Food and Nutrition Service	**November 2016**

THE APEC II STUDY: ESTIMATING AND VALIDATING STATISTICAL MODELS FOR GENERATING STATE-LEVEL ESTIMATES OF IMPROPER PAYMENTS IN THE SCHOOL MEAL PROGRAMS (SUMMARY)

Overview

The National School Lunch Program (NSLP) and School Breakfast Program (SBP) are federally assisted meals programs that operate in about 100,000 public and nonprofit private schools and residential child care institutions. These school meal programs provide partially and fully subsidized (i.e., free and reduced-price) meals to millions of children each year.

Federal law – most recently the Improper Payments Elimination and Recovery Act of 2010 (IPERA) – requires FNS and other agencies to identify and reduce improper payments in their programs. The second *Access, Participation, Eligibility and Certification* (APEC II) study obtained national estimates of improper payment rates for the NSLP and SBP for the School Year (SY) 2012-2013 using a nationally representative sample of students drawn from a number of school food authorities (SFAs) and schools across the country. In addition to estimating improper payment rates in the NSLP and SBP in SY 2012-13, the APEC II included statistical models that can be used to estimate and update improper payment rates at the national and State levels annually without having to conduct primary data collection.

The objectives of the APEC II State-level modeling report include: (1) estimation of the APEC II improper payment model by State; and (2) validation of the APEC II improper payment model.

Methodology

The first step in validating the State-level models of improper payments in the NSLP and SBP involved estimating school district-level improper payment rates using the APEC II sample. Improper payments were calculated separately depending on their source: certification error in schools using the Community Eligibility Provision (CEP)[1], certification error in non-

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[1] CEP is an alternative to traditional certification which allows schools in high-need communities to serve free meals to all students. These schools are reimbursed for meals based on the percentage of students who are directly certified to receive free meals. Direct certification is determined by participation in another means-tested Government assistance program including, but not limited to Supplemental Nutrition Assistance Program (SNAP) and Temporary Assistance for Needy Families (TANF).

CEP schools, and meal-claiming error. Certification errors occur when students are certified for the incorrect meal reimbursement category. Meal-claiming errors occur when the incorrect numbers of meals are reported for reimbursement to FNS.

Next, administrative data sources that contain information associated with district-level improper payment rates were obtained. Key data sources included the Verification Collection Report, the Common Core of Data, the Private School Survey, Census Small Area Income and Poverty Estimates, and Local Area Unemployment Statistics. These data contain rich information on district characteristics, school meal program policies, and local economic conditions. Regression models based on these data were used to estimate improper payments for each school district, and these were summed to derive improper payment rates for each State.

Once statistical models were developed, they were used to estimate State improper payment rates and then were validated. Specifically, model-based improper payment rates were compared to sample-based improper payment rates at the school district level. A more direct validation test involved constructing "simulated" States with various-sized districts and comparing the model-based improper payment rates to the sample-based improper payment rates. The results of these analyses are detailed below.

Results

Results of State model estimation

The estimated State-level improper payment rates varied considerably for each of the sources of improper payments. For the NSLP, estimated certification error in non-CEP schools ranged from 2.8 to16 percent; estimated certification error in CEP schools ranged from 0.6 to 3.0 percent; and estimated meal-claiming error ranged from 2.5 to 9.7 percent. For the SBP, estimated certification error in non-CEP schools ranged from 2.5 to 15.2 percent; estimated certification error in CEP schools ranged from 0.6 to 3.0 percent; and estimated meal-claiming error ranged from 4.2 to 17.7 percent.

The average sampling error for estimates of improper payment rates for certification error in non-CEP

schools is 3.4 percent; the average sampling error for estimates of improper payment rates for certification error in CEP schools is 1.7 percent; and the average sampling error for estimates of improper payment rates for meal-claiming error is 3.8 percent. The large sampling error associated with the estimates of improper payment rates suggests that they are imprecise predictors of actual improper payment rates. IPERA mandates that 95-percent confidence intervals are no wider than ± 3 percentage points. Despite these large sampling-error values, many States have model-based improper payment rates that are close to the national model-based improper payment rate for each of the three error sources.

Results of State model validation
Because sample-based State estimates were not calculated for the study, two other validation methods were used. The first validation test compared the model-based (i.e., predicted) estimates of improper payment rates at the school district level to sample-based district-level estimates. The statistical tests revealed significant differences between the average model- and sample-based estimates for each of the three error sources. Therefore, we can conclude that this statistical model, based on district-level improper payment rates, does not sufficiently predict State-level improper payment rates to be useful for program assessment and administration.

The second validation test constructed four "simulated" States by randomly selecting districts sampled in APEC II. For each simulated State, sample-based and model-based improper payment rates were computed by summing the relevant improper payment rates across districts. Differences between model-based and sample-based estimates were examined. These differences were statistically significant for some of the simulated States.

Conclusions
There is substantial variation across States in predicted (i.e., model-based) improper payment rates due to certification error in non-CEP schools and meal-claiming error. In addition, the sampling error for these estimates exceeds IPERA guidelines. The predicted State-level improper payment rates due to certification error in CEP schools are less variable, and the sampling error for these estimates is acceptable. Nonetheless, model-based estimates of State-level improper payment rates should be regarded as inexact, and users should interpret them with caution.

At the district level, the statistical model produces inaccurate estimates of improper payment rates for the three error sources, which suggests that the model will also be inaccurate at the State level. Model-based estimates of State-level improper payments may be inaccurate for some States, as indicated by differences between model- and sample-based estimates for more simulated States than would be expected by chance.

Model-based estimates of State-level improper payments may become less accurate over time, as context and policy changes create instability in the model predictors and the model loses some of its predictive ability.

For More Information
Wu, A.Y. and Moore, Q. (2016). *The APEC II Study: Estimating and Validating Statistical Models for Generating States Estimates of Improper Payments in the School Meal Programs.* Prepared by Mathematica Policy Research. Alexandria, VA: USDA, Food \and Nutrition Service. Project Officer: Chan Chanhatasilpa. This report is available online at:
http://www.fns.usda.gov/ops/research-and-analysis.