



## Appendix F

# Estimating the Value of HEAP Benefits

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The Home Energy Assistance Program (HEAP) is a federally funded program that helps low-income households pay for home energy costs. HEAP is comprised largely of four different components, including regular and emergency assistance, assistance to pay for cooling, and heating equipment repair and replacement (HERR) benefits. HEAP benefits can be quite substantial, although the vast majority of HEAP-assisted households, particularly renters, receive very modest assistance in New York City.<sup>1</sup> The American Community Survey (ACS) does not collect information on HEAP program participation or the value of HEAP assistance.

As a remedy, we impute missing information from New York City administrative HEAP data into the ACS. In earlier editions of this report HEAP benefits were only imputed to renter households, but starting with this edition, NYCgov has imputed HEAP benefits to homeowners for the years 2013–2018 as well. We also imputed receipt of the HERR benefit for that same time period. This program, which assists eligible homeowners with furnace and tank repair or replacement, is an infrequently distributed benefit and available only to homeowners.

In addition, we have implemented changes to our imputation method. Unlike previous editions, we have employed individual household-level matching methods that identify and link similar units between administrative records and ACS households. Beginning in 2013, for all benefit components excluding HERR, a predictive mean matching (PMM) technique is employed to compensate for missing energy assistances in the ACS. HERR benefits are imputed separately using a random matching method that links similar units between the ACS and administrative data. These recent changes create a significant break in our imputed HEAP values so the resulting poverty data series requires some caution in interpreting time trends in our data.<sup>2</sup>

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<sup>1</sup> The maximum benefit level set for the regular benefit component varies greatly by fuel type, ranging from \$350 to \$650 for FY 2017–2018. HERR benefits are higher, around \$6,000, yet 95 percent of HEAP-assisted households in New York City received less than \$50. This represents the HEAP benefit to low income renters as compensation for heating costs included in rent.

<sup>2</sup> For the years 2011 and 2012, if, as part of the housing imputation process, an ACS household was matched to a Housing Vacancy Survey (HVS) household that reported receiving HEAP payments, it was also assumed to be receiving a HEAP benefit. See 2016 and previous appendices for a description of the pre-2011 imputation method.

Our approach involves three steps: 1) simulating program rules to construct a pool of potentially eligible households in the ACS, 2) estimating regression parameters of total HEAP values conditional upon a set of predictors on the administrative donor database and utilizing the estimated parameters to compute predicted values of HEAP, and 3) matching each recipient record to a donor unit with the assistance of nearest neighbor algorithms or random match techniques, then transferring the actual HEAP value received by donors to the paired ACS recipient records.

## Identifying Potentially Eligible ACS Households

To receive energy assistance, applicants are required to meet basic eligibility rules for all HEAP components. Requirements include both financial and non-financial criteria, including qualified living quarters, citizenship or alien status, and responsibility for heating costs (either through a direct vendor relationship or undesignated payments included in rent). In constructing a pool of eligible ACS households, we simulate general rules that use data points common to both data sets to identify potentially eligible ACS households.

HEAP benefits are designed to assist households whose income falls below 60 percent of state median income.<sup>3</sup> In determining a household's income eligibility, we exclude incomes from individuals age 21 or over who are unrelated to the head of household or are foster children. HEAP program rules do count income from anyone in the household who is not a U.S. citizen or a qualified alien but excludes them from being counted in the size of the household. This makes it less likely that a mixed-status household whose members include different citizenship or immigration statuses will qualify for the same program benefits relative to other households. Since the ACS does collect information on the legal status of immigrants, these rules only apply to households with noncitizens present. If a household is composed of all noncitizens, it will be identified as ineligible for inclusion in our simulation. This means that our imputation inevitably will result in underestimation of reciprocity and aggregate HEAP values in the city.

In New York City, households that participate in cash assistance, Supplemental Nutrition Assistance Program (SNAP) benefits, or Supplemental Security Income (SSI) programs<sup>4</sup> are automatically considered to be eligible since they have met income eligibility requirements for other means-tested programs. This subset of categorically eligible households comprises 98.2 percent of the assisted households in the city for Fiscal Year (FY) 2017–2018. Because participation in these transfer programs is under-reported in the ACS, a strict application of categorical eligibility rules in the ACS would render a pool of eligible household far short of the administrative caseload. Thus we extend the definition of categorically eligible ACS households to include those with Medicaid coverage.

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<sup>3</sup> For households of 11 or more, 150 percent of a monthly poverty guideline is used.

<sup>4</sup> Specifically, only those SSI beneficiaries whose cases are designated as "living alone" by Code A of the Social Security Administration are categorically eligible for HEAP benefits.

In addition, energy assistance is available for those households in an eligible living arrangement. Excluded from eligibility are those households living in boats, RVs, or vans, and those who are occupying housing units without payment in rent.

To qualify for HERR component benefits, applicant households are required to meet several additional requirements:

- Must have resided in the dwelling unit for 12 months prior to the month of application
- Dwelling must not have more than two units
- Home ownership

### **Prediction of Combined HEAP Values – Excluding HERR Benefits**

HEAP assistance is structured to take into account household income, energy costs, and family size in order to ensure that the highest benefits are paid to those households with the highest energy costs.<sup>5</sup> Except for households whose rent includes heat, fuel type dictates the maximum allowable base amounts for those receiving regular benefits. This comprises a large majority of the administrative caseload.<sup>6</sup> Relying on linear regression technique, we estimated a predictive model of HEAP values in the administrative data set as a function of household income and size, as well as fuel type. Table F.1 shows regression coefficients. These parameters are then used to compute the predicted values of energy assistance for the records in both ACS and HEAP administrative data. Overall, the performance of our prediction model is satisfactory, given that average prediction error is estimated to be \$11. As shown in Table F.2, however, prediction errors greatly vary by fuel type. The largest prediction error occurs in the household subgroup that uses wood or coal as heating fuel.

### **Matching Procedures and Results**

As mentioned earlier, two separate matches are performed: 1) PMM matching to impute total payments of regular, emergency, and cooling benefit components, and 2) a random matching to impute HERR benefits.

PMM is performed on the basis of the predicted HEAP values. For each ACS recipient record, a search is performed for a donor case in the administrative data with the same or nearest predicted value and within each allocation cell (defined as a combination of borough of residence, fuel type, and recipient type, i.e., renter vs. homeowner). The use of matching criteria is to ensure that geographic and other demographic variations in HEAP payments are replicated in the ACS.

<sup>5</sup> In administrative data, some recipients participate in the multiple benefit component of the HEAP program, e.g., cooling and heat-related benefits. We aggregate all benefit payments per recipient. Note that zero HEAP households in the administrative data received both HERR and other benefit components.

<sup>6</sup> For FY 2017–2018, the maximum level of base benefit is set at \$675 for oil, kerosene, or propane; \$525 for wood or coal; and \$350 for natural gas.

According to NYC Department of Social Services (DSS) administrative data, only 46 households received HERR benefit components for FY 2017–2018. Our simulation identified 1,226 ACS sampled homeowners (unweighted count) as potentially eligible for HERR benefits. Those households, on average, carry household sampling weights of 86. In order to meet a control target of less than 1 percent of total caseloads, we limited a pool of ACS HERR recipient candidates to those with household sampling weights of less than 30 (12 households in an unweighted count), then randomly matched them with an administrative case. We assigned the value of the HERR benefit received by the matched administrative record. The resulting weighted allocation is satisfactory, given that rendered HERR receipts totaled less than 1 percent of all ACS HEAP recipient households. More importantly, it replicates the geographic distribution of HERR benefits despite geography not specifically controlled for in the allocation process (see Table F.3).

Tables F.4 through F.7 demonstrate how well our imputation method replicates the distribution of HEAP in the administrative data into the imputed NYCgov data. Table F.4 shows that while both the number of receipts and the aggregate value of energy assistance are under-allocated compared to administrative data on HEAP-assisted households, the mean and median HEAP payments between the administrative and NYCgov data are close. This is likely the result of two contributing factors: underreporting of program participation in the ACS, and not being able to identify and include those qualified alien households due to a lack of information on immigration status.

In Table F.5 we compare the share of HEAP households that are categorically eligible for program benefits in administrative data and NYCgov imputations. Despite an expansion of categorical eligibility to those households with Medicaid, their share of total caseloads in our NYCgov data falls significantly short of the administrative target.

Table F.6 compares the number of recipients and aggregate HEAP payments by homeowners and renters. As shown, the percentage breakdowns between the datasets for these two groups are close, indicating that the matching process successfully preserves HEAP distribution by recipient type.

Table F.7 illustrates that our matching approach also satisfactorily preserves the geographic distribution of receipt.

## **The Effect of HEAP on the NYCgov Poverty Rate**

Once estimated, the value of the HEAP benefit is added to a poverty unit's income. Since there can be more than one poverty unit in an ACS-defined household, the benefit is only given to the primary poverty unit in a multi poverty unit household.<sup>7</sup> This follows program rules that limit payments to one per household.

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<sup>7</sup> Usually the unit containing head of household.

Table F.8 compares NYCgov estimates to DSS administrative data for the number of New York City households that received HEAP benefits, the total value of the benefits, and the mean benefit per household in 2018. The NYCgov estimates come to 79.8 percent of the administrative data for the number of HEAP households, 82.8 percent of the administrative data for total benefits, and 103.7 percent of the administrative data for mean benefit per household.

The very low dollar value of HEAP benefits explains the too-small-to-register effect of HEAP on the NYCgov poverty rate noted in Chapter 1, Chapter 2, and Table F.9 of this appendix. The marginal impact of HEAP benefits on the NYCgov poverty rate lowers the poverty rate by 0.03 percentage points.

Table F.1

### Regression Model to Predict HEAP Assistance, 2018

Predictors	Estimate
(Intercept)	250.3*
Monthly Household Income	0.0
House Size	1.0*
<b>Fuel Type</b>	
<i>(Reference Group: Coal or Wood)</i>	
Municipal Electric Heat	-149.0*
Fuel Oil	398.7*
Heat Included in Rent	-221.5*
Natural Gas	84.3*
Other Fuel	-217.1*
Unknown	-93.9*

Source: Administrative Data on HEAP-Assisted Households compiled by New York City Department of Social Services.  
 Note: Dependent variable is the sum of all energy assistance, including regular, cooling, emergency, and utility assistance.  
 \* < .0001

Table F.2

**Performance of Predictive Model by Fuel Type, FY 2017–2018**

	Average Assistance	Average Value of Predicted Assistance	Mean Absolute Prediction Error
Coal or Wood	\$251	\$251	\$260
Electricity	\$103	\$103	\$111
Oil or Kerosene	\$651	\$651	\$95
Heating Included in Rent	\$31	\$31	\$6
Natural Gas	\$338	\$338	\$90
Other Fuel Type	\$35	\$35	\$1
Fuel Type Unknown	\$190	\$158	\$143

Source: Administrative Data on HEAP-Assisted Households compiled by New York City Department of Social Services.

Table F.3

**Geographic Distribution of Heating Equipment Repair and Replacement (HERR) Benefits by Borough, 2018**

	Bronx	Brooklyn	Manhattan	Queens	Staten Island	Total
Administrative Data	6	13	0	26	1	46
%	13.0%	28.3%	0.0%	56.5%	2.2%	100%
NYCgov Data	29	29		216	29	303
(weighted %)	9.6%	9.6%	0.0%	71.3%	9.6%	100%

Sources: The American Community Survey Public Use Micro Sample as augmented by NYC Opportunity, and New York City Department of Social Services.

Table F.4

### Comparison of HEAP Distributions between Administrative Data and NYCgov Data, 2018

	Administrative Data on Home Energy Assistance	Home Energy Assistance in NYCgov Data	Ratio of NYCgov Data to Administrative Data
HEAP Caseload NYC	778,341	621,229	79.8%
	778,295*	556,182*	71.5%
Aggregate HEAP (\$)	37,810,226	31,302,928	82.8%
	34,074,850*	26,888,708*	78.9%
Mean	\$49	\$66	134.7%
	\$48*	\$48*	100.0%
Median	\$35	\$35	100.0%
	\$35*	\$35*	100.0%
99th Percentile	\$401	\$401	100.0%

Sources: The American Community Survey Public Use Micro Sample as augmented by NYC Opportunity, and New York City Department of Social Services.

\* Estimates do not include HERR benefits.

Table F.5

### Share of Categorically Eligible Households among Assisted Households, 2018

	Home Energy Assistance Administrative Data		Imputed Home Energy Assistance NYCgov Data	
	Number	Percent	Number	Percent
Total Caseload	778,341	100%	621,229	100%
Categorically Eligible Household*	768,223	98.7%	556,182	89.5%
Non-categorically Eligible Household	10,118	1.3%	65,047	11.7%

Sources: The American Community Survey Public Use Micro Sample as augmented by NYC Opportunity, and New York City Department of Social Services.

\* A household is considered categorically income eligible for HEAP when they have already met income eligibility for TA, SNAP, or the Code A SSI program. Participation in those programs are under-reported in ACS data. To compensate, we expand categorical eligibility to include household reporting Medicaid coverage.



Table F.6

**Distribution of Home Energy Assistance  
by Recipient Type, 2018**

	Home Energy Assistance Administrative Data		Imputed Home Energy Assistance NYCgov Data	
Panel A: Number of Assisted Households	Number	Percent	Number	Percent
<b>Total</b>	778,341	100%	621,229	100%
Homeowners	24,710	3.2%	25,458	4.1%
Renters	717,549	92.2%	595,771	95.9%
Panel B: Value of HEAP Payment	Number	Percent	Number	Percent
<b>Total</b>	\$37,810,226	100%	\$31,302,928	100%
Homeowners	\$6,642,441	17.6%	\$6,943,840	22.2%
Renters	\$29,967,523	79.3%	\$24,359,088	77.8%

Sources: The American Community Survey Public Use Micro Sample as augmented by NYC Opportunity, and New York City Department of Social Services.

Table F.7

**Table F.7 Geographic Distribution of HEAP Households by Borough, 2018**

	Bronx	Brooklyn	Manhattan	Queens	Staten Island	Total
<b>Assisted Households in Administrative Data*</b>	211,748	263,726	127,369	142,783	32,169	777,795
	27.2%	33.9%	16.4%	18.4%	4.1%	100%
<b>Assisted Households in NYCgov Data</b>	202,179	157,148	121,716	120,030	20,156	621,229
	32.5%	25.3%	19.6%	19.3%	3.2%	100%

Sources: The American Community Survey Public Use Micro Sample as augmented by NYC Opportunity, and New York City Department of Social Services.

\*Administrative data exclude cases where borough is not recorded.

Table F.8

### Comparison of NYCgov Estimates to Administrative Data for HEAP Program, 2018

Panel A. Recipient Households	
NYCgov Estimate	621,229
DSS Administrative Data	778,341
NYCgov as a Percentage of DSS	79.8%
Panel B. Total Benefits	
NYCgov Estimate	\$31,302,928
DSS Administrative Data	\$37,810,226
NYCgov as a Percentage of DSS	82.8%
Panel C. Mean Benefit per Household	
NYCgov Estimate	\$50
DSS Administrative Data	\$49
NYCgov as a Percentage of DSS	103.7%

Sources: The American Community Survey Public Use Micro Sample as augmented by NYC Opportunity, and New York City Department of Social Services.

Table F.9

### Impact of Energy Assistance on Poverty Rates, 2018

(Numbers are Percent of the Population)

	All Persons	Renters	Homeowners
<b>Total NYC Opportunity Income</b>	19.1	21.6	10.6
<b>Net of HEAP Benefits</b>	19.1	21.6	10.6
<b>Marginal Effect of HEAP Benefits</b>	-0.03	-0.03	-0.01

Source: The American Community Survey Public Use Micro Sample as augmented by NYC Opportunity.