indicators in a representative sample of Canadian youth aged 9-18 years. We chose to examine milk, calcium and vitamin D intakes as they are implicated in bone health in youth, and there is considerable vitamin D deficiency among Canadian youth.[12-14] We studied sweetened beverage consumption because of its association with obesity,[15] and fruit and vegetable consumption, which is associated with numerous health benefits.[16] We also examined longer-term nutritional indicators such as height and overweight status.

METHODS

The CCHS Cycle 2.2 targeted persons of all ages living in private dwellings in Canada's ten provinces. Residents of the three territories, persons living on First Nations reserves or Crown lands, persons living in institutions, and residents of some remote regions were excluded. Our study population included 8,938 youth aged 9-18 years. We excluded pregnant and breastfeeding girls.

Data were collected in person in all months of 2004, using a computer-assisted interviewing method. Interviewers received 3 days of training.

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Twenty-four-hour dietary recalls of participants aged 9-11 years were conducted with the parent/guardian; participants 12 or older provided their own information. Nutrient intakes from food and supplements were reported separately. We used Canada's Food Guide to Healthy Eating[17] to define fruit, vegetable and milk servings (which included soy milk consumed as a beverage, but not as an ingredient in recipes). We created a sweetened beverage variable which included: soft drinks, fruit drinks with <70% fruit juice, sports drinks, sweetened tea and coffee, and hot chocolate. Nutrient intake data were created using Nutrition Survey System with food composition data from the Canadian Nutrient File 2001b. To examine the quality of dietary intake data, estimated energy expenditure was calculated using equations provided by the Institute of Medicine.[18] Energy expended was assessed by asking participants about the frequency and duration of 22 possible physical activities engaged in during the last 3 months. Since no data were collected on intensity from the participants, the lowest metabolic equivalent of each activity was assumed. Energy expenditure was estimated using the frequency, duration and metabolic equivalent of each task (MET) value of the activity.[19] Participants were classified as inactive if their energy expenditure (kcal/kg/day) was $<1.5 \geq 0$, moderately active if $<3.0 \geq 1.5$, and active if $<96 \geq 3.0$.[19] Sedentary activity was measured by asking participants the number of hours in a typical week in the last 3 months that they spent viewing television, using a computer, playing video games and reading. Youth who were sedentary <5 hours/week were assigned a value of 1; those sedentary 5-9 hours/week were assigned a value of 2 and so on. The ratio of energy intake divided by the estimated energy requirements (EI/EER) was compared across income and food-insecure groups to identify differences in reporting of energy intake.

For participants aged ≤17, a parent/guardian provided data on household income and food security. A variable integrating information on total household income and household size was stratified into 4 income groups-low-income was defined as <$20,000 if 3-4 people lived in the household; the highest-income category was defined as ≥$80,000 if ≥3 individuals lived in the household. Household food security was measured using 10 adult-referenced questions and 8 child-referenced questions. Households were categorized into food-secure, food-insecure without hunger, and food-insecure with hunger, at any time in the last 12 months using a coding method adopted by Health Canada.[20] In Canada, the experience of food insecurity is not restricted to the lowest-income households.[11] Therefore, to examine the effect of food insecurity among low-income households, we dichotomized youth from the two lowest-income groups into food-secure or food-insecure groupings; these categories were low income–food secure (LIFS) and low income–food insecure (LIFI). For participants aged ≥12 years, for which data on smoking were available, a dichotomous variable was created differentiating ever- from never-smokers. Height and weight were measured in 71% of the sample. There were no differences in household income or age in youth with and without height and weight measured. Height was measured to the nearest 0.1 cm at maximal inspiration using a measuring tape and triangular level. Weight was measured in light indoor clothing with shoes removed. Body mass index (BMI) was calculated by dividing weight by height squared (kg/m^2). Youth were categorized as overweight if they were ≥85th percentile of BMI for their sex and age using CDC norms.[21]

All analyses used weights specific to the CCHS 2.2 to account for the unequal probabilities of selection resulting from the sample design, non-response, and planned over-sampling of selected subgroups. Bootvar was used to estimate variance for the computation of confidence intervals. Multiple regression using variance estimates from bootvar was used to generate p-values for estimates. For foods and nutrients, the confounding influence of age and height were controlled by including energy intake as an independent variable. We adjusted for age in the regressions to control for its confounding effect in regressions for sedentary behaviour and BMI. All analyses were conducted using SAS version 9.1 (SAS Institute, Inc., Cary, NC).

RESULTS

Comparison of youth from households with different family income levels

A comparison of youth characteristics by household income level indicated that boys from higher-income households were older than low-income boys, whereas this was not the case for girls (Table 1). There were more youth from single-parent households in the low-income groups, and a higher prevalence of overweight among lower-income girls. Youth from lower-income households had lower age- and sex-specific height percentiles than youth from higher-income households. We also found that 9-11 year olds had income-associated height disparities similar to those aged 12-18 years (data not shown). Smoking, reported by those aged ≥12 years, was more prevalent among low-income girls. Sedentary activities were significantly higher among boys from higher-income households.

Higher-income boys had higher mean energy intake, but were significantly older (Table 2). Both boys and girls from high-income households had higher calcium intake than those from low-income households after adjusting for energy intake. Only boys from the highest-income households had a mean calcium intake above the recommended 1,300 mg/day.[22] Dietary vitamin D intakes were lower in low-income boys, but in all income groups the mean daily intake was below 15µg, the daily dietary vitamin D intake recommended by the Institute of Medicine.[22] Vitamin D-fortified milk intake was lower in boys from low-income households. The mean number of fruit and vegetable servings was below the 6-8 servings recommended by the Canadian Food Guide for Healthy Eating in all groups.[17] Girls in the highest-income households had a lower ratio of energy intake to estimated energy expenditure compared to girls in lower-income households, suggesting dietary under-reporting. There was a lower intake of dietary supplements among low-income groups (data not shown).

Comparison of youth from low income–food insecure and low income–food secure households

Since food insecurity is observed in middle-income households,[9] we sought to examine the influence of food insecurity in the two lowest-income groups on nutrient intake and anthropometric measures. The comparison between the LIFS and the LIFI groups supported the findings from the comparison of the low-income groups as there was evidence of greater nutritional deprivation among more disadvantaged groups (Table 3). There was a higher prevalence of youth from single-parent households in the LIFI group, and youth were, on average, younger than those in the LIFS group. Boys from food-insecure households had a higher prevalence of overweight. There was no difference in height percentiles between the two groups. Boys from LIFI households had lower

Table 1. Demographic Characteristics, Height, Weight and Sedentary Behaviour Stratified by Household Income in Youth Aged 9-18 Years, CCHS (n=7378)

Characteristic	(N)	Lowest Income (764)	Low Middle (1533)	Upper Middle (2649)	Highest Income (2432)	P
% Female		51.8 (45.7-57.9)	49.1 (45.1-53.0)	49.2 (46.5-51.9)	46.7 (44.1-49.3)	NS
Mean age, years	Boys	13.0 (12.5-13.5)*	13.1 (12.8-13.3)*	13.3 (13.1-3.5)*	13.4 (13.2-13.6)	0.020
	Girls	13.0 (12.5-13.5)*	13.3 (13.0-13.6)*	13.0 (12.8-3.3)*	13.4 (13.2-13.7)	NS
% of households with post-secondary degree	Boys	49.4 (41.0-57.7)*	57.0 (51.4-62.6)*	72.5 (69.0-76.0)*	86.7 (83.4-90.0)	<0.001
	Girls	47.4 (39.7-55.1)*	62.3 (57.3-67.4)*	72.8 (69.0-76.6)*	85.8 (82.8-88.8)	<0.001
% Food insecure	Boys	34.7 (25.6- 43.8)*	14.3 (9.9-18.6)*	4.1 (2.5-5.7)	2.2 (0.50-3.9)	<0.001
	Girls	30.0 (23.2-38.7)*	9.9 (6.6-13.2)*	3.7 (2.2-5.1)*	0.5 (0.1-0.9)	<0.001
% Single-parent households	Boys	43.8 (35.4-52.1)*	32.9 (27.4-38.3)*	20.0 (16.6-23.3)*	6.7 (4.4-9.0)	<0.001
	Girls	47.6 (39.9-55.2)*	27.8 (23.2-32.3)*	15.4 (12.6-18.3)*	6.2 (4.1-8.2)	<0.001
% Immigrant households	Boys	13.3 (8.2-18.4)	11.1 (7.5-14.5)	7.7 (5.0-11.0)	4.3 (3.9-6.0)	<0.001
	Girls	16.1 (9.9-22.3)	10.5 (7.0-14.1)	5.8 (3.9-7.8)	3.4 (1.9-4.9)	<0.001
Height percentile	Boys	51.4 (45.0-57.9)*	57.9 (54.4-61.3)	56.7 (53.7-59.7)	59.9 (56.7-63.1)	0.047
	Girls	52.3 (47.0-57.6)	47.8 (44.0-51.7)*	55.6 (52.3-58.9)	58.0 (54.8-61.3)	0.001
% ≥85th percentile of BMI†	Boys	30.9 (20.5-41.3)	31.0 (24.9-37.2)	33.7 (28.6-38.8)*	26.6 (21.7-31.6)	NS
	Girls	31.9 (22.9-40.9)	27.8 (21.2-34.4)	29.5 (25.1-33.9)*	21.5 (17.0-26.0)	0.031
Sedentary behaviour scale†	Boys	2.7 (2.2-3.2)*	3.1 (2.8-3.5)	3.5 (3.2-3.8)	3.3 (3.0-3.6)	0.012
	Girls	2.5 (2.0-2.9)	2.7 (2.3-3.0)	2.6 (2.4-2.8)	2.9 (2.7-3.5)	NS
% Ever smoked‡	Boys	14.5 (10.2-18.8)	12.7 (9.8-15.6)	13.0 (10.9-15.1)	10.5 (8.6-12.5)	NS
	Girls	21.3 (16.3-26.3)	15.5 (12.4-18.6)	14.0 (11.7-16.3)	11.3 (9.1-13.5)	0.039

Values in cells are means (95% confidence interval); P-values represent a trend in income; NS=not significant.
* p<0.05 with high-income group as the referent category.
† Adjusted for age in regression.
‡ Smoking is not measured in participants <12 years of age.

Table 2. Foods and Nutrients of Public Health Importance Stratified by Household Income in 9-18 Year Olds, CCHS 2.2 (n=7378)

	(N)	Lowest Income (764)	Low Middle (1533)	Upper Middle (2649)	Highest Income (2432)	P
Total calories	Boys	2490 (2333-2647)*	2660 (2526-2794)	2592 (2500-2685)*	2778 (2662-2893)	0.013
	Girls	2115 (1983-2247)	2087 (1979-2195)	2088 (2015-2162)*	2013 (1955-2071)	NS
Fruit/vegetable servings	Boys	5.0 (4.0-6.0)	5.4 (4.7-6.2)	5.3 (4.7-5.9)	5.1 (4.7-5.6)	NS
	Girls	4.7 (3.9-5.5)	5.6 (4.5-6.6)	5.4 (4.9-5.9)	5.6 (5.1-6.1)	NS
Sweetened beverage servings	Boys	1.9 (1.5-2.3)	1.6 (1.4-1.9)	1.9 (1.7-2.0)	1.8 (1.6-2.0)	NS
	Girls	1.3 (1.0-1.6)	1.4 (1.2-1.5)	1.3 (1.2-1.4)	1.1 (1.0-1.2)	NS
Milk servings	Boys	1.3 (1.1-1.5)*	1.4 (1.3-1.6)	1.5 (1.4-1.7)	1.8 (1.6-1.9)	0.001
	Girls	1.1 (0.9-1.3)	1.1 (0.9-1.3)	1.1 (1.0-1.2)	1.2 (1.1-1.3)	NS
Vitamin D (µg)	Boys	6.4 (5.6-7.2)	7.3 (6.6-8.0)	6.9 (6.5-7.3)	8.0 (7.5-8.5)	0.026
	Girls	5.3 (4.6-6.0)	5.5 (4.7-6.3)	5.3 (5.0-5.7)	5.7 (5.2-6.2)	NS
Calcium (mg)	Boys	1145 (1010-1281)	1200 (1119-1282)*	1203 (1143-1263)	1374 (1306-1443)	0.005
	Girls	914 (828-1001)*	920 (838-1002)*	967 (919-1015)	1014 (951-1077)	<0.001
Fibre (grams)	Boys	17.1 (15.7-18.5)	17.0 (15.8-18.2)	16.9 (16.1-17.8)	17.7 (16.9- 18.5)	NS
	Girls	14.4 (13.0-15.8)	14.4 (13.5-15.3)	14.4 (13.7-15.1)	14.7 (14.0-15.3)	NS
Saturated fat (% of energy)†	Boys	10.1 (9.6-10.7)*	11.1 (10.6-11.7)	10.6 (10.3-10.9)	11.1 (10.7-11.4)	NS
	Girls	10.1 (9.5-10.8)	10.6 (10.1-11.0)	10.4 (10.0-10.8)	10.6 (10.3-11.0)	NS
Energy intake/estimated energy expenditure†	Boys	0.93 (0.83-1.04)	0.97 (0.91-1.03)	0.91 (0.87-0.96)	0.98 (0.93-1.02)	NS
	Girls	1.01 (0.93-1.09)	1.03 (0.95-1.1)*	1.03 (0.98-1.07)*	0.95 (0.90-0.99)	0.042

Values in cells are means (95% confidence interval); P-values represent a trend in income after adjusting for energy intake; NS=not significant.
* p<0.05 with high-income group as the referent category.
† Not adjusted for energy intake.

mean hours of sedentary behaviour than boys from LIFS households. There was no difference in smoking prevalence between the two food-security low-income groups.

We found that mean dietary vitamin D intakes were lower in LIFI girls than in LIFS girls. But both LIFS and LIFI girls had mean daily vitamin D intake below the recommended 15µg/ (Table 4). LIFI girls had both lower milk consumption and a higher intake of sweetened beverage than LIFS girls. There was a non-significant trend toward less fruit and vegetable consumption among LIFI boys, reaching a mean of 4 servings/day in this group; the mean intakes in all groups were well below the recommended 6-8 servings.[17]

DISCUSSION

Our analysis of nutritional indicators in the CCHS indicated a clear socio-economic gradient in calcium intake. Consistent with this, milk consumption was low in low-income compared to higher-income youth. Our results on measured height and BMI support the nutrient intake findings: height was lower in low-income boys and girls, and low-income girls and LIFI boys had a higher prevalence of overweight. Smoking was more prevalent among the girls from low-income households. Collectively, these results suggest that, among Canadian youth, exposures associated with a higher risk of chronic disease tend to be more prevalent in disadvantaged households. Our results are comparable to work in the US showing that nutrition likely has a modest contribution to health inequalities in youth.[23,24]

Among youth from low-income and LIFI households, we found that the chosen dietary indicators were worse than higher-income and LIFS households, respectively. For example, milk intake was lower in LIFI girls but sweetened beverage consumption was higher. This was consistent with other work in the CCHS 2.2 which showed lower milk consumption among 14-18 year-old girls from food-insecure compared to food-secure households.[9] The observation of greater sweetened beverage intake among disadvantaged youth is supported by NHANES (1999-2004) which showed that sweetened beverage intake was higher in youth living below the poverty line.[25] We found that calcium and vitamin D intakes were lower in youth from low-income and LIFI households, likely

Table 3. Demographic Characteristics, Height, Weight and Sedentary Behaviour Stratified by Household Food Security Status Among the Two Lowest-income Groups in Youth Aged 9-18, CCHS (n=2280)

Characteristic	(N)	Food-secure and Low-income (1818)	Food-insecure and Low-income (462)	P
Female (%)		50.9 (47.5-54.4)	45.0 (37.4-52.7)	NS
Age (years)	Boy	13.3 (13.0-13.5)	12.1 (11.6-12.6)	<0.001
	Girl	13.2 (13.0-13.5)	12.9 (12.3-13.5)	NS
% of households with post-secondary degree	Boy	56.3 (51.3-61.2)	59.1 (54.3-64.0)	NS
	Girl	48.6 (38.1-59.2)	50.6 (41.2-60.0)	NS
% Single-parent households	Boy	32.5 (27.6-37.5)	51.1 (40.2-61.9)	0.002
	Girl	31.2 (26.6-35.9)	49.9 (40.2-61.9)	<0.001
% Immigrant household	Boys	13.6 (10.3-16.9)	4.5 (1.2-7.7)	0.003
	Girl	12.5 (9.0-16.0)	12.4 (4.7-20.2)	NS
Height percentile	Boy	54.8 (51.4-58.2)	60.0 (52.3-67.7)	NS
	Girl	49.6 (46.1-53.2)	49.1 (42.7-55.5)	NS
≥85th percentile of BMI†	Boy	27.1 (21.8-32.4)	45.0 (31.1-58.9)	0.034
	Girl	30.0 (24.0-36.1)	26.8 (17.0-36.7)	NS
Sedentary behaviour scale†	Boy	3.0 (2.7-3.3)	2.8 (2.2-3.5)	0.038
	Girl	2.6 (2.3-2.9)	2.4 (1.9-2.9)	NS
% Ever smoked‡	Boy	9.1 (6.2-11.9)	6.6 (2.9-10.3)	NS
	Girl	12.0 (8.4-15.6)	6.8 (2.9-10.6)	NS

Values in cells are means (95% confidence interval); P-values represent the association of food insecurity among individuals in the two lowest-income groups; NS=Not significant.
† Adjusted for age in regression.
‡ Smoking not measured in participants <12 years old.

Table 4. Nutrients and Foods of Public Health Importance by Strata of Food Security in Participants Aged 9-18 Years, CCHS (n=2280)

Characteristic	(N)	Food-secure and Low-income (1818)	Food-insecure and Low-income (462)	P
Total calories	Boy	2611 (2494-2728)	2581 (2332-2830)	NS
	Girl	2091 (1996-2185)	2143 (1990-2297)	NS
Fruit/vegetable servings	Boy	5.6 (4.8-6.3)	4.4 (3.1-5.6)	NS
	Girl	5.4 (4.5-6.3)	4.7 (3.6-5.9)	NS
Sweetened beverage servings	Boy	1.8 (1.6-2.0)	1.5 (1.1-1.9)	NS
	Girl	1.3 (1.1-1.4)	1.7 (1.3-2.0)	0.032
Milk servings	Boy	1.4 (1.3-1.6)	1.3 (1.0-1.5)	NS
	Girl	1.2 (1.0-1.3)	0.8 (0.6-0.9)	<0.001
Vitamin D from food (µg)	Boy	7.1 (6.5-7.8)	6.5 (5.4-7.6)	NS
	Girl	5.6 (4.9-6.3)	4.7 (4.0-5.3)	0.008
Calcium (mg)	Boy	1181 (1107-1256)	1187 (1003-1370)	NS
	Girl	932 (859-1004)	874 (774-973)	NS
Fibre (grams)	Boy	17.1 (16.0-18.2)	16.6 (14.5-18.7)	NS
	Girl	14.6 (13.8-15.4)	13.9 (12.4-15.5)	NS
Saturated fat (% of energy)†	Boy	10.8 (10.4-11.2)	11.1 (9.8-12.3)	NS
	Girl	10.4 (10.0-10.9)	10.4 (9.7-11.1)	NS
Energy intake/estimated energy expenditure†	Boy	0.95 (0.89-1.00)	1.0 (0.86-1.13)	NS
	Girl	1.00 (0.95-1.08)	1.06 (0.96-1.16)	NS

Values in cells are means (95% confidence interval); P-values represent the association between food insecurity and nutritional indicators among individuals in the two lowest-income groups after adjusting for energy intake; NS=not significant.
† Not adjusted for energy intake in regression analysis.

because milk intake is highly correlated with these nutrients.[26] Consistent with this, both US and Canadian studies have shown that serum vitamin D levels are lower among low-income youth,[12,27] and that vitamin D deficiency is relatively common in Canadian youth, particularly at the end of winter and beginning of spring.[12,13] Although much of our vitamin D comes from sunlight, Canadians are dependent on vitamin D from food and supplements to maintain vitamin D levels in winter. These were both lower in less-advantaged youth. Among LIFI boys, there was a non-significant trend toward lower fruit and vegetable consumption compared to that in low income–food secure households. Among boys aged 9-18 years in the CCHS 2.2, food insecurity alone was not associated with lower fruit and vegetable consumption.[9]

Our data suggest that food insecurity has a limited independent effect on dietary quality in low-income households. A similar comparison was made between low income–food insecure and low income–food secure households in 0-17 year-old US youth using the Continuing Survey of Food Intake (1994-1996). This study found that dietary differences were limited to lower consumption of nuts, seeds and dark green leafy vegetables in the low income–food insecure group.[24] In Canada, income subsidies to low-income households, such as the Universal Child Care Benefit and the Canadian Child Tax Benefit, may have shielded low-income and food-insecure households from greater nutritional deprivation by reducing the extent of chronic poverty. Nonetheless, public health campaigns to improve dietary choices among disadvantaged households may still be unsuccessful due to budgetary constraints.[28]

We found evidence that low income was associated with lower height in youth of both sexes. Youth from LIFI households did not have lower height percentiles compared to their food-secure counterparts. Similar results have been reported in 15-year-old youth in Northern Ireland, where there was a 3 cm height difference between those whose parents had manual and those whose parents had non-manual occupations.[29] We also found that 9-11 year-old youth had income-associated height disparities similar to 12-18 year olds, suggesting that height differences are likely established

before puberty. Approximately 80% of income-associated height differences are established early, during the period of rapid postnatal growth.[30] Thus the height differences reported here are likely due to nutritional and/or psychosocial exposures in the first two years of life.[31]

As shown by our data and others,[26,32] the association between income and obesity is complex. We found that low household income was associated with a higher prevalence of obesity in girls. As low-income women are widely reported to be at increased risk of being overweight,[33] our results suggest that the relationship between low income and overweight in women may be established early. The relationship between low income and overweight in men is less consistent.[34] In our data, there was a non-significant trend of increased overweight in boys from lower-income households. The reasons for the inconsistency in the relationship between overweight and low socio-economic status across sexes are not well understood. Boys from LIFI households had a higher prevalence of obesity than LIFS boys. Among the food-insecure families, there was a tendency for there to be more boys, the boys were significantly more overweight, and they tended to be taller. As these data are cross-sectional, it may be that the greater caloric intake of larger boys may challenge low-income households in terms of maintaining dietary adequacy. This finding is supported by a qualitative study which showed that even with two incomes, the large appetite of growing children makes it difficult to maintain a balanced budget.[35]

Study limitations include that the sampling frame did not capture hard-to-reach populations such as street youth, who experience higher levels of socio-economic[36] and nutritional vulnerability.[37] There is a high degree of intra-individual variability in single dietary 24-hour recalls.[38] A single 24-hour recall, however, can be used to accurately assess the mean dietary intake of groups of individuals, although there is likely some attenuation of the effects observed due to misclassification. There was likely dietary under-reporting in the highest-income girls. Dietary under-reporting is common in youth, particularly youth who are concerned with body image.[39] Consistent with this, girls in the highest-income households (who also likely under-reported their energy intake) had the lowest prevalence of overweight. Thus, although these girls may under-report unhealthy food choices like sweetened beverages, the effect of these food choices on the anthropometric measures was not evident. Finally, as this study is cross-sectional, we cannot establish the causality between low income, food insecurity and height or obesity.

To conclude, using a representative sample of Canadian youth, we found evidence that girls in low-income households and boys in food-insecure households had higher levels of overweight. Both boys and girls in low-income households had lower height percentiles than those in high-income households. We also found evidence that milk may be partially replaced by less costly sweetened beverages. Consistent with this, calcium and vitamin D intakes were lower in low-income youth, and there was some evidence of this among youth in LIFI households.

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RÉSUMÉ

Objectif : Le faible statut socioéconomique est associé à une moins bonne santé à tous les âges au Canada. Le rôle de la nutrition dans les inégalités en santé est mal compris, surtout chez les enfants. Nous avons cherché à examiner l'influence du revenu et l'influence conjointe du faible revenu et de l'insécurité alimentaire sur plusieurs indicateurs alimentaires au sein d'un échantillon représentatif de jeunes Canadiens.

Méthode : Nous avons utilisé les données du cycle 2.2 de l'Enquête sur la santé dans les collectivités canadiennes (ESCC), un échantillon représentatif de la population du pays, pour examiner le régime alimentaire de 8 938 jeunes de 9 à 18 ans. L'information sur le régime a été recueillie à l'aide d'une feuille de rappel des aliments ingérés pendant les 24 dernières heures. Les entretiens ont eu lieu en personne, et des mesures anthropométriques ont pu être prises sur 71 % de l'échantillon. Les estimations de la variance ont été calculées à l'aide du programme Bootvar avec des pondérations propres à l'ESCC. Des modèles linéaires généralisés ont servi à examiner les associations entre le faible revenu, et l'insécurité alimentaire combinée au faible revenu, et les mesures anthropométriques, les aliments ingérés et les apports en nutriments.

Résultats : Les jeunes des ménages à faible revenu se situaient dans des centiles de taille inférieurs à ceux des jeunes de ménages à revenu élevé. Les filles des ménages à faible revenu (mais pas les garçons) présentaient une plus forte prévalence d'IMC ≥85^{e} centile que les filles des ménages à revenu élevé. Dans les ménages à faible revenu souffrant d'insécurité alimentaire, il y avait une plus forte prévalence d'IMC ≥85^{e} centile chez les garçons que dans les ménages à faible revenu sans insécurité alimentaire. Les apports en calcium et en vitamine D étaient plus faibles chez les garçons et les filles vivant au sein de ménages à faible revenu. De même, la consommation de lait était inférieure chez les garçons des ménages à faible revenu. Les filles des ménages à faible revenu vivant une insécurité alimentaire consommaient proportionnellement moins de lait et plus de boissons édulcorées.

Conclusion : Dans un échantillon représentatif, nous avons trouvé des indices de défavorisation nutritionnelle chez les jeunes Canadiens vivant dans des ménages défavorisés. Les indicateurs à plus long terme de l'état nutritionnel, comme la taille inférieure et le poids supérieur dans les ménages défavorisés, étaient conformes à ces constatations.

Mots clés : enfant; adolescent; régime alimentaire; revenu du ménage; insécurité alimentaire