



# Who feels the calorie crunch and when? The impact of school meals on cyclical food insecurity<sup>☆</sup>

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## ARTICLE INFO

### Article history:

Received 11 March 2017

Received in revised form 17 July 2018

Accepted 7 August 2018

Available online xxxx

### JEL classifications:

D13

D14

D91

I38

### Keywords:

SNAP

Consumption smoothing

Food security

School meal programs

## ABSTRACT

Monthly welfare programs such as the Supplemental Nutrition Assistance Program (SNAP) produce consistent cycles of expenditure and consumption among recipients. Food insecurity, health status, crime, poor behavior and test scores track these cycles. This paper leverages new data from the USDA—the FoodAPS survey—to better understand these cycles in three ways. First, I find that expenditure and consumption cycles are correlated within households—a fact not previously established. Second, I study diet quality over the benefit month, and find that it worsens, potentially compounding the harmful consequences of cyclical food insecurity. Third, I find that kids bear less of the burden of the consumption cycle than adults, and that much of this difference may be driven by school-meal programs. This finding suggests large potential gains in child welfare from expanding summer meal programs.

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## 1. Introduction

While a sizable literature has documented beneficial effects of the Supplemental Nutrition Assistance Program (SNAP) on nutritional, health and economic outcomes, less well-known is the fact that households who participate in the program still experience high levels of food insecurity.<sup>1</sup> In a 2011 and 2012 sample, roughly 61% of SNAP households were food insecure, 31% had very low food security, and 25% of households had food-insecure children (Mabli et al., 2013).<sup>2</sup> This is in part because they exhibit within-month expenditure and consumption cycles (i.e. the end of month ‘calorie crunch’) that produce a variety of

harmful effects.<sup>3</sup> Existing research on the calorie crunch, however, leaves at least three important questions unanswered. First, while sharp expenditure declines over the benefit month are often taken as hallmarks of consumption declines, we do not have evidence on whether these two phenomena are actually related. Second, we have very little evidence on whether diet quality adjusts in a way that exacerbates or mitigates changes in diet quantity. Third, we do not have evidence on who, within a household, bears the burden of the calorie crunch.

This paper uses a relatively new data source, the USDA’s FoodAPS (U.S. Department of Agriculture National Household Food Acquisition and Purchase Survey), to address these gaps. What makes the FoodAPS unique are its simultaneous seven-day expenditure and individual-specific meal-consumption diaries for each participating household. In the past, researchers looking to analyze benefit-month dynamics using

<sup>☆</sup> This project was funded by the United States Department of Agriculture Economic Research Service and the University of Kentucky Center for Poverty Research, grant # 3048111062-15-030. I owe sincere thanks to James Ziliak, James Andreoni, Jessica Todd, Craig Gundersen, Glen Waddell, Benjamin Hansen, Peter Kuhn and participants at the FoodAPS Research Initiative conference for comments and advice.

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<sup>1</sup> See Bhattacharya and Currie (2001) and Hoynes and Schanzenbach (2009) on food insecurity. See Devaney and Moffitt (1991) on nutritional intake. See Currie and Cole (1991), Currie and Moretti (2008), Almond et al. (2011) and Kreider et al. (2012) on child health. See Hoynes et al., 2016 on long-run outcomes.

<sup>2</sup> A household is food insecure if there are reports of “reduced quality, variety, or desirability of diet,” and has very low food security if there are “multiple indications of disrupted eating patterns and reduced food intake” (USDA, 2016).

<sup>3</sup> Foley (2011) shows that crime increases over the benefit month in areas with highly time-concentrated disbursements of welfare (including SNAP), and Carr and Packham (2018) link the SNAP cycle directly to grocery store theft rates. Seligman et al. (2014) find that hospital admissions for hypoglycemia are more common at the end of the month in low-income communities, and Gennetian et al. (2015) show that incidents resulting in school disciplinary actions for middle and high-school students in SNAP households in Chicago increase by 51% between the first and the last week of the benefit month. Cotti et al. (2017) show that standardized test scores decrease for children in SNAP households at the end of the benefit month.

diary data have been forced to pick either expenditure or consumption as the outcome of interest.

My main findings are established in the paper's three main sections. In Section 3 I estimate the calorie crunch in terms of both expenditure and consumption, and then determine whether those cycles are cross-sectionally correlated at the household level. Given past work using expenditure (Hastings and Washington, 2010; Castner and Henke, 2011; Smith et al., 2016; Goldin et al., 2016; Kuhn, 2018) and consumption (Wilde and Ranney, 2000; Shapiro, 2005; Todd, 2015), verifying the expenditure–consumption relationship is important. This is especially true given the work by Aguiar and Hurst (2005), who find that people smooth consumption, but not expenditure, across a predictable income change. On the other hand, they find that neither is smoothed across an unpredictable income change. Given that the SNAP disbursement cycle is highly predictable, the expenditure–consumption relationship should be suspect in this domain.

I find strong downward trends for both expenditure on food and consumption of food over the benefit month in the FoodAPS data. The meals-consumed consumption estimates indicate a loss of roughly six meals per individual, per benefit-month, relative to the counterfactual of constant meal consumption at the level established on the first day of the benefit month. Expenditure and consumption estimates are both robust to using SNAP-eligible non-participants and near-eligible non-participants as a control group.<sup>4</sup> Importantly for this entire literature, I find that expenditure and consumption cycles, measured at the household level, are correlated.

Section 4 of the paper examines the incidence of consumption cycles within households. Do children suffer the worst or do adults and/or school meal programs shelter them? Do mothers or fathers feel the greatest impacts of food shortfall? These questions are crucial for gauging the welfare consequences of the SNAP benefit cycle. The results will also be important for assessing the importance of school meal programs for the calorie crunch: there are no estimates to date of how school meals interact with the SNAP consumption cycle. On the other side of that same coin, the results will speak to the potential value of *summer* meal programs that mimic school meal programs; only a small number of kids participating in school meal programs receive summer meals from the USDA's Summer Food Service Program (SFSP, Hayes et al., 2016). Existing literature on the National School Lunch Program (NSLP) and School Breakfast Program (SBP) is focused on overall impacts, and is silent on how they relate to cyclical food insecurity.<sup>5</sup> The bulk of recent economics research on school meals relates to the impact of expanding SBP access with universally-free and in-classroom programs.<sup>6</sup> I evaluate the impact of school meals using a 'difference-in-difference-in-trends' design, where I examine the differential impact that school being open or closed has for school-meal redeemers and non-redeemers on the benefit-month trend in consumption. I include month fixed effects in these specifications to account for the correlation between the school calendar and season.

I find that adults experience a more severe calorie crunch than kids. However, for schoolchildren participating in school meal programs, this is only true during the school year. During the summer, there is almost no difference in consumption trends between these kids and adults. The same is not true for schoolchildren who do not fully redeem their school meals. This suggests that school meal programs may play a valuable role in smoothing consumption, but that there are substantial potential

gains from expanding summer meal programs. I find that this impact spills over into the household budget: school meal programs reduce the cycle in dinner consumption for schoolchildren and overall meal consumption for adults in their household. Men and women experience similar consumption cycles regardless of whether they are parents.

In Section 5, I use the detailed nutrition information on expenditures in the FoodAPS to estimate the change in diet quality over the course of the SNAP benefit month. The FoodAPS is specially designed to allow researchers to construct the Healthy Eating Index (HEI), a formal measure of diet quality, from its expenditure data. As resources dwindle, households may be forced to purchase more calorie-dense foods for energy and to stay satiated. These foods are likely to be low in nutritional content, which could be a mechanism through which many of the harmful side effects of the calorie crunch manifest. For example, two of the most notable side effects of the calorie crunch for children are poor behavior and lower test scores (Gennetian et al., 2015 and Cotti et al., 2017, respectively). Both of these manifest while school is in session, yet I find that school meal programs help mitigate the increase in missed meals over the benefit month. Because the overall household continues to experience a calorie crunch when school is in session, reduced diet quality for the kids might be a key pathway to behavioral outcomes.

I find that diet quality, as measured by the HEI, decreases over the benefit month. This replicates the finding of Todd (2015), using single-day consumption data from the National Health and Nutrition Examination Survey (NHANES). The decrease in HEI over the benefit month is present even when total expenditures are held fixed: grocery trips are not just getting smaller over the benefit month, but they are changing composition. This appears to result from a disappearance of fruit and healthy fats from diets, which are replaced by refined grains.

Beyond the literatures on SNAP and school meals, this paper is relevant to the broader discussion of interactions between social insurance programs in public economics. The vast majority of this work is dedicated to understanding the impact of changes to one program on participation in others.<sup>7</sup> This paper is somewhat different in that I estimate how regular changes in participation in school meal programs through school breaks affects the user experience and effectiveness of SNAP, as measured by the calorie crunch. For many purposes, it is useful to represent program participation as a binary variable. In other cases, however, the day-to-day and month-to-month experience of participants can be highly variable. The yearly Earned Income Tax Credit (EITC) is a perfect non-SNAP example: being 'on' EITC means something very different in April than it does in October. Researchers and policy makers should expect spillovers between programs to shift accordingly.

## 2. Data and methodology

### 2.1. FoodAPS diary data

The USDA's National Household Food Acquisition and Purchase Survey (FoodAPS) surveyed 4826 U.S. households between April 2012 and January 2013. Among these households, 1581 were SNAP participants, 1312 were non-participants with incomes under 185% of the poverty threshold and 1933 had incomes >185% of the poverty threshold. My primary analysis is restricted to households receiving SNAP benefits, but I also use both eligible and near-eligible non-participants as a control group in some specifications.

What makes the FoodAPS unique among the data that have been used to estimate the calorie crunch is its collection of week-long diaries

<sup>4</sup> Eligibility is based on household income as a fraction of the poverty threshold.

<sup>5</sup> Gleason and Suiitor (2003) show that the National School Lunch Program (NSLP) improves nutritional intake, but also increases dietary fat consumption. Schanzenbach (2009) links the NSLP to increased childhood obesity, but Gundersen et al. (2012) estimate an overall positive impact of the NSLP on health. Bhattacharya et al. (2006) show improvements in nutritional intake and overall diet quality for School Breakfast Program (SBP) participants.

<sup>6</sup> There is mixed evidence as to whether such programs improve learning, behavior and health outcomes (Ribar and Haldemann, 2013; Leos-Urbel et al., 2013; Dotter, 2013; Imberman and Kugler, 2014; Schanzenbach and Zaki, 2015).

<sup>7</sup> See, for example, Ziliak et al. (2000) on the impact of welfare on SNAP, Duggan and Kearney (2007) on the impact of Supplemental Security Income (SSI) on Medicaid, Duggan et al. (2007) on the impact of Social Security on Disability Insurance (DI), Staubli (2011) on the impact of DI on Unemployment Insurance (UI) and sick leave, Baicker et al. (2014) on the impact of Medicaid on SNAP, welfare, SSI, and DI, Lindner and Nichols (2014) on the impacts of welfare, SNAP, UI, and worker's compensation on DI and SSI, and Mueller et al. (2016) on the impact of UI on DI.

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