This is an overview of SAS programs used in the analysis for “Racial/Ethnic Disparities in Length of Life after Dementia Diagnosis: an 18-Year Follow-up Study of Medicare Beneficiaries,” by Yi Chen, Eileen Crimmins, Patricia Ferido, and Julie Zissimopoulos published in the *Lancet* in 2022. The programs are meant to run in order, with later programs relying on data created by earlier ones. A header program, not included, held most librefs so users will have to replace with their own.

**Harmonize raw MBSF files**

clmids.sas

* Source data: Medicare Part A, B, and D claims - specifically carrier, dme, hha, hospice, inpatient, outpatient, SNF and Part D claims
* Creates: clmid[year]
* creates annual files flagging whether a beneficiary has a claim in that year from any of the files

bene\_demog2018.sas

* Source data: Medicare beneficiary summary files, clmid[year]
* Creates: bene\_demogall2018, bene\_demog2018
* creates a file of beneficiary non-time-varying demographics across all years of available data

p2egwp2017.sas

* Source data: Medicare Part D plan characteristics files
* Creates: p2egwp.fmt
* creates a format identifying different Part D plans made up of contract ID, plan ID and EGWP indicator

bene\_status\_year2001\_2018.sas, statyr.sas, bene\_status.fmt, p2egwp.fmt

* Source data: Medicare beneficiary summary files and harmonized files from bene\_demog2018
* Creates: bene\_status\_year[year]
* summarizes enrollment data.sas, HMO status.sas, dual eligibility.sas, Part D plan by year

sample\_selection\_FFS\_allrace.sas

* Source data: harmonized MBSF files (bene\_status\_year[year] and bene\_demog2018)
* Creates: samp\_3yrffs\_9918\_allrace
* Summarize sample information and identify sample as those 67+ and enrolled in FFS in years *t-2, t-1,* and *t*

**Build Control Variables**  
comorbidities.sas

* Source data: Medicare chronic conditions and other conditions files, bsfcc[year]
* Creates: cc9917
* Gets first date of all the chronic conditions to use as controls

other\_comorbidities.sas

* Source data: Medicare chronic conditions and other conditions files, otcc[year]
* Creates: otcc0017
* Gets first date of all the other chronic conditions to use as controls

urban\_rural\_measures.sas

* Source data: Area Resource File 2012 and 2015 files (ahrf2012 & ahrf2015)
* Creates: urbanruralcont
* Creates an indicator for urban or rural. There are two years for the urban rural continuum – 2003 and 2013, all cohort years from 2008 to 2013 will bet the 2003 value, and years from 2013 on will get the 2013 value

**Identify Dementia**

identify\_ad\_drug\_ndcs.sas

* Source data: Part D drug characteristics extract (pdch[year].drug\_char\_[year]\_extract)
* Creates: ad\_ndc
* Identifies all NDC’s for the following drugs used to treat dementia symptoms – donepezil, galantamine, memantine, rivastigmine

ADdrugs.sas

* Source data: Part D Events files (pde[year].pde\_demo\_[year]\_0[mo]), ad\_ndc
* Creates: ADdrugs\_0618, ADdrugs\_dts\_0618
* Pulls all drug claims for drugs used to treat dementia symptoms and creates a claim-level and date-level file

pull\_dementia\_dx\_2019.sas

* Source data: demdx.fmt, Part A and B claims – carrier, outpatient, inpatient, SNF, HHA
* Creates: dementia\_dx\_bcarrier\_[year], dementia\_dx\_hha\_[year], dementia\_dx\_inpatient\_[year], dementia\_dx\_outpatient\_[year], dementia\_dx\_snf\_[year]
* Pulls all dementia claims from the Part A & B files

dementia\_dxdt.sas

* Source data: demdx.fmt, dementia\_dx\_bcarrier\_[year], dementia\_dx\_hha\_[year], dementia\_dx\_inpatient\_[year], dementia\_dx\_outpatient\_[year], dementia\_dx\_snf\_[year]
* Creates: dementia\_dt\_1999\_2019
* Combines all dementia claims and makes it patient date-level

ADRDinc\_methods.sas

* Source data: dementia\_dt\_1999\_2019, ADdrugs\_dts\_0618, bene\_demog2018
* Creates: adrdinc\_verified
* Build dementia incidence dates using different methods of verification

**Analysis**

sample\_selection\_table.sas

* Source data: bene\_status\_year2001, adrdinc\_verified, samp\_3yrffs\_9918\_allrace
* Get sample characteristics and get attrition table

mort\_cohort01\_allrace.sas

* Source data: adrdinc\_verified, samp\_3yrffs\_9918\_allrace, cc9917, otcc0017, bene\_status\_year2001, mbsf\_ab\_2001 (Medicare provided)
* Creates: cohort01\_allrace
* Builds sample of enrolled cohort with dementia in 2001, runs sample statistics

mort\_cohort01\_annual\_allrace.sas

* Source data: adrdinc\_verified, samp\_3yrffs\_9918\_allrace, cc9917, otcc0017, Medicare MBSF files from 2001-2013, bene\_status\_year2001-bene\_status\_year2013
* Creates: cohort\_5yrsurvival\_allrace2001-cohort\_5yrsurvival\_allrace2013
* Builds annual cohorts of those with dementia from 2001 to 2013

charlson\_comorbidity\_index\_macro.sas, charlson\_comorbidity\_index.sas

* Source data: cohort\_5yrsurvival\_allrace2001-cohort\_5yrsurvival\_2013, cohort01\_allrace, Part A & B medicare claims – carrier, outpatient, inpatient, SNF
* Creates: cci\_2001\_2013\_otherrace
* Calculate Charlson Comorbidity Index in each year from 2001 to 2013

mort\_cohort01\_geo.sas

* Source data: cohort01\_allrace, cci\_2001\_2013\_otherrace, urbanruralcont
* Creates: cohort01\_geo\_allrace
* Add geographic control variables and CCI to the 2001 sample

mort\_cohort01\_models\_ccisq.sas

* Source data: cohort01\_geo\_allrace
* Model mortality for the 2001 cohort and get distribution of time to death by subgroup

mort\_cohort01\_annualmodels\_ccisq.sas

* Source data: cohort\_5yrsurvival\_allrace2001-cohort\_5yrsurvival\_allrace2013, cci\_2001\_2013\_otherrace
* Model survival in 5 years for annual cohorts using COX proportional hazards and logistic regression

mort\_cohort01\_statemodels\_byrace\_ccisq.sas

* Source data: cohort\_5yrsurvival\_allrace2001-cohort\_5yrsurvival\_allrace2013, cci\_2001\_2013\_otherrace
* Model survival in 5 years controlling for state

RR\_ttest.sas

* Source data: cohort01\_geo\_allrace
* Run t-tests on the 2001 sample