



# National Household Food Acquisition and Purchase Survey (FoodAPS)

## Supplementary Documentation Food-Away-From-Home (FAFH) Data

The OMB clearance number for FoodAPS is 0536-0068. The data were collected by the U.S. Department of Agriculture under authority of U.S.C, Title 7, Section 2026 (a)(1).

Information about the entire data collection, including instructions on how to request access to the data, may be found at <http://www.ers.usda.gov/foodaps>.

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### Suggested citation:

*National Household Food Acquisition and Purchase Survey (FoodAPS): Supplementary Documentation Food-Away-From-Home (FAFH) Data.* U.S. Department of Agriculture, Economic Research Service, November 2016.

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## 1. Introduction

This document provides details on how interrelated expenditure variables in the food-away-from-home (FAFH) event and item data were reviewed and edited in the National Household Food Acquisition and Purchase Survey (FoodAPS). The *FAFH Event Data Codebook* and the *FAFH Item Data Codebook* summarize how the rest of the event and item data were collected and processed. Users should read these documents first. Users should also read the *User's Guide to Survey Design, Data Collection, and Overview of Datasets* for information about the survey design and sample, survey instruments and data collection, and analytic notes.

## 2. Overview of Purchase Information Variables

Variables related to expenditures in both the FAFH event and item data were reviewed and edited together to ensure consistency. The total amount paid at the event including tax and tip (TOTALPAID), the amount of tip (TIPAMT), and FREE, an indicator of whether the event was obtained at no cost, are included in the FAFH event data, along with related flag variables indicating edits to the respective variables. The FAFH item data include two measures of expenditure on items: ITEM COST, which is the cost for one unit of the item (QUANTITY = 1), and TOTITEM COST, which is the total cost of the item obtained, calculated as ITEM COST \* QUANTITY. Both ITEM COST and QUANTITY in the item data were reviewed and edited, along with TOTALPAID, TIPAMT, and FREE in the event data.

First, the sum of the reported total item costs (TOTITEM COST or ITEM COST \* QUANTITY) were compared to the reported TOTALPAID and the TOTALPAID less TIPAMT.<sup>1</sup> When these measures resulted in consistent information, no edits were made to ITEM COST, QUANTITY, TOTALPAID, TIPAMT, or FREE. In general, the sum of the total item costs (TOTITEM COST) in an event was expected to equal TOTALPAID less TIPAMT when tax was not applicable to the event; TOTALPAID less TIPAMT was expected to be no more than 10 percent greater than the sum of TOTITEM COST if tax

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<sup>1</sup> QUANTITY was edited along with the size variables, SIZE and SIZEUNIT (see FAFH Item Data Codebook, section 2.3.2).

was applicable. If the sum of TOTITEMCOST was greater than TOTALPAID less TIPAMT, then TOTALPAID and TIPAMT were edited. Items obtained from schools (MENUGRP=SCH) were reviewed separately from other items.

## **2.1. Non-School Items**

TOTALPAID and TIPAMT were edited for non-school items using the item cost information as indicated below.

Let  $DIFF = (TOTALPAID \text{ less } TIPAMT) - \text{sum of TOTITEMCOST}$

- If the sum of TOTITEMCOST is less than TOTALPAID, but DIFF is negative, TIPAMT was edited, reduced by DIFF. (Assumed TIPAMT was wrong.)
- If  $TIPAMT > 0$  and the sum of TOTITEMCOST = TOTALPAID, the TIPAMT was added to TOTALPAID. (Assumed TOTALPAID did not include TIPAMT originally.)
- If  $TIPAMT = 0$  and  $DIFF < \$2$ , TOTALPAID was revised to be the sum of TOTITEMCOST. (Assumed TOTALPAID was incorrect due to rounding.)
- If  $TIPAMT > 0$  and the sum of TOTITEMCOST is greater than TOTALPAID, TOTALPAID was edited to be the sum of TOTITEMCOST + TIPAMT. (Assumed TOTALPAID was entered incorrectly.)
- If  $TIPAMT = 0$  and the sum of TOTITEMCOST is greater than TOTALPAID, TOTALPAID was edited to be equal to the sum of TOTITEMCOST. (Assumed TOTALPAID was entered incorrectly.)

If the comparison of TOTALPAID less TIPAMT and the sum of TOTITEMCOST indicated inconsistency that could not be addressed with the edits described above, the event was identified for item-level editing due to possible missing items and/or cost imputation due to missing item costs (see section 3).

## 2.2. School Items

Nearly 98 percent of school acquisitions had consistent information for FREE, TOTALPAID, and item costs. The few acquisitions with inconsistent information were manually reviewed and edited as follows:

- If the acquisition was free (FREE=1) or all other item costs added up to within 10 percent or \$1 of TOTALPAID less TIPAMT, the missing item cost was set equal to zero.
- When TOTALPAID and item costs were missing, the acquisition was compared to others for the same person to manually fill a school meal price for TOTALPAID (TOTALPAID\_FLAG=9) or set to FREE=1 (FREE\_FLAG=5).
- If the TOTALPAID was equal to the cost of a reduced-price school meal (0.30 or 0.40), FREE was changed from 1 to 0.
- When TOTALPAID was missing and no item costs were missing, TOTALPAID was set equal to the sum of TOTITEMCOST.
- When TOTALPAID was reported and all item costs were missing, the value of TOTALPAID was assigned to the first item for consistency with reported school meals where TOTALPAID was reported as an item cost (ITEMCOST\_FLAG=11).
- When FREE, TOTALPAID, item costs, and payment tender type were not reported and PLACETYPE>300 (not a restaurant or food store), FREE was recoded as 1.
- The median paid for a school meal was assigned to acquisitions if TOTALPAID was not reported, FREE=0, and the acquisition included only items eligible for reimbursable meals. Medians were calculated by meal and age group (5-10 years, 11-13 years, and 14-18 years) from among acquisitions by children identified in the Initial Interview as receiving full-price meals. The median was assigned as an item price (IMPITEMCOST, IMPCOSTMETHOD=6).

After these edits, 18 items were flagged for imputation along with non-school items using median prices calculated within imputation cells described in the next section.

### 3. Item Cost Imputations

A large share of items in purchased acquisitions (FREE=0) had a cost of zero or missing. Among school purchases, 55.2 percent of the items had a reported cost of zero, and for 8.6 percent, the cost was missing. Among non-school purchases, 21.8 percent of items had a zero cost, and 13.6 percent had a missing cost.

In general, a combo meal is associated with a single price, with the main component carrying the full cost and the rest of the components having an item cost of zero. Multiple prices are observed if there is substitution or an upgrade to the standard bundle (e.g., a milk shake was obtained instead of a soft drink, or if fries or a drink—but not both—were up-sized).

Before imputing item costs, inconsistencies in ITEM COST, TOTAL PAID, and related variables were first resolved, when possible. Any unresolved inconsistencies were flagged for imputation. Table 1 summarizes the types of edits performed and indicates when items were flagged for item-cost imputation.

Deterministic methods were used to impute missing item costs for 1,971 (6 percent) non-school acquisitions where edits could not resolve inconsistencies in purchase variables. Only items with missing item costs (not items with a reported price of \$0) were imputed, except for acquisitions with all zero prices. In the case of events with all item costs reported as \$0, all item costs were flagged for imputation. Bundles with all missing costs were edited to have the missing cost assigned to the main item (to be imputed) and zero cost for the remainder of the components. To impute item costs, first within-sample median item costs were calculated, and this median cost was assigned as the initial imputed cost (IMPITEMCOST) to items with missing prices. The total imputed cost (IMPTOTCOST) for the item was calculated as  $IMPITEMCOST * QUANTITY$ .

**Table 1. Summary of edits to TOTALPAID, FREE, ITEMCOST, and imputations performed**

Groups of Acquisitions	Number of School Acquisitions	Number of Non-School Acquisitions	Editing/Imputations for Non-school Acquisitions <sup>a</sup>
<b>Free Events (FREE=1) &amp; TOTALPAID=0</b>			
No ITEMCOST>0 and at least one missing ITEMCOST	1	967	EDIT: Missing ITEMCOST=0
At least one ITEMCOST>0 and no item costs missing	21	115	EDIT: TOTALPAID=sum of TOTITEMCOST
<b>Other Free Events (FREE=1)</b>			
TOTALPAID>0, all ITEMCOST=0	6	37	IMPUTE all item costs; ratio adjustment used
TOTALPAID>0, some ITEMCOST>0, and some ITEMCOST missing, consistency in sum of non-missing TOTITEMCOST and TOTALPAID	0	2	EDIT: Missing ITEMCOST=0
TOTALPAID>0 or not, some ITEMCOST>0 or not, and some ITEMCOST missing, cannot determine consistency in sum of non-missing TOTITEMCOST and TOTALPAID	0	37	IMPUTE missing item costs
<b>Non-free Events (FREE=0) &amp; TOTALPAID&gt;0</b>			
Some reported ITEMCOST and some missing ITEMCOST			
Consistency in sum of non-missing TOTITEMCOST and TOTALPAID	0	273	EDIT: Missing ITEMCOST=0
Cannot determine consistency in sum of non-missing TOTITEMCOST and TOTALPAID	0	96	IMPUTE missing item costs; ratio adjustment used
All ITEMCOST=0	111	277	IMPUTE item costs; ratio adjustment used
No ITEMCOST>0 and some missing	0	1,368	IMPUTE missing item costs; ratio adjustment used
<b>FREE and TOTALPAID Not Reported<sup>a</sup></b>			
No ITEMCOST>0, some or none missing	17	199	EDIT: FREE using PLACETYPE; IMPUTE missing ITEMCOST when not edited to be free
Some ITEMCOST>0, none missing	21	88	EDIT: TOTALPAID=sum of TOTITEMCOST
Some ITEMCOST>0, some missing	0	16	IMPUTE missing ITEMCOST; construct TOTALPAID=sum of imputed item costs
<b>Edited Acquisitions</b>	43 (0.6%)	1,504 (4.8%)	
<b>Acquisitions Requiring Imputations</b>	117 (1.7%)	1,971 (6.0%)	

<sup>a</sup>. See text for rules applied to school acquisitions, which include acquisitions from school and daycare.

The median cost and the percent of items with zero cost were calculated for 563 groups defined by MENUGRP (BEV, TOP, GEN, or SCH), place group (based on MENUID and

PLACETYPE), 4-digit food group from What We Eat in America (WWEIA), whether the item was bundled, and the relative size (only for beverages and chicken).<sup>2</sup>

Specifically, five place groups were defined as

- Top fast-food restaurants: MENUID >100 and <200 or >500, but not equal to 504 or 515
- Top non-fast-food restaurants: MENUID>200 and <300 or equal to 504 or 515
- Food store: MENUID=4 and PLACETYPE>100, but <200
- Other restaurants: MENUID=4 and PLACETYPE>200, but <300
- Other non-restaurants: MENUID=4 and PLACETYPE >300, but <400

Food groups were defined by the 4-digit code from WWEIA, but some beverage groups were combined. Specifically:

- Milk=1002, 1004, 1006, 1008, 1204, 1206, 1208, 1402
- Juice=7002, 7004, 7006
- Soft drinks and juice drinks=7102, 7104, 7202, 7204

Bundled items were identified if BUNDLETYPE=3.

Beverage sizes were determined by the SIZERELATIVE value, when available, or based on the size in ounces (small if <12 ounces, medium if 13-20 ounces, large if 21-36 ounces, and X-large if >36 ounces), and otherwise were assumed to be medium.

Chicken items were grouped based on the number of pieces in the item. All chicken items not sized by piece were grouped together.

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<sup>2</sup> Note that because imputation of item costs relied on food categories, cost imputation was done after MPR finished matching FAFH items to food codes/nutrients.

The median values were then adjusted for each item using a ratio adjustment so that the sum of reported and imputed costs (plus tip where reported) equaled the TOTALPAID for the event. Specifically, the residual for the event was calculated as:

$$\text{RESIDUAL}=[(\text{TOTALPAID less TIPAMT})/1.1] - \text{sum of reported TOTITEMCOST}$$

The adjustment factor for each item with an imputed cost was then calculated as:

$$\text{ADJFACTOR}=\text{RESIDUAL} / \text{sum of IMPTOTCOST}$$

An adjustment factor equal to one would indicate that the imputations exactly filled the gap between reported item costs and total amount paid minus tip and estimated taxes. An adjustment factor greater than 1 indicates that the imputed values should be increased to have item costs sum to total paid, and a factor less than one indicates that they need to be lowered. An acceptable range for the adjustment factors was set by the 10th and 90th percentiles ( $0.5 \leq \text{ADJFACTOR} \leq 2.1$ ).

For all acquisitions with an adjustment factor within the acceptable range, the initial imputed prices were adjusted by this factor:

$$\text{final IMPITEMCOST}=\text{initial IMPITEMCOST}*\text{ADJFACTOR}.$$

In the case of extremely low adjustment factors (less than 0.5), all items with a high share of observations with a zero reported cost (at least 70 percent of all items in the sample) were identified, and the imputed cost for these items was then set equal to zero in the event. The adjustment factor was then recalculated for the remainder of the items and adjusted as described above if the adjustment factor was within the acceptable range. Some acquisitions had no items with 70 percent or more having a zero reported price, so there was no change in the adjustment factor, and imputed prices were not assigned to the items with missing prices for these events. The assumption here was that the difference between item costs and total paid was due to rounding.

In the case of adjustment factors above the acceptable range, imputed values were also assigned to all items with a zero price (using the median values), and then the adjustment factor was recalculated. Some acquisitions had no items with a zero reported price, so there was no change to the adjustment factor. When the adjustment factor remained above the acceptable range, imputed prices were not adjusted by the adjustment factor, and were instead kept at the initial median values.

Among acquisitions with missing costs, 71 percent were ratio-adjusted, 9 percent were not ratio-adjusted because TOTALPAID was missing, 8 percent were not ratio-adjusted because of large adjustment factors, and 12 percent have no imputed costs because the adjustment factor was too small (and thus the difference between reported cost and TOTALPAID is likely due to rounding error). IMPCOSTMETHOD indicates the method used to impute item costs and can vary within acquisitions. Table 2 summarizes school and non-school acquisitions by whether any item costs were imputed, why, and how. Table 3 summarizes the prevalence of missing item costs before and after editing and imputations.

**Table 2. Distribution of acquisitions by type of item cost imputation**

Type of Imputation	School Acquisitions		Non-School Acquisitions	
	Number	Percent	Number	Percent
<b>No Imputation</b>				
No imputation, item costs add up to total	7,002	99.8	26,915	88.6
No imputation, item costs do not add up, no missing prices	8	0.1	1,480	4.9
No imputation, small residual value	0	0	220	0.7
<b>Item-Cost Imputation</b>				
One or more item costs imputed with ratio adjustment	22	0.3	1,399	4.6
One or more item costs imputed without ratio adjustment because TOTALPAID not reported	4	0.0	172	0.6
One or more item costs imputed without ratio adjustment because large residual value suggests unreported items	0	0.0	189	0.6

**Table 3. Prevalence of missing item prices for non-school acquisitions before and after item-cost imputation**

	Before Editing and Imputation	After Edits	After Edits and Imputation <sup>a</sup>
<b>Number and percent of items by cost type</b>			
Total items	91,983	91,983	91,983
ITEMCOST >0	42.7%	41.9%	47.0%
ITEMCOST=0	45.4%	53.6%	52.3%
ITEMCOST is missing but applicable (FREE=0)	11.9%	4.6%	0.7%
Total	100.0%	100.0%	100.0%
Item cost is imputed	NA	NA	5.1%
<b>Distribution of non-zero item costs<sup>b</sup></b>			
Mean	\$4.06	\$3.80	\$3.80
Minimum	0.01	0.04	0.04
5th percentile	0.70	0.70	0.75
10th percentile	0.99	0.99	0.99
1st quartile	1.25	1.25	1.25
Median	2.29	2.25	2.29
3rd quartile	5.09	5.00	5.00
90th percentile	8.50	8.00	8.00
95th percentile	11.94	10.60	10.68

<sup>a</sup>The edited reported ITEM COST and imputed ITEM COST (IMPITEMCOST) are stored in two different variables. This column summarizes the combination of these two variables.

<sup>b</sup>The distribution of item prices is unweighted.

Note: The maximum value is not shown as it is an extreme outlier (payment for a banquet) and may make the acquisition identifiable.

#### 4. Known Data Anomalies

Respondents were instructed to report the “[t]otal paid including tax and tip.” For FAFH, this amount does not typically include prices for nonfood items. However, we expect that respondents usually reported the total printed on the receipt. The sum of the item prices (TOTITEMCOST) may not equal the TOTALPAID reported on the Red Page even after adjusting for tip, and the edits described above. This difference typically reflects State and local sales tax applied to food purchases. However, there are instances where bottle deposits and the purchase of nonfood items are reflected in the TOTALPAID, but not in the item costs. This is because the study only entered food items and their costs into the data entry system (i.e., subtotals paid for taxes, bottle

deposits, and nonfood items were not recorded). Nonfood items that were mistakenly recorded were dropped from the data file during processing. The amount provided for TOTALPAID for the event was not adjusted when nonfood items were dropped from the event.

In the event that TOTALPAID, after accounting for tip and tax, exceeds the sum of the item costs (TOTITEMCOST), is it possible that the respondent either underreported the amount of people for whom the food was purchased, or the total paid was extracted from a receipt when payment was split with someone outside the household.