This is an overview of SAS programs used in the analysis for “Pharmaceutical treatment for Alzheimer’s disease and related dementias: utilization and disparities,” by Douglas Barthold, Geoffrey Joyce, Patricia Ferido, Emmanuel Drabo, Zachary A. Marcum, Shelley Gray and Julie Zissimopoulos published in the *Journal of Alzheimer’s Disease* in 2020.

**Harmonize Part A, B and D Claims**

partABlib.mac

* sets up raw data file libnames for Parts A and B claims

partDlib.mac

* sets up raw data file libnames for Part D claims

setup.inc

* sets up directories for Medicare claims data project work

sascontents.mac

* Macro that runs contents on data set and outputs to specified folder

renvars.mac

* Macro that renames variables in list

pdeplan\_dts.sas

* Source data: Medicare Part D Events files
* Get all Part D plan information by bene\_id and plan

bene\_pdeplan\_dts.sas

* Source data: Cleaned Part D Plans data from pdeplan\_dts.sas
* Summarize Part D plan information on beneficiary level

claim\_dates.sas

* Source data: Medicare RIF claims files
* Extract claim dates from claim segment for all claim types

clmids.sas

* Source data: Claim dates data from claims\_dates.sas
* Creates a beneficiary level file that flags whether the beneficiary has a type of claim

claimfile\_set\_nseg.inc

* Sets number segments for claim types and years that have been broken up into smaller segment files

extractfrom1.mac, extprocs1.mac, extprocs1\_xwseg.mac

* macros to loop through years of claims files and extract and rename variables

xwalk0205.mac

* Source data: EHIC and beneficiary ID crosswalk
* crosswalk 2002-2005 EHIC ids to beneficiary ids

diag\_pta.sas

* Source data: Medicare Part A RIF claims files
* Extracts diagnoses information form Part A claims

diag\_ptb.sas

* Source data: Medicare Part B RIF claims files
* Extracts diagnoses information from Part B claims

provider\_id.sas

* Source data: Medicare Part A and B RIF claims files
* Extracts provider information from Part A and B claims

p2egwp.sas

* Source data: Part D plan information
* Creates a format of Part D plan information

**Harmonize raw MBSF files**

bsf\_allyrs.sas

* Source data: Medicare Beneficiary Summary Files
* merges bsfab and bsfd files together after 2006

bene\_demog2016.sas, veryold.fmt

* Source data: Medicare beneficiary summary files and harmonized files from bsf\_allyrs.sas
* creates a file of beneficiary non-time-varying demographics across all years of available data

bene\_status.fmt, bene\_status\_year.sas

* Source data: Medicare beneficiary summary files and harmonized files from bsf\_allyrs.sas and bene\_demog2016.sas
* summarizes enrollment data.sas, HMO status.sas, dual eligibility.sas, Part D plan by year

bene\_geo.sas, ssa2fips\_state.fmt, ssa\_statenm.fmt, fips\_statenm.fmt, ssa2fips\_county.fmt, ssa\_countynm.fmt, fips\_countynm.fmt

* Source data: Medicare beneficiary summary files
* extracts geographic identifiers from bsf files and crosswalks other geographic identifiers

bsf\_cc.sas

* Source data: Medicare Chronic Conditions files
* harmonizes the chronic conditions files across years

phy0616.sas

* Source data: Medicare Cost & Use files
* harmonizes the physician visit information from the cost & use files

**Pull Anti-dementia Drug Use Claims**

pull\_ADdrugs\_dts.sas

* Source data: First DataBank extract data, Medicare Part D Events files
* Pulls Part D claims for donepezil, galantamine, memantine, and rivastigmine

read\_in\_taxonomy\_xw\_2017.sas

* Source data: Medicare provider crosswalk <https://data.cms.gov/Medicare-Enrollment/CROSSWALK-MEDICARE-PROVIDER-SUPPLIER-to-HEALTHCARE/j75i-rw8y>
* Read in Medicare provider/supplier crosswalk

clean\_taxonomy\_xwlk.sas

* Source data: Medicare provider crosswalk data, Medicare NPPES data
* Clean taxonomy crosswalk, identifying dementia specialists among provider specialties

adrx\_descriptives.sas

* Source data: pulled AD drug Part D claims and NPI specialist dictionary
* Summarizes AD drug use and identifies incident use for each beneficiary

**Pull Dementia Diagnoses Claims**

dementia\_dx.sas

* Source data: Harmonized diagnosis extracts from Part A and B files
* Pull all dementia diagnoses from extracts

dementia\_dxdt\_typ.sas

* Source data: Pulled dementia diagnosis claims from ‘dementia\_dx’
* Turn the claim level file into date level

dementia\_dxdate.sas

* Source data: Date level dementia diagnosis claims from ‘dementia\_dxdt\_typ’
* Combine all the date level dementia diagnosis claims

dem\_symptoms.sas

* Source data: Harmonized diagnosis extracts from Part A and B files
* Pull all dementia symptom diagnoses from extracts

dem\_symptoms\_carmrg.sas

* Source data: Pulled dementia symptom diagnosis claims from ‘dem\_symptoms’
* Combine the carrier header and line files into one merged carrier file

**Build Analytical Files**

sample\_selection.sas

* Source data: Harmonized beneficiary status files and beneficiary demography file, Medicare Chronic Conditions files
* Summarize sample information and identify sample as those 67+ and enrolled in FFS and Part D in years *t-2, t-1,* and *t*

sample\_selection\_monthly.sas

* Source data: Medicare Beneficiary Summary files for Part A and B, and Part D, sample data set from above program
* Create a monthly level data set with enrollment and sample information

1a\_ad\_providers.sas, 1b\_adrd\_providers.sas, 1c\_symptoms\_providers.sas,

1ai\_ad\_providers\_carmrg.sas, 1bi\_adrd\_providers\_carmrg.sas, 1ci\_symptoms\_providers\_carmrg.sas

* Source data: Pulled claims of dementia and dementia symptoms diagnoses
* Merged provider information to claims

2a\_ad\_upin\_npixw.sas, 2b\_adrd\_upin\_npixw.sas, 2c\_symptoms\_upin\_npixw.sas

* Source data: Merged diagnoses with provider information from above programs
* Merge NPI to claims with only UPIN information to maximize claims with NPI information

3a\_ad\_phys\_specialty.sas, 3b\_adrd\_phys\_specialty.sas, 3c\_symptom\_phys\_specialty.sas

* Source data: Dementia claims with NPI information created from above programs
* Merge dementia claims with NPI to NPI info dictionary to get specialty information and turn date-level

4a\_adinc\_spec.sas, 4b\_adrdinc\_spec.sas, 4c\_symp\_inc.sas

* Source data: Dementia claims with specialist information of diagnosing physician from above programs
* Using hierarchy of physician type to identify whether or not a diagnosis was given by a dementia specialist or a non-dementia-specialist

build\_analytical.sas

* Source data: Dementia claims with specialist info created above, pulled anti-dementia drug claims, sample information
* Merge dementia diagnoses, anti-dementia drug use, and sample information to create a base analytical data set

build\_bene\_geo.sas

* Source data: Sample data set, harmonized beneficiary geographic information, beneficiary HCC scores built using Medicare risk adjustment algorithms (<https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors>), ZCTA to ZIP crosswalk, ACS zip code information about income and education, sample data set
* Create a data set with zip code level SES information and HCC score for each beneficiary

build\_stillusing.sas

* Source data: Base analytical data set from ‘build\_analytical’
* Summarize length of anti-dementia drug use for anti-dementia drug users

.sas

* Source data: Anti-dementia drug claims with prescriber information, base analytical data set from above, sample data set with geographic SES info, harmonized Chronic Conditions data set, harmonized physician cost and use file, harmonized bene status files
* Create a clean data set with all covariates for logistic regression

**Analysis**

sample\_desc.sas

* Source data: Harmonized beneficiary status files, dementia claims with specialist info, base analytical data set, harmonized Chronic Conditions files, harmonized physician visits cost and use files, sample data set with geographic SES
* Describe sample characteristics – Table 1

logit\_ADRDsymp.sas

* Source data: Analytical data set for logistic regression
* Regress anti-dementia drug use on beneficiary characteristics for those with dementia or dementia symptoms diagnosis – Table 2

adrx\_use\_trends.sas

* Source data: Base analytical data set, sample data set with geographic SES info
* Analyze trends in anti-dementia drug use – Table 3

adrx\_cost.sas

* Source data: Anti-dementia drug use claims, Part D events files
* Analyze trends in average cost for anti-dementia drugs – Table 3

prevalence\_byracesex.sas, prevalence\_all.sas

* Source data: Base analytical data set
* Analyze prevalence of anti-dementia drug use by sex and race – Figure 1

use\_dx\_timing.sas

* Source data: Monthly sample data, Part D events, Anti-dementia drugs data
* Analyze timing of anti-dementia drug use relative to incident diagnosis – Figure 2

prevalence\_incidence.sas

* Source data: Base analytical data set, monthly sample data, data set with information on length of use
* Analyze trends in prevalence and incidence of anti-dementia drug use – ETable 1

logit\_AD.sas

* Source data: Analytical data set for logistic regression
* Regress anti-dementia drug use on beneficiary characteristics for those with only Alzheimer’s Disease diagnosis – ETable 2

logit\_ADRD.sas

* Source data: Analytical data set for logistic regression
* Regress anti-dementia drug use on beneficiary characteristics for those with dementia diagnosis – ETable 3