

Kaiser Family Foundation ACA Eligibility Analysis, Technical Appendix B: Immigration Status Imputation

To impute documentation status for each person in the sample, we draw on the methods underlying the 2013 analysis by the State Health Access Data Assistance Center (SHADAC) and the recommendations made by Van Hook et. al.^{1,2} This approach uses the Survey of Income and Program Participation (SIPP) to develop a model that predicts immigration status; it then applies the model to a second data source, controlling to state-level estimates of total undocumented population from Department of Homeland Security. Below we describe how we developed the regression model and applied it to the Current Population Survey Annual Social and Economic Supplement (CPS-ASEC). We also describe how the model may be applied to other data sets. The programming code, written using the statistical computing package R v.3.3.1, is available upon request for people interested in replicating this approach for their own analysis.

Data Sources

We used the second wave of the 2008 Survey of Income and Program Participation (SIPP) panel data to build the regression model. The SIPP Wave Two dataset contains questions on migration history at the person level.

The regression model is designed to be applied to other datasets in order to impute legal immigration status. The code mentioned above includes programming to apply the model to either the SIPP Core file or the Current Population Survey (CPS) (for years 2007 on). Because the SIPP Core file and CPS contain different survey questions and variable specifications, we create unique regression models to apply the model to each dataset. For the analysis underlying *Estimates of Eligibility for ACA Coverage among the Uninsured in 2016*, we apply the regression model to the 2014 CPS-ASEC and then the 2016 CPS-ASEC.

Due to underreporting of legal immigration status in the SIPP, in imputing immigration status we control to state and national-level estimates of the undocumented population from the Department of Homeland Security, Office of Immigration Statistics. DHS reports estimates for the nation and for states with the highest population of unauthorized immigrants.³ It also includes estimates by age categories.

Construction of Regression Model

We use the SIPP Wave Two to create a binomial, dependent variable that identifies a respondent as a potential unauthorized immigrant. The dependent variable is constructed based on the following factors:

- 1) Respondent was not a United States (US) citizen,
- 2) Respondent did not have permanent resident status upon US entry,
- 3) Respondent's immigration status did not change to permanent resident since US entry, and
- 4) Respondent does not have other indicators that imply legal status.⁴

We use the following independent variables to predict unauthorized immigrant status:⁵

- 1) Place of birth,
- 2) Year of US entry,
- 3) Whether respondent moved into current residence within the last twelve months,
- 4) Job industry classification,
- 5) State of residence,
- 6) Family Poverty Level,
- 7) Ownership or rental of residence,
- 8) Presence of at least one citizen in household,
- 9) Number of occupants in the household (< or >= six occupants),
- 10) Whether all household occupants are related,
- 11) Number of workers in household,
- 12) Health insurance coverage status,
- 13) Ethnicity, and
- 14) Age.

The regression model was sub-populated to remove respondents who could not be considered unauthorized. People who could not be considered unauthorized include people who 1) were born in the US, 2) are US citizens, or 3) have other indicators that imply legal status.³

Imputing Unauthorized Immigrants in Other Datasets

We use the DHS estimates as targets for the total number of unauthorized immigrants that the imputation generates. We first apply this strategy to the 2014 CPS-ASEC, which contains calendar year 2013 income and health insurance information prior to the ACA's coverage expansions. We stratify the targets by state (among the five states with the highest population of unauthorized immigrants) and by six age categories, for a total of 36 strata. State categories include: California, Florida, Illinois, New York, Texas, and all other states. Age categories include 18 and under, 18-24 years, 25-34 years, 35-44 years, 45 to 54 years, and 55 and above. We impute immigration status within each stratum.⁶

To generate the imputed immigration status variable, we first calculated the probability that each person in the dataset was unauthorized based on the SIPP regression model. Next, we isolated the dataset to each individual stratum described above. Within each stratum, we sampled the data using the probability of being unauthorized for each person. After sampling, we summed the person weights until reaching the DHS population estimate for each stratum. The records that fell within the DHS population estimate were considered to be unauthorized immigrants. We repeated the process of sampling using the probability of being unauthorized and subsequently summing the person weights to reach DHS targets ten times, creating ten different unauthorized variables per record. These ten imputed authorization status variables were then incorporated into a standard multiple imputation algorithm, closely matching the imputed variable analysis techniques used by the Centers for Disease Control and Prevention for the National Health Interview Survey.⁷

We used this first pass on the CPS-ASEC 2014 to inform our sampling targets for the latest available microdata (CPS-ASEC 2016). Looking at the results of our undocumented imputation on the CPS-ASEC 2014, we calculated the share of undocumented immigrants lacking health insurance within each of those thirty-six strata prior to the ACA's coverage expansions and transferred that information into a new dimension of sampling strata for the CPS-ASEC 2016. We split each of the thirty-six sampling strata used on the pre-ACA CPS-ASEC 2014 into uninsured versus insured categories, resulting in seventy-two sampling strata for subsequent years. We then repeated our imputation on the CPS-ASEC 2016 with the newly-divided strata. We believe that fixing the uninsured rate of the unauthorized population to calendar year 2013 levels appears to introduce the smallest amount of error to our model.⁸

To easily apply the regression model to other data sets, we created a function that applies this approach to a chosen data set. The function first loads the dataset of choice, then standardizes the data to match the independent variables from the SIPP regression model, and finally applies the multiple imputation to generate a variable for legal immigration status.

Endnotes

¹ State Health Access Data Assistance Center. 2013. "State Estimates of the Low-income Uninsured Not Eligible for the ACA Medicaid Expansion." Issue Brief #35. Minneapolis, MN: University of Minnesota. Available at: http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2013/rwjf404825

² Van Hook, J., Bachmeier, J., Coffman, D., and Harel, O. 2015. "Can We Spin Straw into Gold? An Evaluation of Immigrant Legal Status Imputation Approaches" *Demography*. 52(1):329-54.

³ DHS updates these estimates periodically. We use the estimates applicable to the year for the data sets to which we apply the regression model. The most recent estimates are: N Rytina, B Baker. *Estimates of the Unauthorized Immigrant Population Residing in the United States*. (Department of Homeland Security, Office of Immigration Statistics), March 2013. Available at: <http://www.dhs.gov/publication/estimates-unauthorized-immigrant-population-residing-united-states-january-2012>. Since an update of this document has not occurred for the most recent years of data, 2012 estimates were inflated for 2013, 2014, and 2015 using non-citizen population growth in the 2012, 2013, and 2014 American Community Survey subtracted by counts of legal permanent residents, asylees, and refugees also published by DHS-OIS. This inflation technique was developed from conversations with DHS-OIS researchers, and subsequently distributed using age and state-stratified population proportions also furnished by DHS-OIS researchers.

⁴ Indicators that imply legal status include: (i) respondent entered the US prior to 1980, or (ii) respondent is enrolled in any of the following public programs: Medicare, military health insurance, public assistance, Supplemental Security Income, or Social Security Income.

⁵ The first three listed independent variables are excluded when using the regression model to analyze the SIPP Core Data because they are not included in Core SIPP files.

⁶ For more information, see SHADAC 2013, footnote 6. The table created for this function contains estimates of the undocumented across 2007-2015. Only five large states were included in the strata due to low sample size within some of the age categories by state relative to the calculated population targets.

⁷ For more detail, see documentation available at: National Health Interview Survey. *2015 Imputed Income Files*. October 3, 2016. Available at: http://www.cdc.gov/nchs/nhis/nhis_2015_data_release.htm

⁸ As an example of this, we found that approximately half of undocumented children in the state of Texas did not have health insurance during calendar year 2013. Our undocumented uninsured model for all post-2014 calculations now incorporates the assumption that about half of undocumented children in Texas should be sampled from the insured population and the other half should be sampled from the uninsured population, thereby holding the uninsured rate constant. Prior to implementing this new sampling dimension, we found unrealistic drops in the uninsured rate of the undocumented population that we largely attributed to our prediction model's inability to discern this group from legally-present non-citizens, many of whom are eligible for assistance under the ACA's coverage expansions. Although a few states have implemented programs that allow for coverage of the undocumented population, these programs are state-funded and relatively small in scale compared to the nationwide coverage expansions accompanying the ACA.