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Money speaks: Reductions in severe food insecurity follow the Canada Child Benefit

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ABSTRACT

Food insecurity is a pervasive public health problem in high income countries, disproportionately affecting households with children. Though it has been strongly linked with socioeconomic status and investments in social protection programs, less is known about its sensitivity to specific policy interventions, particularly among families. We implemented a difference-in-difference (DID) design to assess whether Canadian households with children experienced reductions in food insecurity compared to those without following the roll-out of a new country-wide income transfer program: the Canada Child Benefit (CCB). Data were derived from the 2015–2018 cycles of Canadian Community Health Survey. We used multinomial logistic regressions to test the association between CCB and food insecurity among three samples: households reporting any income (N = 41,455), the median income or less (N = 18,191) and the Low Income Measure (LIM) or less (N = 7579). The prevalence and severity of food insecurity increased with economic vulnerability, and were both consistently higher among households with children. However, they also experienced significantly greater drops in the likelihood of experiencing severe food insecurity following CCB; most dramatically among those reporting the LIM or less (DID: −4.7%, 95% CI: −8.6, −0.7). These results suggest that CCB disproportionately benefited families most susceptible to food insecurity. Furthermore, our findings also indicate that food insecurity may be impacted by even modest changes to economic circumstance, speaking to the potential of income transfers to help people meet their basic needs.

1. Introduction

The increasing prevalence and rising demands for food charity have helped to highlight the pervasiveness of food insecurity across high-income countries (Tarasuk et al., 2018; Foodbank Australia, 2018; Loopstra et al., 2019). Defined as the inadequate or insecure access to food due to financial constraint, food insecurity affects roughly 10% of their populace, although rates vary markedly between nations (Smith et al., 2017). In Canada, over 12% of households, nearly 40% of which have children, experience food insecurity (Tarasuk et al., 2018). Its individual and collective impacts are substantial.

Among children, exposure is associated with impaired development and increased risk of chronic physical and mental health problems (Burke et al., 2016; Shankar et al., 2017; Gundersen and Ziliak, 2015; Kirkpatrick et al., 2010; McIntyre et al., 2013). Food insecure adults report higher rates of multiple chronic conditions and poor disease management, compromising quality of life and longevity (Gundersen and Ziliak, 2015; Tarasuk et al., 2013; Jessiman-Perreault and McIntyre, 2017; Berkowitz et al., 2019; Aibibula et al., 2016; Gregory and Coleman-Jensen, 2017; Gundersen et al., 2018), and increasing healthcare utilization and costs (Gundersen and Ziliak, 2015; Tarasuk et al., 2013; Jessiman-Perreault and McIntyre, 2017; Berkowitz et al., 2019; Aibibula et al., 2016; Gregory and Coleman-Jensen, 2017; Gundersen et al., 2018; Tarasuk et al., 2015; Berkowitz et al., 2018). The relationship between household food insecurity and health is graded, with more severe food insecurity associated with higher likelihood of negative health outcomes (Burke et al., 2016; Tarasuk et al., 2013; Jessiman-Perreault and McIntyre, 2017).

Food insecurity is tightly linked to socioeconomic vulnerability (Loopstra et al., 2019; Smith et al., 2017; Tarasuk et al., 2019a), and there is considerable evidence of its sensitivity to public policy interventions that affect household resources (Loopstra, 2018). Strong investments in social protection programs appeared to insulate some European countries from rises in food insecurity during the Great

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Recession (Loopstra et al., 2016), and recent studies suggest that food insecurity in the United Kingdom has increased with cuts to social welfare spending (Loopstra et al., 2019; Loopstra, 2018).

In Canada, several studies have provided indications of improvements in food security among population subgroups in tandem with income-based interventions (Tarasuk et al., 2019b; Li et al., 2016; Ionescu-Ittu et al., 2015; Loopstra et al., 2015; McIntyre et al., 2016). However, our understanding of the policies needed to promote food security at a population level remains fragmented, constrained by the limited scope and generalizability of existing research. Due in no small part to its strong history of national monitoring, the majority of domestic policy assessments come from the United States, where the Supplemental Nutrition Assistance Program in particular has been extensively evaluated (Gregory et al., 2015). Yet, extrapolations to other policy contexts are limited due to the restricted and uniquely food-focused nature of United States' programs. The paucity of deliberate policy evaluations from more traditional welfare states prohibits a thorough examination of which social protections may be most relevant to the persistence – or alleviation – of food insecurity, and in turn, how their impact could be optimized within and across other countries.

Recent changes to Canada's child assistance policy have created an opportunity to assess how food security functions relative to changes in a direct income transfer program. In July 2016, the federal government replaced the Child Tax Benefit and Universal Child Care Benefit with a more generous, income-tested program: the Canada Child Benefit (CCB) (Department of Finance Canada, 2017). During its first year of implementation, CCB issued an average of $6800 to eligible families, approximately $2300 more than its predecessors (Department of Finance Canada, 2017). This analysis uses an intent-to-treat, difference-in-difference (DID) design to assess whether Canadian households with children experienced reductions in the prevalence and severity of food insecurity following its roll-out.

2. Methods

2.1. Policy intervention

CCB provides tax-free financial assistance to households with children under 18 (Department of Finance Canada, 2017). All primary caregivers meeting specified income requirements and who classify as Canadian residents for tax purposes are eligible to apply (Canada Revenue Agency, 2019). Household benefit amount is determined by adjusted net income, as well as the age(s) and number of children. From July 2016–June 2018, beneficiaries received a maximum of $6400 per child under 6, and $5400 per child between 6 and 17 (Department of Finance Canada, 2017). Graduated phase-outs were applied to incomes greater than $30,000 and $60,000, respectively, so that households with incomes up to $249,737 were eligible (Jacks, 2016). Details are described in Appendix A. During the first year of implementation, a quarter of beneficiaries had incomes under $30,000, a quarter between $30,000-60,000, and half greater than $60,000 (Office of the Parliamentary Budget Officer, 2016).

2.2. Data source

Data were derived from the 2015–2018 cycles of the Canadian Community Health Survey (CCHS). CCHS is an annual cross-sectional survey administered by Statistics Canada. Its multi-stage sampling frame aims to capture 97% of Canadians over the age of 12, excluding full-time members of the Canadian Armed Forces, individuals living on First Nation Reserves or in institutions, and two remote regions of Quebec (Statistics Canada, 2018). Participants over 18 receive household weights to generate a representative sample (Statistics Canada, 2018).

2.3. Study sample

Our sample included any potentially eligible – and childless, but otherwise comparable – households with full food security data and household level survey weights. Exchangeability between treatment and control groups is not vital for DIDs (Gertler et al., 2011), but increasing their similarities reduces the likelihood that the they experience differential trends leading up to and throughout the course of the study. Respondents that reported retirement or pension savings as their main source of household income, were 65 years of age or older and either living alone or with just a spouse were excluded, as they were unlikely to be eligible for or comparable to households receiving CCB. We also omitted respondents who emigrated within the past two years (due to CCB's residency requirements) and/or were under 18 years old (due to absence of household-level survey weights). We lacked the data to determine eligibility and subsequently exclude households based on adjusted net income, as CCHS reports only a pre-tax income variable that combines market earnings with government transfers (e.g., CCB). Nevertheless, CCB's eligibility thresholds exceed the vast majority of Canadian household incomes (Statistics Canada, 2019a), so it is unlikely our sample is populated with many financially-ineligible families. Eight provinces had 2015–2018 food security data available at the time of this analysis; we limited our sample to these jurisdictions.

The full sample contained 41,455 households. However, we were also interested in whether CCB would have differential impacts at lower income thresholds, and generated two subsamples reporting income at or below the pre-tax national median (N = 18,191) and income at or below the pre-tax Low-Income Measure (LIM), i.e., half of the national median (N = 7579), respectively.

2.4. Outcome

Food security over the past 12 months was measured using an adapted version of the United States Department of Agriculture's 18-item Household Food Security Survey Module (HFSSM) (Economic Research Service, United States Department of Agriculture, 2012). Ten items correspond to adults' food security, eight to children's. Applying Health Canada's classification scheme (Health Canada, 2007), we grouped responses into one of four categories based on each household's raw score: food secure, marginally food insecure, moderately food insecure, or severely food insecure. This cross-classification method accounts for the different number of items and conditions used to categorize households with and without children, enabling comparisons to be made between the two groups (Nord and Coleman-Jensen, 2014). However, to determine whether basing household status on responses to the 10-item adult subscale would influence our results, we conducted analyses using this revised classification as well.

2.5. Exposure

We constructed four treatment groups defined by presence of children (age < 18) in the household and the timing of participants' interviews relative to CCB's implementation. Households with children were considered “treated” and those without, “controls.” Participants interviewed during the year leading up to CCB (July 2015–June 2016) were “unexposed” to the policy; those interviewed post-implementation (July 2017–June 2018) were “exposed.” Given HFSSM's annual measurement window, we chose to exclude July 2016–June 2017 from our exposure period to eliminate potential carryover effects from the previous programs.

2.6. Study design

DIDs estimate policy impacts by comparing changes in an outcome among a “treated” population to those among a “control” population, before and after implementation (Gertler et al., 2011). They are

Table 1
Standardized mean and proportional differences of covariates among households with children (C) and without children (NC), within three subpopulations.

	Any income		≤Median income		≤LIM	
	NC	C	NC	C	NC	C
IPTW weights						
Education	< 0.1	< 0.1	< 0.1	< 0.1	< 0.15*	z < 0.1
Household composition	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
[Respondent] Black or Aboriginal	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
[Respondent] immigrant	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Income from wages/salaries	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Owns home	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Received social assistance	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Province	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.15*
Children five or under	–	< 0.1	–	< 0.1	–	< 0.1
Children six or older	–	< 0.1	–	< 0.1	–	< 0.1
Month of interview	< 0.15*	< 0.1	< 0.15*	< 0.15*	< 0.2*	< 0.2*
Urban	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
IPTW weights combined with household-level survey weights						
Education	< 0.1	< 0.1	< 0.1	< 0.1	< 0.15*	< 0.1
Household composition	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
[Respondent] Black or Aboriginal	< 0.1	< 0.1	< 0.1	< 0.1	< 0.15*	< 0.1
[Respondent] immigrant	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Income from wages/salaries	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Owns home	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Received social assistance	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Province	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.15*
Children five or under	–	< 0.1	–	< 0.1	–	< 0.1
Children six or older	–	< 0.1	–	< 0.1	–	< 0.1
Month of interview	< 0.15*	< 0.1	< 0.15*	< 0.15*	< 0.2*	< 0.2*
Urban	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

* At least one category within covariate has standardized proportion > 0.1.

especially useful in observational settings, as DIDs do not require treatment groups to experience the same pre-intervention conditions – only the same outcome trends (Gertler et al., 2011). While this has made DIDs an attractive option for researchers, additional assumptions must be upheld for them to produce valid estimates (Gertler et al., 2011; Dimick and Ryan, 2014). Notably, these include observing parallel trends in the outcome variable between treatment groups leading up to the policy's implementation and the absence of differential shocks (Dimick and Ryan, 2014).

Due to limited data availability, we assessed food security trends in a modified sample population leading up to our study period. We also reviewed financial shocks, and federal as well as provincial-level assistance adjustments made just before and after implementation of the CCB. To our knowledge, there were no changes to provincial family policies, and none of the overall fiscal trends had the potential to influence food security on a national level as dramatically as CCB (Glowacki, 2016; Statistics Canada, 2019b; Battle, 2015). Even if fiscal trends were more influential than anticipated, we would not expect them to differentially impact food security among households with and without children.

2.7. Accounting for confounding

Using four distinct groups to approximate two populations introduces additional variability to traditional cohort-based DID studies. Consequentially, it cannot be assumed that time invariant differences will cancel out (Warton et al., 2010) without statistical intervention. To achieve balance within our treated and control populations and further boost comparability between them, we constructed a directed acyclic graph (Appendix B) informed by prior research (Tarasuk et al., 2019a; Loopstra and Tarasuk, 2013) to determine which factors may influence eligibility and/or uptake of CCB as well as food security: province, living in an urban vs. rural setting, household composition (including the number of children over and under six years of age), and sociodemographic variables. In the absence of household level data, we used respondents' immigration status and Black or Aboriginal racial identity to serve as proxies. Because we could not disentangle the CCB benefit amount from other income sources, including reported income in our models would have adjusted away the effects of CCB. Instead, we accounted for other components of socioeconomic status: reliance on wages or salaries for income and home ownership as indicators of financial security, maximum educational attainment as an indicator of social mobility, and receipt of any social assistance as an indicator of extreme economic disadvantage.

2.8. Statistical analysis

2.8.1. IPTW

We employed modified inverse probability of treatment weights (IPTW) (Rosenbaum, 1987) to ensure that the composition of key characteristics within our treatment groups remained stable across the study period. To accomplish this, we first calculated propensity scores using household-weighted (Ridgeway et al., 2015) logistic regressions, incorporating the aforementioned covariates for households with and without children, within each analytical subgroup. As well, the month participants were interviewed was included to balance potential micro-temporal variations that could influence food security reporting. "Unexposed" households were set as the reference for both models; IPTWs corresponded to the inverse of each household's probability of belonging to this group (Rosenbaum, 1987). To gauge their success at promoting exchangeability, we assessed standardized mean and proportional differences for each covariate included in our models (Table 1). Differences > 0.2 indicate imbalance (Stuart, 2010); covariates for all households fell within this threshold.

IPTWs ranges were similar among households with and without children, spanning from about 1.5 to 5, 1.5 to 6, and 1.5 to 8 among households reporting any income, the median income or less, and the LIM or less, respectively (Statistics Canada prohibits the release of exact minimums and maximums). We multiplied all IPTWs by their corresponding household-level survey weight to permit simultaneous

weighting in our DID models (DuGoff et al., 2014).

2.8.2. Regression models

To calculate the DIDs, we ran multivariate, multinomial logistic regressions within each subpopulation. We applied the combination weights and adjusted for the same covariates included in our propensity models to account for potential residual confounding (Abadie and Imbens, 2007) and elements of between group variation. Instead of presenting the ratios of relative risk ratios produced by multinomial regressions, we ran post-estimation marginal effects to obtain more interpretable results, yielding the difference in the predicted probabilities of experiencing each food security category between households with and without children, before and after CCB. Standard errors were estimated using 1000 bootstrap replicate weights.

2.8.3. Missing data

Approximately 5.5% of households were missing values for at least one covariate ($N = 2431$), with no discernable patterns or apparent relation to food security. Given that the missing data appeared to pose minimal bias, we ultimately ran complete case analyses.

This project was conducted using Stata-15 (College Station, TX) and approved by the Office of Research Ethics at the University of Toronto.

3. Results

3.1. Parallel trends

All food insecurity trends ran fairly parallel leading up to our study period, with some small fluctuations in marginal and severe food insecurity (Fig. 1). We identified no significant differences in the changes in any category between treated and control groups, either by year or over time. Details can be found in Appendix C.

3.2. Full sample: descriptive statistics, predicted probabilities

The majority of our participants were Canadian born, home owners, reported wages or salaries as their main source of income, did not receive financial assistance or identify as black or aboriginal, and had at least some post-secondary education (Table 2). There was some variation in the distribution of covariates. Households with children had several indicators of higher socioeconomic status (higher prevalence of post-secondary education, home ownership, and reliance on wages or salaries for income; slightly lower prevalence of social assistance) and were more likely to be comprised of romantic partners.

In adjusted models, households with children reporting any income were less likely to be food secure (83.5% vs. 85.4%), but also less likely to be severely food insecure (3.6% vs. 4.0%), than those without children leading up to CCB (Table 3A). After implementation, households with and without children had higher probabilities of being food secure as well as marginally food insecure; moderate food insecurity remained essentially unchanged. Only households with children experienced a drop in likelihood of experiencing severe food insecurity (3.6% to 2.5%).

3.3. Analytical subgroups: predicted probabilities

The probability of experiencing food insecurity increased with economic vulnerability, regardless of CCB or presence of children in the household (Table 3B). Levels of intensity increased as well. The likelihood of experiencing moderate or severe food insecurity was higher among households reporting the median income or less compared to households reporting any income, and highest among those reporting the LIM or less.

Overall, households with children appeared to fare better following CCB than those without (Table 3B). The former experienced greater relative increases in food security, as well as marked reductions in severe food insecurity. Among households without children, the probability of severe food insecurity increased. Changes in moderate food insecurity were less consistent and pronounced between the two groups. Only households with children experienced increases in the probability of experiencing marginal food insecurity after CCB.

3.4. Difference-in-differences

Households with children reporting the median income or less and LIM or less experienced positive increases in food security compares to households without (2.1% and 2.3%, respectively) (Table 4). As well, there were largely insignificant increases in marginal food insecurity (excluding households reporting any income, whose probability significantly increased by 1.1% (95% CI: 0.0, 2.3)) and decreases in

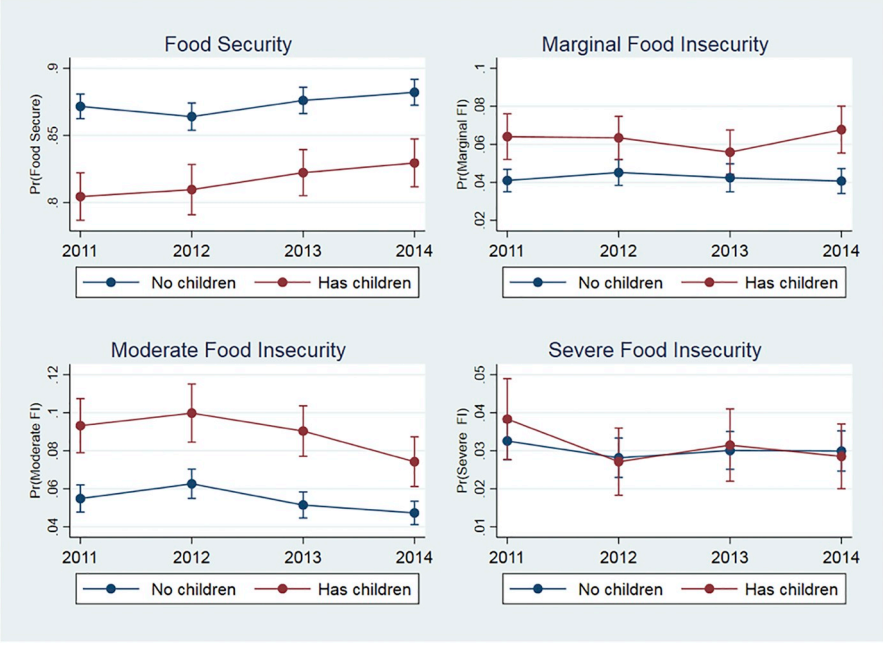

Fig. 1. Food security trends in select Canadian provinces, 2011-2014

Table 2
Weighted household characteristics of a sample of CCHS respondents stratified by presence of children in the household, survey years 2015–2018.

	Households without children (N[a] = 26,743)	Households with children (N[b] = 14,712)	Total (N[c] = 41,455)
Education			
High shool or less	23.8%	14.7%	20.5%
Some post-secondary education	41.7%	40.7%	41.3%
College +	34.5%	44.6%	38.2%
Household composition			
Single adult	41.3%	18.2%	32.8%
Single adult with other adults	9.3%	2.0%	6.7%
Partnered adults	47.1%	72.5%	56.4%
Partnered adults with other adults	1.9%	6.0%	3.4%
Other	0.4%	1.3%	0.7%
[Respondent] Black or Aboriginal	6.3%	9.0%	7.2%
[Respondent] immigrant	17.6%	24.2%	20.0%
Income from wages/salary	88.0%	91.9%	89.5%
Owns home	64.1%	75.2%	68.2%
Received social assistance	15.5%	14.2%	15.0%
Province			
Prince Edward Island	0.7%	0.7%	0.7%
Nova Scotia	4.6%	4.1%	4.4%
New Brunswick	3.5%	3.5%	3.5%
Quebec	41.0%	39.1%	40.3%
Manitoba	5.5%	5.9%	5.7%
Saskatchewan	4.8%	5.7%	5.1%
Alberta	18.5%	20.3%	19.2%
British Columbia	21.4%	20.9%	21.2%
Lives in urban location	82.4%	81.1%	81.9%
Number of children < 6 (mean, SD)	–	0.6 (0.8)	–
Number of children > 5 (mean, SD)	–	1.2 (1.0)	–

[a] Estimating 15,500,000 households.
[b] Estimating 8,500,000 households.
[c] Estimating 24,00,000 households.

moderate food insecurity. Differences in severe food insecurity were greater among all but the households reporting any income. Those reporting the LIM or less experienced the most dramatic declines (DID 4.7%, 95% CI: −8.6, −0.7).

3.5. 18 vs. 10-item HFSSM

Restricting analyses to the 10-item scale did not substantially alter our results. We observed similar trends among households with and without children, before and after CCB. Increases in food security following CCB among households with children compared to those without were consistent across subpopulations and slightly larger. Reductions in severe food insecurity were slightly smaller. All findings are presented in Appendix D.

4. Discussion

Using a DID approach, we identified improvements to overall food security status among Canadian households with children across the income spectrum following the implementation of CCB. Decreases in the probability of experiencing severe food insecurity were significant and more pronounced with declining economic circumstance, suggesting that CCB, and more specifically, increases to the country's child benefits, disproportionately benefited vulnerable households.

As long as CCB benefits are indexed to inflation (Department of Finance Canada, 2017), we anticipate that these improvements will persist. A recent simulation study (Kesselman, 2019) explored several cost-neutral strategies to retarget existing CCB payments towards low and moderate income households, resulting in benefit increases from 8 to 50%. Such changes could contribute to more drastic reductions in the

Table 3A
Crude and adjusted predicted probabilities of categorical food security among households with and without children, before and after the Canada Child Benefit (N = 41,455[a]).

	Households without children		Households with children	
	Pre-CCB	Post-CCB	Pre-CCB	Post-CCB
Unadjusted model[b]				
Food secure	85.9 (85.2, 86.6)	86.0 (84.8 87.1)	83.9 (82.8, 84.9)	84.3 (82.7, 85.9)
Marginally food insecure	4.1 (3.7, 4.4)	3.8 (3.1, 4.4)	5.1 (4.6, 5.7)	5.4 (4.4, 6.3)
Moderately food insecure	6.0 (5.5, 6.5)	6.1 (5.3, 6.9)	7.9 (7.1, 8.7)	8.0 (6.7, 9.3)
Severely food insecure	4.1 (3.7, 4.5)	4.1 (3.5, 4.7)	3.1 (2.6, 3.6)	2.3 (1.7, 3.0)
Adjusted model				
Food secure	85.4 (84.4, 86.4)	86.1 (85.2, 87.1)	83.5 (81.9, 85.1)	84.1 (82.6, 85.2)
Marginally food insecure	4.6 (4.0, 5.2)	4.0 (3.2, 4.6)	4.2 (3.5, 4.9)	4.7 (3.9, 5.5)
Moderately food insecure	6.0 (5.3, 6.6)	5.9 (5.2, 6.5)	8.7 (7.4, 10.3)	8.5 (7.4, 9.7)
Severely food insecure	4.0 (3.4, 4.6)	4.0 (3.4, 4.6)	3.6 (2.8, 4.4)	2.7 (2.0, 3.4)

[a] Estimating 24,000,000 households.
[b] With household, but not IPTW, weights.

Table 3B
Adjusted predicted probabilities of categorical food security among two analytic samples of households with and without children, before and after the Canada Child Benefit.

	Households without children		Households with children	
	Pre-CCB	Post-CCB	Pre-CCB	Post-CCB
≤Median income (N = 16,205)[a]				
Food secure	74.3 (72.4, 76.2)	74.5 (72.6, 76.4)	72.8 (69.6,76.0)	75.1 (72.2, 78.0)
Marginally food insecure	7.4 (6.2, 8.6)	6.5 (5.3, 7.7)	5.7 (4.4, 7.0)	6.1 (4.7, 7.4)
Moderately food insecure	10.6 (9.4, 11.8)	10.9 (9.6, 12.2)	14.0 (11.4, 16.6)	13.8 (11.4, 16.6)
Severely food insecure	7.8 (6.7, 9.8)	8.1 (7.0, 9.1)	7.5 (5.8, 9.2)	5.1 (3.6, 6.5)
≤LIM (N = 6276)[b]				
Food secure	61.9 (58.6, 65.2)	61.8 (58.4, 65.2)	61.6 (57.4, 65.9)	63.8 (59.9, 67.7)
Marginally food insecure	10.0 (7.6, 12.5)	8.2 (5.9, 10.4)	6.7 (5.0, 8.4)	7.9 (6.0, 9.8)
Moderately food insecure	15.4 (13.0, 17.8)	16.7 (14.1, 19.2)	19.4 (15.8, 23.1)	20.0 (16.4, 23.7)
Severely food insecure	12.7 (10.5, 14.8)	13.4 (11.1, 15.6)	12.3 (9.2, 15.3)	8.2 (5.9, 10.6)

[a] Estimating 10,600,000 households.
[b] Estimating 4,600,000 households.

Table 4
Difference-in-differences in food security between households with and without children following the Canada Child Benefit.

	DID estimate (95% CI)
Any income	
Food secure	−0.1 (−2.1, 1.8)
Marginally food insecure	1.1 (0.0, 2.3)**
Moderately food insecure	−0.0 (−1.6, 1.4)
Severely food insecure	−1.0 (−2.0, 0.0)*
≤Median income	
Food secure	2.1 (−1.9, 6.1)
Marginally food insecure	1.3 (−0.8, 3.3)
Moderately food insecure	−0.6 (−3.6, 2.4)
Severely food insecure	−2.8 (−5.0, −0.6)**
≤LIM	
Food secure	2.3 (−3.6, 8.2)
Marginally food insecure	3.1 (0.3, 6.5)*
Moderately food insecure	−0.7 (−5.8, 4.5)
Severely food insecure	−4.7 (−8.6, −0.7)**

* $p < 0.1$.
** $p < 0.05$.

prevalence and/or severity of food insecurity. However, it seems unlikely that the policy as it is currently structured will spur additional long-term gains. The rises in marginal food insecurity, rather than food security, accompanying declines in more severe levels of food insecurity suggest that while existing benefit levels may enable households to better meet their basic needs, they may be insufficient to provide full protection against material deprivation.

Nevertheless, our findings are noteworthy. Severe food insecurity is associated with the greatest negative impacts on health (Burke et al., 2016; Kirkpatrick et al., 2010; Tarasuk et al., 2013; Jessiman-Perreault and McIntyre, 2017). In Canada, the long-term effects of children's exposure to severe food insecurity (measured as hunger) are well documented, including the subsequent development of serious mental health problems (Kirkpatrick et al., 2010; McIntyre et al., 2013). The deleterious impacts of extreme deprivation are also reflected in healthcare utilization and spending patterns. One study found that adults in severely food insecure households incurred an additional $1124, $1769, and $2322 per year in health care costs relative to those in moderately food insecure, marginally food insecure, and food secure households, respectively (Tarasuk et al., 2015). Reductions in the severity of food insecurity are likely to be associated with profound health and financial gains.

4.1. Study Limitations and Strengths.

This study should be interpreted with several limitations in mind. First, our analyses strictly captured aggregate changes over time, compromising our ability to make causal inferences. A longitudinal study tracking the same households would be better suited for isolating the potential impact of CCB by further reducing variability and the probability of confounding bias. Second, the pre-tax income measure precluded us from studying the effects of CCB within the three income-tiered benefit categories. We were able to gauge broad changes associated with CCB and identify differential effects across the economic spectrum, however, we could not identify if and how the program's structure altered food security. This is a crucial element for understanding and being able to thoughtfully improve upon CCB. One cannot identify subpopulations for which the assistance was (in)sufficient without knowing the level of assistance they received.

Third, by omitting five jurisdictions, we sacrificed some external generalizability in favor of maintaining internal validity. The cost of living – and potential purchasing power of CCB – varies throughout the country. Additionally, the omission of households living on First Nations reserves from CCHS also means this highly vulnerable group has not been included in our analysis. Therefore, our results cannot be interpreted as evidence of how CCB functioned nation-wide. Nevertheless, Ontario, the largest jurisdiction omitted, has a food insecurity rate that has historically resembled the Canadian average, and only 3% of the country's population lives in the other excluded jurisdictions. We believe it is unlikely that their exclusion meaningfully impacted our results. Fourth, intent-to-treat designs often provide more conservative estimates than other methods (Gupta, 2011). By including all households – some who were eligible for CCB but may not have received it, and some who may not have been eligible at all – it is possible that we diluted CCB's true treatment effects. Fifth, data limitations necessitated omitting three of the eight provinces in this study and 2014–2015 outcome comparisons from the parallel trends assessment. Though we captured the majority of our sample and years leading up to the study period, these exclusions may have biased our results and subsequent interpretation. Finally, our limited sample size compromised both our power and precision, particularly among the smallest and most economically vulnerable subgroup.

Despite these limitations, our methodologically rigorous, interdisciplinary approach to program evaluation has allowed this study to overcome many of the limitations inherent to analyses that utilize cross-sectional data. This study is the first to directly assess the potential impact of CCB on food security, and to our knowledge, one of the first to assess how a federal income transfer program may impact food security among families with children of all ages. Moreover, comparing outcomes associated with CCB to those associated with its predecessors (as opposed to the absence of programming) helped us to estimate its relative, and most policy-relevant impacts.

As high rates of food insecurity and conversations regarding cuts to

social spending simultaneously persist, it is critical to understand the specifics of their interplay before acting upon either. By leveraging routine food security monitoring data to engage with this analysis, we have helped lay the groundwork for future assessments of similar population-level interventions.

5. Conclusions

Our findings contribute to the growing body of evidence suggesting that household food insecurity can be impacted by policy decisions yielding even modest changes to households' economic circumstances (Loopstra et al., 2019; Ionescu-Ittu et al., 2015; Loopstra et al., 2015; McIntyre et al., 2016). Mirroring results from the evaluation of Canada's previous non-income tested child benefit program (Ionescu-Ittu et al., 2015), we found that sensitivity was greatest at the bottom of the income spectrum, where the risk and repercussions of food insecurity are also most severe.

Elucidating the potency and true long-term impacts of CCB will require that more detailed, longitudinal data from recipients become available. Namely, consistent food security measurement across jurisdictions and the separation of market income from government transfers – and in turn, the prioritization of measuring food security as a policy outcome. However, this study speaks to the potential of income transfers to impact food insecurity, emphasizing the (positive or negative) role that changes in social protections might play.

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