Supplementary material: Aktary ML et al. Impact of a farmers' market healthy food subsidy on the diet quality of adults with low incomes in British Columbia, Canada: a pragmatic randomized controlled trial

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Supplementary methods

Deviations from study protocol

FMNCP sample size calculation

Our original sample size was based on our power calculation to detect a 5.0-point difference in

Healthy Eating Index-2015 (HEI-2015) scores with 90% power, assuming a type I error of 5%,

an attrition rate of 30% by 16 weeks post-intervention, and a variance inflation factor of 25%.

This calculation indicated that our required sample size was n=400. However, following more

extensive statistical consultation it appeared that a variance inflation factor of 10% was more

appropriate and that 80% power was sufficient. Therefore, we recalculated the sample size

assuming a type I error of 5%, a variance inflation factor of 10%, and an attrition rate of 30% by

16 weeks post-intervention, to detect a 5.0-point difference in HEI-2015 scores with 80% power,

which yielded a required sample size of n=264 participants.

Eligibility criteria

Pregnant and/or breastfeeding females were initially ineligible to participate in the study due to

variations in diet quality throughout stages of pregnancy and breastfeeding and their expected

low representation among Farmers' Market Nutrition Coupon Program (FMNCP) participants,

risking imbalances between intervention groups. Adults < 55 years who lived alone were initially

deemed ineligible as they are currently excluded from the existing FMNCP. However, to

augment participation rates, pregnant and breastfeeding females and adults < 55 years who lived

alone were later included in the study. To ensure balance between groups, pregnancy and

breastfeeding were used as blocking variables in the randomization.

Linear mixed effects models

Linear mixed effects models were initially planned to include geographic location (urban, rural) as a random effect; however, this variable should not be considered as random and was instead included in the models as a fixed effect.

A significant p-value for interaction terms was initially set at 0.10; however, given that the interaction term is the main effect in the primary analysis, the more commonly accepted p-value of 0.05 was used to indicate statistical significance to avoid type I errors.

Dose-response analysis

Dose-response analyses for number of coupons redeemed and nutrition skill-building activities attended were planned; however, due to lack of data on participant-specific coupon distribution and redemption and potentially unreliable data pertaining to participation in nutrition skill-building activities, these analyses were not conducted. However, given that there was low attendance to the nutrition skill-building activities and little variability in intervention dose (i.e., 85.0% of coupons were distributed, with 99.1% of coupons redeemed), a dose-response analysis would unlikely provide additional information on potential program impacts.

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Supplementary results

Supplementary Tables 1 to 3 describe the frequency of shopping and purchasing food at

farmers' markets among participants in the FMNCP and control groups at post-intervention.

Supplementary Table 1: Frequency of purchasing food in farmers' markets at post-intervention (using coupons or money) (n=285)

	FMNCP (n = 143)	Control (n = 142)
	n (%)	n (%)
Never	5 (3.7)	60 (46.2)
Less than once per month	6 (4.4)	11 (8.5)
Once or twice per month	38 (27.7)	27 (20.8)
One per week	76 (55.5)	18 (13.9)
More than once per week	9 (6.6)	4 (3.1)

FMNCP, Farmers' Market Nutrition Coupon Program

Supplementary Table 2: Frequency of money spent at farmers' markets at post-intervention (excluding coupons) (n=189)

	FMNCP (n = 129)[a]	Control (n = 60)[a]
	n (%)	n (%)
Never	43 (33.3)	6 (10.0)
Less than once per month	21 (16.3)	12 (20.0)
Once or twice per month	36 (27.9)	22 (36.7)
One per week	23 (17.8)	15 (25.0)
More than once per week	3 (3.1)	4 (6.7)

[a]Includes only participants who reported purchasing foods from farmers' markets.
FMNCP, Farmers' Market Nutrition Coupon Program

Supplementary Table 3: Amount of money spent at most recent farmers' market visit (excluding coupons) (n=137)

	FMNCP (n = 84)[a]	Control (n = 53)[a]
	n (%)	n (%)
$1 - $5	17 (20.2)	2 (3.8)
$6 - $10	25 (29.8)	9 (17.0)
$11 - $19	26 (31.0)	25 (47.2)
$20 or more	14 (16.7)	14 (26.4)

[a]Includes only participants who reported spending money at farmers' markets.
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Supplementary Table 4 presents estimates of participant characteristics associated with study

dropout and missing Healthy Eating Index-2015 scores.

Supplementary Table 4: Participant characteristics associated with study dropout and missing Healthy Eating Index-2015 scores

Variable	Dropout		Missing HEI-2015 scores	
	OR (95% CI)	p	OR (95% CI)	p
Group				
Control (reference)	-	-	-	-
FMNCP	0.60 (0.17, 2.13)	0.43	0.43 (0.13, 1.36)	0.15
Sex				
Male (reference)	-	-	-	-
Female	4.80 (0.41, 55.84)	0.21	2.01 (0.31, 13.01)	0.46
Age (years)	0.94 (0.86, 1.03)	0.16	0.96 (0.90, 1.04)	0.34
Children living in the home	2.32 (0.27, 19.74)	0.44	1.55 (0.27, 8.76)	0.62
Educational attainment				
High school diploma or less (reference)	-	-	-	-
Some post-secondary or trade	2.66 (0.51,13.86)	0.25	1.45 (0.37, 5.63)	0.59
Bachelor's degree	0.24 (0.01, 6.55)	0.40	0.14 (0.01, 2.33)	0.17
Graduate degree	8.28 (0.61, 113.33)	0.11	5.10 (0.69, 37.58)	0.11
Other	1.00		1.00	
BMI (kg/m^2)	1.09 (0.96, 1.24)	0.20	1.08 (0.97, 1.21)	0.16
Number of household members				
Single person (reference)	-	-	-	-
2 to 4 people	0.68 (0.04,11.97)	0.79	1.10 (0.09, 14.20)	0.94
5 to 8 people	2.59 (0.06, 118.70)	0.62	4.06 (0.14, 114.15)	0.41
Marital Status				
Married or common-law (reference)	-	-	-	-
Divorced	4.22 (0.29, 62.28)	0.29	2.68 (0.24, 30.42)	0.43
Separated	1.18 (0.11, 13.08)	0.89	2.93 (0.42, 20.30)	0.28
Single	1.63 (0.25, 10.49)	0.61	1.05 (0.20, 5.60)	0.95
Widowed	135.25 (3.37, 5427.25)	**0.01**	83.61 (2.58, 2711.78)	**0.01**
Race/ethnicity				
White (reference)	-	-	-	-
Black	1.00		1.00	
East and Southeast Asian	1.26 (0.14, 11.57)	0.84	1.16 (0.16, 8.49)	0.89
South and West Asian	3.24 (0.33, 31.31)	0.31	3.85 (0.61, 24.15)	0.15
Indigenous	0.41 (0.05, 3.25)	0.40	0.51 (0.08, 3.31)	0.48
Other	20.88 (0.53, 823.92)	0.11	5.03 (0.22, 117.52)	0.31
Self-reported physical health				
Poor (reference)	-	-	-	-
fair	0.69 (0.03, 14.07)	0.81	2.97 (0.18, 48.43)	0.44
good	0.40 (0.02, 8.89)	0.56	2.85 (0.19, 43.68)	0.45
very good	0.24 (0.00, 11.15)	0.46	2.32 (0.10, 51.41)	0.60
excellent	0.62 (0.01, 32.04)	0.81	11.65 (0.39, 345.79)	0.16
Smoking				
Not at all (reference)	-	-	-	-
Occasionally (less than once per day)	12.11 (1.16, 126.22)	**0.04**	4.28 (0.61, 30.16)	0.14
Daily	0.78 (0.08, 8.11)	0.84	0.79 (0.10, 6.30)	0.82
Years lived in Canada	1.08 (1.00, 1.15)	**0.04**	1.07 (1.01, 1.13)	**0.03**
Annual household income				
Less than $20,000 (reference)	-	-	-	-
$20,000 to $39,999	0.66 (0.14, 3.04)	0.59	0.70 (0.18, 2.73)	0.61
$40,000 to $59,999	1.04 (0.15, 7.04)	0.97	0.74 (0.13, 4.08)	0.73

More than $60,000	0.07 (0.00, 2.17)	0.13	0.24 (0.02, 2.60)	0.24
Income source				
Employment (reference)	-	-	-	-
Private retirement or investment income	0.25 (0.01, 8.51)	0.44	0.11 (0.00, 3.36)	0.21
Seniors' income from government	1.00		1.00	
Social assistance	0.10 (0.01, 0.83)	**0.03**	0.12 (0.02, 0.90)	**0.04**
Other or none	0.05 (0.00, 0.82)	**0.04**	0.75 (0.15, 3.68)	0.73
Constant	0.01 (0.00, 9.04)	0.17	0.00 (0.00, 0.90)	0.05

Note: Analyses were conducted using logistic regression models, adjusting for baseline values of covariates. Bold font indicates statistically significant differences ($p<0.05$).

FMNCP, Farmers' Market Nutrition Coupon Program; HEI-2015, Healthy Eating Index-2015; OR, odds ratio

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Supplementary Table 5 presents variables from unadjusted and fully adjusted linear mixed

effects models examining differences in HEI-2015 total scores between the FMNCP and control

group at post-intervention and 16 weeks post-intervention. Results from subgroup analyses by

age group and sex are presented in **Supplementary Table 6.**

Supplementary Table 5: Unadjusted and adjusted models examining differences in Healthy Eating Index-2015 scores between the FMNCP and control groups at post-intervention and 16 weeks post-intervention (n=285)

Variable	Unadjusted model		Adjusted model	
	β (95% CI)	p	β (95% CI)	p
Group				
Control (reference)	-	-	-	-
FMNCP	-0.31 (-3.70, 3.07)	0.86	1.58 (-1.88, 5.05)	0.37
Time				
Baseline (reference)	-	-	-	-
Post-intervention	2.44 (-0.03, 4.92)	0.05	2.34 (-0.46, 5.14)	0.10
16 weeks post-intervention	-0.05 (-2.59, 2.49)	0.97	-0.55 (-3.53, 2.43)	0.72
Group x time				
Control x baseline (reference)	-	-	-	-
FMNCP x post-intervention	-0.73 (-4.18, 2.71)	0.68	-0.07 (-4.07, 3.93)	0.97
FMNCP x 16 weeks post-intervention	-0.36 (-3.90, 3.18)	0.84	1.22 (-3.00, 5.44)	0.57
Sex				
Male (reference)			-	-
Female			4.65 (0.21, 9.08)	**0.04**
Age (years)			0.31 (0.19, 0.43)	**<0.01**
BMI (kg/m^2)			-0.07 (-0.32, 0.19)	0.60
Children living in the home			4.80 (0.75, 8.85)	**0.02**
Educational attainment				
High school diploma or less (reference)			-	-
Some post-secondary or trade			-3.04 (-6.39, 0.32)	0.08
Bachelor's degree			0.97 (-3.26, 5.20)	0.65
Graduate degree			0.82 (-3.59, 5.23)	0.72
Other			-4.33 (-24.94, 16.28)	0.68
Marital Status				
Married or common-law (reference)			-	-
Divorced			-7.96 (-13.48, -2.44)	**0.01**
Separated			-4.61 (-9.83, 0.62)	0.08
Single (never married)			-2.57 (-6.58, 1.44)	0.21
Widowed			-7.83 (-14.02, -1.63)	**0.01**
Race/ethnicity				
White (reference)			-	-
Black			3.28 (-4.05, 10.61)	0.38
East or southeast Asian			-1.26 (-6.18, 3.66)	0.62
South or west Asian			8.60 (4.56, 12.63)	**<0.01**
Indigenous			-7.34 (-12.94, -1.73)	**0.01**
Other			-0.31 (-7.49, 6.86)	0.93
Self-reported physical health				
Poor (reference)			-	-
Fair			3.26 (-2.87, 9.40)	0.30
Good			5.46 (-0.31, 11.23)	0.06
Very good			3.17 (-3.01, 9.35)	0.32

Excellent		10.95 (2.25, 19.65)	**0.01**
Smoking			
Not at all (reference)		-	-
Occasionally (less than once per day)		-4.75 (-10.95, 1.44)	0.13
Daily		-1.01 (-6.86, 4.85)	0.74
Geography			
Rural (reference)		-	-
Urban		-2.48 (-6.60, 1.63)	0.24
Day of data collection			
Both recalls weekend (reference)		-	-
Weekend/weekday		1.05 (-3.95, 6.04)	0.68
Both recalls weekdays		3.40 (-1.60, 8.40)	0.18
Number of household members			
Single person (reference)		-	-
2 to 4 people		-5.77 (-10.91, -0.64)	**0.03**
5 to 8 people		-4.25 (-10.98, 2.47)	0.22
Pregnant		5.06 (-4.22, 14.34)	0.29
Breastfeeding		3.50 (-1.90, 8.90)	0.20
Constant	60.37 (57.98, 62.77)	41.21 (26.30, 56.13)	**<0.01**
SD (time)	-	2.15 (0.41, 11.12)	**-**
SD (constant)	10.44 (9.33, 11.69)	6.50 (4.52, 9.36)	**-**
Corr (time, constant)	-	-0.02 (-0.85, 0.84)	**-**
SD (Residual)	10.19 (9.58, 10.83)	9.90 (8.93, 10.96)	**-**

Note: Linear mixed effects models included group, time, and a group by time interaction as fixed effects. Random effects included repeated measures within participants, and a random slope for time using an unstructured covariance matrix. Baseline values of covariates were included in the adjusted models. Bold font indicates statistically significant differences (p<0.05).
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Supplementary Table 6: Differences in Healthy Eating Index-2015 scores between the FMNCP and control groups at post-intervention and 16 weeks post-intervention by age group and sex (n=285)

	Post-intervention		16 weeks post-intervention	
	β (95% CI)	p	β (95% CI)	p
Age group				
18-59 years (FMNCP n=112, Control n=115)	-1.04 (-5.65, 3.57)	0.66	-0.05 (-4.76, 4.66)	0.99
60+ years (FMNCP n=31, Control n=27)	3.28 (-4.36, 10.93)	0.40	3.66 (-5.48, 12.80)	0.43
Sex				
Males (FMNCP n=13, Control n=14)	-4.07 (-14.05, 5.92)	0.43	6.25 (-9.13, 21.63)	0.43
Females (FMNCP n=130, Control n=128)	0.45 (-3.75, 4.66)	0.83	1.09 (-3.23, 5.41)	0.62

Note: Linear mixed effects models included group, time, and a group by time interaction as fixed effects. Random effects included repeated measures within participants, and a random slope for time using an unstructured covariance matrix. Models adjusted for baseline age (sex-stratified model only), sex (age group-stratified model only), pregnancy, breastfeeding, geographic location, highest educational level, race/ethnicity, marital status, body mass index, smoking status, perceived physical health, number of household members, children living in the home, and the day on which the dietary recalls were completed.
FMNCP, Farmers' Market Nutrition Coupon Program

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Supplementary Table 7 presents results from the sensitivity analyses. Missing HEI-2015 scores were imputed using multiple imputation with chained equations under a missing at random assumption, with 15 imputations performed (37). The ratio of reported total energy intake to predicted total energy expenditure was included in the models as a continuous variable to adjust for dietary intake misreporting (38). Per-protocol and as-treated analyses examined the extent to which contamination of the intervention groups may have affected study outcomes. The per-protocol analysis included participants who adhered to their group allocation (i.e., participants in the FMNCP group who reported receiving coupons (n=139) and participants in the control group who reported not receiving coupons (n=116)). In an additional per-protocol analysis, we considered coupon receipt and nutrition skill-building attendance. This analysis included participants in the FMNCP group who reported receiving coupons (n=139) and participants in the control group who reported not receiving coupons nor attending nutrition skill-building activities (n=97). This per-protocol analysis did not exclude participants in the FMNCP group who did not attend nutrition skill-building activities, as attendance is not a requirement in the existing FMNCP. In the as-treated analysis, participants were analysed according to the intervention actually received (i.e., participants who received coupons were analysed as part of the FMNCP group (n=165) and participants who did not receive coupons were analysed as part of the control group (n=120)). Participation in nutrition skill-building was not considered because our aim was to assess the FMNCP as delivered, and in the existing FMNCP, nutrition skill-building activities are not a requirement of program participation. Finally, a sensitivity analysis was conducted whereby participants who completed 24-hour dietary recalls 2 weeks or more after farmers' market closures were excluded.

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Supplementary Table 7: Differences in mean Healthy Eating Index-2015 scores between the FMNCP and control groups at post-intervention and 16 weeks post-intervention: results from sensitivity analyses

Sensitivity analysis	Post-intervention		16 weeks post-intervention	
	β (95% CI)	p	β (95% CI)	p
Multiple imputation (n=285)[1, 2]	0.73 (-3.06, 4.53)	0.70	0.30 (-3.72, 4.32)	0.88
Adjusted for misreporting (n=234)[1, 3]	0.12 (-4.04, 4.27)	0.96	2.48 (-1.91, 6.87)	0.27
Per-protocol analysis: coupon receipt (n=255)[1, 4]	-0.45 (-4.63, 3.73)	0.83	-0.01 (-4.35, 4.33)	0.99
Per-protocol analysis: coupon receipt and nutrition skill-building (n=236)[1, 4, 5]	1.48 (-2.86, 5.83)	0.50	1.27 (-2.95, 5.50)	0.55
As-treated analysis (n=285)[1, 6]	0.40 (-3.71, 4.51)	0.85	1.23 (-2.99, 5.45)	0.57
24-hour dietary recalls completed ≥2 weeks after farmers' market closure excluded (n=257)	-0.14 (-4.37, 4.09)	0.95	1.40 (-3.06, 5.85)	0.54

[1]Linear mixed effects models included group, time, and a group by time interaction as fixed effects. Random effects included repeated measures within participants, and a random slope for time using an unstructured covariance matrix. Models adjusted for sex, pregnancy, breastfeeding, geographic location, age, highest educational level, race/ethnicity, marital status, body mass index (BMI), smoking status, perceived physical health, number of household members, children living in the home, and the day on which the dietary recalls were completed.

[2]Missing Healthy Eating Index-2015 scores were imputed using multiple imputation with chained equations under a missing at random assumption. Fifteen imputations were performed.

[3]The ratio of reported total energy intake to predicted total energy expenditure was included in the models as a continuous variable to adjust for dietary intake misreporting.

[4]Only participants who adhered to their group allocation considering coupon receipt only (i.e., participants in the FMNCP group who reported receiving coupons and participants in the control group who reported not receiving coupons).

[5]Only participants who adhered to their group allocation considering coupon receipt and attendance to nutrition skill-building activities (i.e., participants in the FMNCP group who reported receiving coupons and participants in the control group who reported that they did not receive coupons nor attend nutrition skill-building activities).

[6]Participants were analyzed according to the intervention actually received.

FMNCP, Farmers' Market Nutrition Coupon Program