```
/*******************************************************
*Multivariable Fractional Polynomial regression
*   Drawing on do-file of Julie Simpson and Nick Douglas
*******************************************************/

capture log close
version 13.1
set linesize 100
set more off
cd "C:\data\malaria\results"
loc today = c(current_date)
log using "malariaproject_log_`today'.txt", append text
local T = c(current_time)
local T = subinstr("`T'",":","_",.)

capture: drop agegraph

egen agegraph = cut (Age), at (0 (0.04) 60.04)
sort Age agegraph

*Generate variable excluding 1st and 99th percentiles
su Age, d
loc agep1 r(p1)
loc agep99 r(p99)
gen Age99p = 1 if  Age > `agep1' & Age < `agep99'
codebook Age99p
su Age if Age99p==.

hist Age if Age99p==.
hist Age if Age99p==1

tw hist Age if Age99p==1, freq width(1) fc("216 179 101") lc("black") lwidth(vvvthin) || hist
 Age if Age99p==., fc("90 180 172") lc("black")  lwidth(vvvthin) freq width(.5)
xtitle(,margin(medsmall)) ytitle(,margin(medsmall)) plotr(color(white)) graphr(color(white)
lc(white)) ylab(,nogrid angle(h) format(%9.0fc)) ///
legend(order(1 "146 days {&le} Age {&le} 58 years" ///
            2 "Age {&lt} 146 days {&union} 58 years {&lt} Age") rows(2) pos(6)) ///
|| pcarrowi 14000 0.4  12500 0.4  "1st percentile", lc("black") lwidth(vvthin)  msymbol(i)
mlabcolor(black) mc(black) mlwidth(vthin) mlabpos(1) ///
|| pcarrowi 14000 58  1000 58  "99th percentile", lc("black") lwidth(vvthin)   msymbol(i)
mlabcolor(black) mc(black)  mlwidth(vthin) mlabpos(1) ///
name(age_histo_percentiles)


* Admission

* MFP without age in 1st or 99th percentile
xi: mfp logistic AdmNext14 i.SpeciesX i.EthnicX Age i.sexPreg if Age99p==1, cluster(hrn)
df(2, Age: 4)
/*check model fit*/
linktest, cluster(hrn)
estat gof
/*generate predicted probability and 95% CI for plotting*/
qui: adjust  _IEthnicX_2 _IEthnicX_3 _IsexPreg_2 _IsexPreg_3, by(agegraph SpeciesX) pr ci
replace

* ***Graph the results***
```

```
twoway   (rarea ub lb agegraph if SpeciesX==4 &     ///
    agegraph>0.019, fcolor(gray) fintensity(50) lcolor(white)          ///
    lwidth(none)) (line pr agegraph if SpeciesX==4 & agegraph>0.019,       ///
    lcolor(gray) lwidth(thick) lpattern(solid)) (rarea ub lb agegraph   ///
    if SpeciesX==5 & agegraph>0.20, fcolor(dkorange) fintensity(50)         ///
    lcolor(white) lwidth(none)) (line pr agegraph if SpeciesX==5 &          ///
    agegraph>0.15, lcolor(dkorange) lwidth(thick) lpattern(solid))      ///
    (rarea ub lb agegraph if SpeciesX==1 & agegraph>0.019,                  ///
    fcolor("147 30 17") fintensity(50) lcolor(white) lwidth(none))      ///
    (line pr agegraph if SpeciesX==1 & agegraph>0.019, lcolor("147 30 17")  ///
    lwidth(thick) lpattern(solid)) (rarea ub lb agegraph if SpeciesX==2 &   ///
    agegraph>0.019, fcolor("21 155 2") fintensity(50) lcolor(white)     ///
    lwidth(none)) (line pr agegraph if SpeciesX==2 & agegraph>0.019,        ///
    lcolor("21 155 2") lwidth(thick) lpattern(solid)),                  ///
    ytitle(Probability of early admission) ytitle(, margin(medium)) ///
    ylabel(, nogrid) ymtick(, nogrid) xtitle(Age (years))               ///
    xtitle(, margin(medium))                                            ///
    title("Probability of early admission by {it:Plasmodium} species and age*", span ///
    size(medlarge) margin(medium)) ///
    legend(on order(4 "{it:P. vivax} (95% CI)" 2 "{it:P. falciparum} (95% CI)" 6 "{it:P.
    malariae} (95% CI)" 8 "Mixed (95% CI)") ///
    colfirst notextfirst nostack cols(2) size(small) nobox              ///
    region(fcolor(white) margin(medium) lcolor(white)) bmargin(zero)    ///
    position(2) ring(0)) graphregion(fcolor(white) lcolor(white)        ///
    ifcolor(white) ilcolor(white)) plotregion(fcolor(white)             ///
    lcolor(white) ifcolor(white) ilcolor(white)) ///
    note("*adjusted for ethnicity, sex and pregnancy status;" "Age excludes observations below
    1st percentile and above 99th percentile", span) ///
    name(fp_age_Adm_1, replace)


xi: mfp logistic DiedNext14 i.SpeciesX i.EthnicX Age i.sexPreg if Age99p==1, cluster(hrn)
df(2, Age: 5)
/*check model fit*/
linktest, cluster(hrn)
estat gof
/*generate predicted probability and 95% CI for plotting*/
qui: adjust  _IEthnicX_2 _IEthnicX_3 _IsexPreg_2 _IsexPreg_3, by(agegraph SpeciesX) pr ci
replace


* ***Graph the results***
twoway   (rarea ub lb agegraph if SpeciesX==4 &     ///
    agegraph>0.019, fcolor(gray) fintensity(50) lcolor(white)          ///
    lwidth(none)) (line pr agegraph if SpeciesX==4 & agegraph>0.019,       ///
    lcolor(gray) lwidth(thick) lpattern(solid)) (rarea ub lb agegraph   ///
    if SpeciesX==5 & agegraph>0.20, fcolor(dkorange) fintensity(50)         ///
    lcolor(white) lwidth(none)) (line pr agegraph if SpeciesX==5 &          ///
    agegraph>0.15, lcolor(dkorange) lwidth(thick) lpattern(solid))      ///
    (rarea ub lb agegraph if SpeciesX==1 & agegraph>0.019,                  ///
    fcolor("147 30 17") fintensity(50) lcolor(white) lwidth(none))      ///
    (line pr agegraph if SpeciesX==1 & agegraph>0.019, lcolor("147 30 17")  ///
    lwidth(thick) lpattern(solid)) (rarea ub lb agegraph if SpeciesX==2 &   ///
    agegraph>0.019, fcolor("21 155 2") fintensity(50) lcolor(white)     ///
    lwidth(none)) (line pr agegraph if SpeciesX==2 & agegraph>0.019,        ///
    lcolor("21 155 2") lwidth(thick) lpattern(solid)),                  ///
    ytitle(Probability of early death) ytitle(, margin(medium)) ///
```

```
    ylabel(, nogrid) ymtick(, nogrid) xtitle(Age (years))                ///
    xtitle(, margin(medium))                                             ///
    title("Probability of early death by {it:Plasmodium} species and age*", span ///
    size(medlarge) margin(medium)) ///
    legend(on order(4 "{it:P. vivax} (95% CI)" 2 "{it:P. falciparum} (95% CI)" 6 "{it:P.
    malariae} (95% CI)" 8 "Mixed (95% CI)") ///
    colfirst notextfirst nostack cols(2) size(small) nobox               ///
    region(fcolor(white) margin(medium) lcolor(white)) bmargin(zero)     ///
    position(2) ring(0)) graphregion(fcolor(white) lcolor(white)         ///
    ifcolor(white) ilcolor(white)) plotregion(fcolor(white)              ///
    lcolor(white) ifcolor(white) ilcolor(white)) ///
    note("*adjusted for ethnicity, sex and pregnancy status;" "Age excludes observations below
    1st percentile and above 99th percentile", span) ///
    name(fp_age_Died_1, replace)
```