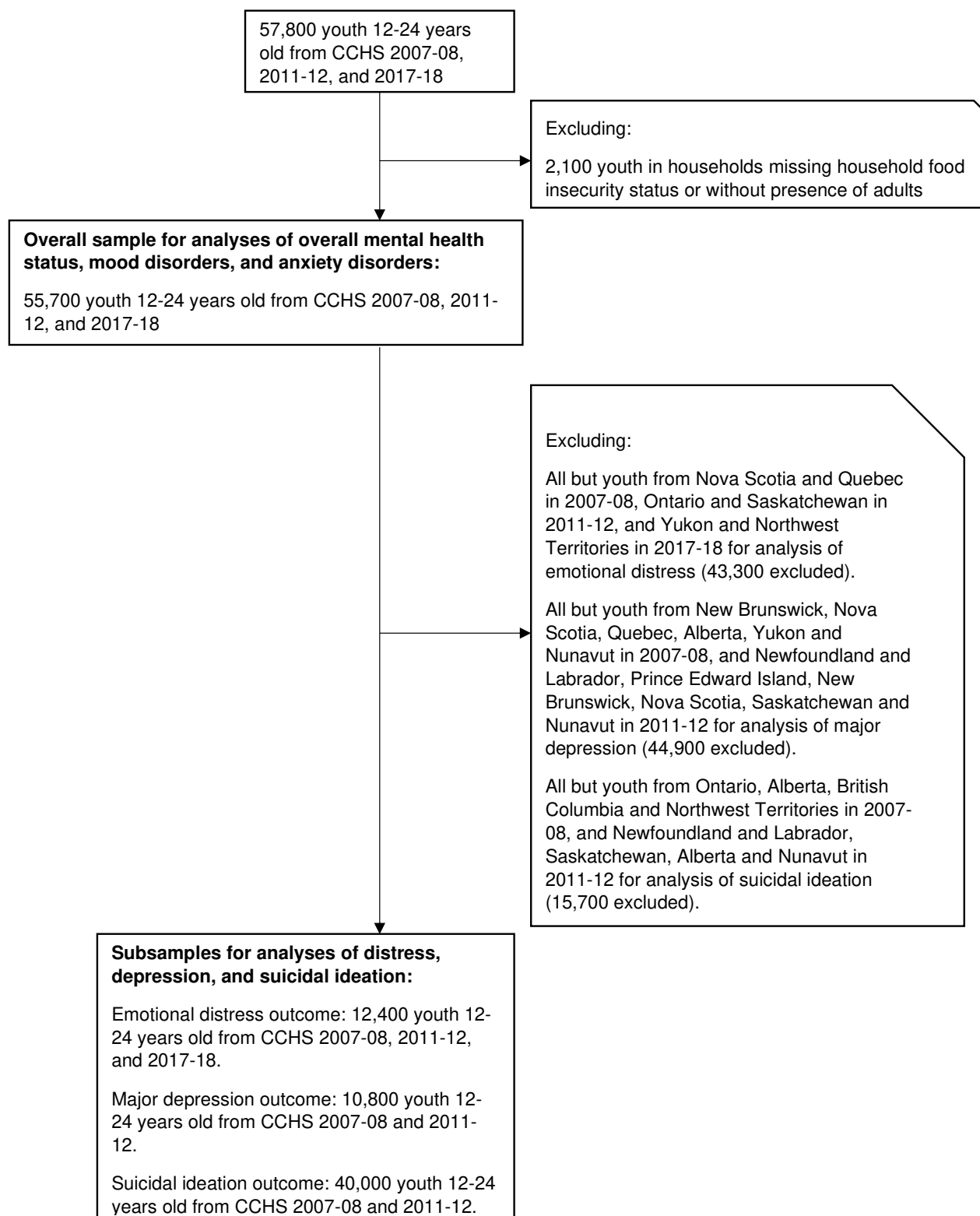
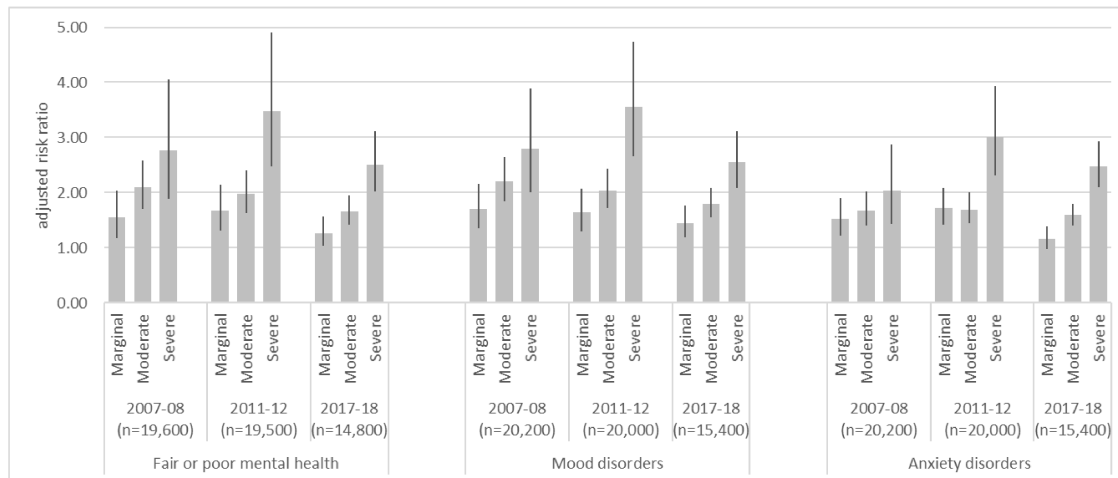


Supplement

eFigure 1. Sample selection process



eFigure 2. Poorer mental health associated with food insecurity similarly across CCHS cycles 2007-08, 2011-12, and 2017-18 for Canadian youth 12-24 years old



eTable 1. Jurisdictions that opted in for the distress, depression, and suicidal ideation measurements in the past CCHS cycles

	NL	PE	NB	NS	QC	ON	SK	MB	AB	BC	YT	NW	NU
Distress													
2007-08				X	X								
2011-12						X	X						
2017-18											X	X	
Depression													
2007-08			X	X	X				X		X		X
2011-12	X	X	X	X			X						X
2017-18													
Suicidal ideation													
2007-08						X			X	X		X	
2011-12	X						X		X				X
2017-18													

Note: "X" denotes opt-in of the measurement by the jurisdiction in a CCHS cycle. Kessler 10-item, 40 points max: Well if 0-9, Mild if 10-14, Moderate 15-24, Severe 25-40. "At least mild distress" if score surpasses 9. No data in 2015-16. Kessler "6-item K-6 distress" if score surpasses 5 (out of 24 total). Measured by 8-item WHO CIDI-SF depression scale, major depressive episodes if scale>4; major depression if scale>2; any depressive symptom if scale>0. PHQ-9 0-27-point scale available in 2017-18, but only applied in PE and NW (N=394). "Suicidal ideation" if had thought of committing suicide in the past 12 months. No data existed in depression or suicidal ideation in 2017-18. NL=Newfoundland and Labrador; PE=Prince Edward Island; NB=New Brunswick; NS=Nova Scotia; QC=Quebec; ON=Ontario; SK=Saskatchewan; MB=Manitoba; AB=Alberta; BC=British Columbia; YT=Yukon; NW=Northwest Territories; NU=Nunavut.

eTable 2. Operational details of outcome variables

Variable	Type	Coding
Mental health status	Dichotomous	Coded 1 if self-rated fair or poor mental health (versus excellent/very good/good).
Mood disorders	Dichotomous	Coded 1 if self-reported clinically diagnosed mood disorder such as depression, bipolar disorder, mania, or dysthymia.
Anxiety disorders	Dichotomous	Coded 1 if self-reported clinically diagnosed anxiety disorder such as phobia, obsessive-compulsive disorder, or panic disorder
Emotional distress	Dichotomous	Measured by 10-item Kessler Psychological Distress Scale. Respondents score 0-4 on each of the ten questions depending on the frequency of distressful feelings in the past 30 days ranging from none (0) to all of the time (4). The total score ranges from 0 to 40. A score of 10 or above is coded 1, indicating possible mental disorder whether it is mild, moderate, or severe. We also experimented with taking log of the total score (to correct for right skewness) and use the continuous variable in an OLS model.
Major depression	Dichotomous	Measured by WHO's CIDI-SF for major depression. Respondents are screened for whether they have either felt depressive or lost interest in most things that usually give them pleasure most of the day almost every day for 2 weeks or more in a row in the past 12 months. Affirmative answer to either screener will classify the respondent as "having any depressive symptom". Follow-up questions ask about "feeling tired", "weight gain or loss", "trouble falling asleep", "trouble concentrating", "feeling down on yourself", and "thoughts about death". Three affirmative answers with at least one on screeners qualify the person as a "probable case of depression". Five affirmative answers with at least one on screeners qualify the person as having "major depressive episodes". We also used the number of affirmative answers as a count variable and fitted it in a Poisson model.
Suicidal ideation	Dichotomous	Coded 1 if ever seriously considered committing suicide or taking your own life in the past 12 months.

eTable 3. Food insecurity level, based on CCHS 18-item questionnaire

Status	Measurement	Interpretation
Food-secure	Affirmed no item on either the 10-item adult food security scale or 8-item child food security scale	No report of income-related problems of food access.
Marginally food-insecure	Affirmed no more than 1 item on either scale	Some indication of worry or an income-related barrier to adequate, secure food access.
Moderately food-insecure	Affirmed 2 to 5 items on the adult scale or 2 to 4 items on the child scale	Compromise in quality and/or quantity of food consumed by adults and/or children due to a lack of money for food.
Severely food-insecure	Affirmed more than 5 items on the adult scale or more than 4 items on the child scale	Disrupted eating patterns and reduced food intake among adults and/or children

eTable 4. Poorer mental health outcomes among Canadian youth 12-24 years old independently associated with household food insecurity

	Fair or poor mental health	Mood disorders	Anxiety disorders	Emotional distress	Major depression	Suicidal ideation
Food-secure (reference)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)
Marginally food-insecure	1.46**** (1.28 - 1.68)	1.57**** (1.38 - 1.78)	1.41**** (1.26 - 1.58)	1.61**** (1.40 - 1.84)	1.49** (1.14 - 1.95)	1.77** (1.21 - 2.60)
Moderately food-insecure	1.89**** (1.70 - 2.09)	2.00**** (1.81 - 2.19)	1.65**** (1.51 - 1.80)	1.64**** (1.46 - 1.84)	1.96**** (1.59 - 2.40)	2.44**** (1.83 - 3.26)
Severely food-insecure	2.82**** (2.39 - 3.32)	2.89**** (2.49 - 3.35)	2.58**** (2.27 - 2.94)	2.26**** (1.83 - 2.78)	2.56**** (1.73 - 3.79)	6.49**** (4.34 - 9.71)
Male (reference)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)
Female	1.37**** (1.28 - 1.48)	1.71**** (1.59 - 1.83)	1.66**** (1.56 - 1.76)	1.52**** (1.41 - 1.63)	2.16**** (1.87 - 2.51)	1.36** (1.12 - 1.65)
Age (years)	1.08**** (1.07 - 1.09)	1.12**** (1.11 - 1.13)	1.06**** (1.05 - 1.07)	1.03**** (1.02 - 1.04)	1.09**** (1.07 - 1.11)	1.12**** (1.09 - 1.14)
White (reference)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)
Black	0.78+ (0.60 - 1.02)	0.42**** (0.30 - 0.59)	0.36**** (0.26 - 0.49)	0.96 (0.76 - 1.21)	1.00 (0.55 - 1.84)	0.83 (0.41 - 1.69)
Indigenous	1.13+ (1.00 - 1.27)	1.19** (1.07 - 1.33)	1.26**** (1.15 - 1.38)	1.20** (1.05 - 1.37)	1.22 (0.95 - 1.56)	1.32+ (0.98 - 1.77)
Other ethnicities	0.87* (0.78 - 0.98)	0.52**** (0.46 - 0.59)	0.49**** (0.44 - 0.55)	0.87* (0.76 - 0.99)	1.04 (0.76 - 1.43)	0.80 (0.56 - 1.13)
Missing	1.09 (0.82 - 1.45)	1.10 (0.84 - 1.44)	0.98 (0.78 - 1.22)	0.88 (0.64 - 1.22)	0.56 (0.24 - 1.31)	1.45 (0.66 - 3.20)
Household income (\$10,000 in 2018 Canadian dollar)	0.99*** (0.98 - 1.00)	0.99*** (0.98 - 0.99)	0.99* (0.99 - 1.00)	0.99* (0.98 - 1.00)	1.00 (0.99 - 1.01)	1.00 (0.98 - 1.02)
Income imputed by Statistics Canada	1.09* (1.00 - 1.19)	1.08+ (1.00 - 1.17)	0.93* (0.86 - 0.99)	1.07+ (0.99 - 1.15)	1.00 (0.86 - 1.15)	1.16 (0.95 - 1.43)
High school incomplete	1.03 (0.86 - 1.24)	1.10 (0.94 - 1.27)	1.08 (0.94 - 1.24)	1.23* (1.01 - 1.48)	1.29 (0.91 - 1.83)	0.73 (0.44 - 1.21)
High school graduate (reference)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)
Some college	1.33** (1.11 - 1.60)	1.11 (0.94 - 1.31)	1.14+ (0.98 - 1.33)	1.23* (1.03 - 1.47)	1.14 (0.81 - 1.60)	1.17 (0.79 - 1.72)
Bachelor's degree	1.00 (0.90 - 1.11)	0.89* (0.81 - 0.97)	0.98 (0.90 - 1.06)	1.06 (0.93 - 1.20)	1.27* (1.00 - 1.60)	0.83 (0.62 - 1.11)
Education status missing	1.25**	1.04	1.14*	1.19*	1.63***	1.18

	(1.08 - 1.45)	(0.91 - 1.19)	(1.01 - 1.28)	(1.03 - 1.39)	(1.24 - 2.13)	(0.84 - 1.66)
Renter (reference)	1.00	1.00	1.00	1.00	1.00	1.00
	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)
Homeowner	0.99	0.96	0.97	0.96	0.96	1.23
	(0.90 - 1.08)	(0.88 - 1.05)	(0.90 - 1.04)	(0.87 - 1.05)	(0.80 - 1.15)	(0.95 - 1.58)
Missing	0.65+	0.73	0.73	0.98	1.58	0.58
	(0.39 - 1.07)	(0.45 - 1.19)	(0.50 - 1.07)	(0.58 - 1.65)	(0.76 - 3.29)	(0.08 - 4.30)
Married with children (reference)	1.00	1.00	1.00	1.00	1.00	1.00
	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)
Married without children	1.01	1.06	1.12+	0.89	0.74+	0.87
	(0.86 - 1.19)	(0.92 - 1.22)	(0.99 - 1.27)	(0.74 - 1.06)	(0.54 - 1.02)	(0.55 - 1.37)
Lone parents	1.31****	1.39****	1.32****	1.16**	1.42***	1.38*
	(1.19 - 1.44)	(1.27 - 1.52)	(1.22 - 1.42)	(1.06 - 1.28)	(1.19 - 1.70)	(1.07 - 1.78)
Individuals and other types	1.24***	1.21***	1.13*	1.04	1.28*	1.44*
	(1.10 - 1.39)	(1.08 - 1.36)	(1.02 - 1.26)	(0.91 - 1.20)	(1.02 - 1.60)	(1.06 - 1.96)
Missing	1.29	1.50*	1.36+	1.33+	0.74	0.77
	(0.82 - 2.03)	(1.00 - 2.25)	(0.96 - 1.92)	(0.95 - 1.86)	(0.25 - 2.21)	(0.19 - 3.15)
Ontario (reference)	1.00	1.00	1.00	1.00		1.00
	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)		(1.00 - 1.00)
British Columbia	1.02	0.91+	0.91*			0.73+
	(0.91 - 1.14)	(0.81 - 1.02)	(0.82 - 1.00)			(0.53 - 1.01)
Quebec	0.57****	0.40****	0.68****	1.33****	1.00	0.00****
	(0.51 - 0.65)	(0.36 - 0.46)	(0.62 - 0.74)	(1.22 - 1.45)	(1.00 - 1.00)	(0.00 - 0.00)
Alberta	0.96	1.01	0.91*		2.16****	2.01****
	(0.85 - 1.08)	(0.90 - 1.12)	(0.82 - 1.00)		(1.76 - 2.65)	(1.58 - 2.54)
Saskatchewan	0.85*	0.81**	0.73****	1.13+	1.07	1.10
	(0.71 - 1.00)	(0.70 - 0.94)	(0.63 - 0.84)	(0.99 - 1.29)	(0.74 - 1.53)	(0.77 - 1.55)
Manitoba	0.96	0.77***	0.87*			0.00****
	(0.83 - 1.12)	(0.66 - 0.89)	(0.77 - 0.99)			(0.00 - 0.00)
Newfoundland and Labrador	0.95	0.83+	0.88		1.71**	0.76
	(0.77 - 1.17)	(0.69 - 1.01)	(0.75 - 1.04)		(1.18 - 2.48)	(0.43 - 1.35)
Maritime provinces	0.97	0.84**	1.01	1.10	1.63****	0.00****
	(0.85 - 1.10)	(0.74 - 0.94)	(0.91 - 1.11)	(0.94 - 1.29)	(1.29 - 2.06)	(0.00 - 0.00)
Territories	0.82*	0.49****	0.46****	1.55****	0.95	0.67
	(0.67 - 1.00)	(0.39 - 0.61)	(0.37 - 0.56)	(1.28 - 1.87)	(0.61 - 1.47)	(0.40 - 1.10)
CCHS 2007-2008	0.82****	0.86***	0.76****	1.00	0.84	2.25****
	(0.75 - 0.90)	(0.79 - 0.94)	(0.71 - 0.83)	(1.00 - 1.00)	(0.67 - 1.04)	(1.82 - 2.79)
CCHS 2011-2012 (reference)	1.00	1.00	1.00	1.00	1.00	1.00
	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)	(1.00 - 1.00)
CCHS 2017-2018	2.06****	1.72****	1.84****	1.00		
	(1.88 - 2.25)	(1.58 - 1.88)	(1.71 - 1.97)	(1.00 - 1.00)		
<i>N</i>	53,900	55,600	55,600	12,400	10,800	40,000

Notes: Adjusted relative risk estimated with robust standard errors. 95% confidence interval shown in parentheses. **** p<0.0001, *** p<0.001, ** p<0.01, * p<0.05, + p<0.1. All models adjusted for food insecurity status, sex, age, race-ethnicity, income, income imputation, household highest education, homeownership, household type, jurisdiction, and CCHS cycle.

eTable 5. Sensitivity tests on exclusion of outliers and modifications to outcomes

	Dropped Nunavut from sample			Changed thresholds of outcomes			Logged outcomes	
	Fair or poor mental health	Mood disorders	Anxiety disorders	Moderate+ distress (15-40)	Any depressive symptom (1-8)	Major depression (3-8)	Log (distress score)	Log (depression probability)
Food security (reference)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Marginal FI	1.43	1.57	1.41	2.05	1.50	1.47	0.45	0.44
LB	1.25	1.39	1.26	1.63	1.20	1.17	0.34	0.17
UB	1.65	1.79	1.57	2.57	1.86	1.85	0.56	0.70
Moderate FI	1.90	2.00	1.68	2.10	1.81	1.79	0.39	0.72
LB	1.71	1.82	1.54	1.74	1.52	1.50	0.29	0.47
UB	2.11	2.21	1.83	2.54	2.14	2.14	0.48	0.96
Severe FI	2.92	3.03	2.71	3.32	2.33	2.29	0.80	1.12
LB	2.48	2.62	2.38	2.36	1.67	1.62	0.58	0.50
UB	3.45	3.51	3.08	4.67	3.24	3.25	1.03	1.74
<i>N</i>	<i>53400</i>	<i>55000</i>	<i>55000</i>	<i>12400</i>	<i>10800</i>	<i>10800</i>	<i>11000</i>	<i>10800</i>

Notes: FI = food insecurity. LB = lower bound of 95% confidence interval. UB = upper bound of 95% confidence interval. Linear models were applied on the two logged outcomes while Poisson models were applied on the other six outcomes. All models adjusted for food insecurity status, sex, age, race-ethnicity, income, income imputation, household highest education, homeownership, household type, jurisdiction, and CCHS cycle.

eTable 6. Conditional predicted probability of mental health problems by food insecurity status based on adjusted Poisson models: overall sample and age, gender, and CCHS cycle subsamples

	Food insecurity status			
	Secure	Marginally insecure	Moderately insecure	Severely insecure
Panel A. Fair or poor mental health				
Overall (n=53,900)	0.046	0.068	0.087	0.130
12-17 years old (n=27,700)	0.036	0.045	0.052	0.062
18-24 years old (n=26,200)	0.056	0.092	0.128	0.211
Male (n=26,800)	0.038	0.066	0.070	0.118
Female (n=27,200)	0.054	0.071	0.103	0.145
CCHS 2007-08 (n=19,600)	0.032	0.050	0.068	0.089
CCHS 2011-12 (n=19,500)	0.038	0.064	0.076	0.134
CCHS 2017-18 (n=14,800)	0.075	0.095	0.124	0.188
Panel B. Mood disorders				
Overall (n=55,600)	0.048	0.076	0.096	0.139
12-17 years old (n=28,900)	0.031	0.046	0.052	0.076
18-24 years old (n=26,700)	0.067	0.107	0.145	0.206
Male (n=27,800)	0.033	0.061	0.072	0.110
Female (n=27,800)	0.063	0.091	0.120	0.170
CCHS 2007-08 (n=20,200)	0.038	0.065	0.084	0.107
CCHS 2011-12 (n=20,000)	0.043	0.070	0.087	0.152
CCHS 2017-18 (n=15,400)	0.068	0.099	0.122	0.173
Panel C. Anxiety disorders				
Overall (n=55,600)	0.069	0.098	0.114	0.178
12-17 years old (n=28,900)	0.056	0.072	0.081	0.132
18-24 years old (n=26,700)	0.083	0.125	0.150	0.228
Male (n=27,800)	0.051	0.071	0.082	0.138
Female (n=27,800)	0.087	0.124	0.145	0.219
CCHS 2007-08 (n=20,200)	0.049	0.074	0.082	0.099
CCHS 2011-12 (n=20,000)	0.060	0.103	0.101	0.180
CCHS 2017-18 (n=15,400)	0.108	0.126	0.172	0.268
Panel D. Optional outcomes, overall				
Emotional distress (n=12,400)	0.173	0.277	0.283	0.390
Major depression (n=10,800)	0.062	0.092	0.121	0.158
Suicidal ideation (n=40,000)	0.008	0.015	0.021	0.054

Note: Regressions and probabilities were estimated only on the overall samples for the optional outcomes in Panel D. Probabilities of food-insecure youth were higher than those of food-secure youth at $p < 0.05$ for all outcomes except for the "fair or poor mental health" and "anxiety disorders" outcomes among marginally food-insecure youth from CCHS 2017-18.