

```

1
2 *****
3 *NUMBER OVER TIME, BY EXPOSURE AND AGE GROUPS*****
4 *****
5 use "...m3_survival_data.dta", clear
6 mdesc
7 keep exp indexdate indexn age_index
8 sum age_index
9 egen float ageg = cut(age_index), at(0 16 28 32 36 40 44 48 100) icodes label
10 tabstat age_index, statistics(min max) by(ageg)
11 gen year_index = year(indexn)
12
13 preserve
14 tab year_index exp, m
15 collapse (count) indexn, by(exp year_index)
16 reshape wide indexn, i(year_index) j(exp)
17 label variable indexn0 "No type 2 diabetes"
18 label variable indexn1 "Type 2 diabetes"
19 set scheme white_tableau
20 graph bar (asis) indexn0 indexn1, over(year_index, gap(25) label(angle(ninety) labsz(size)(small))) stack ytitle("`No. of individuals") legend(rows(1) position(12))
21 cap graph export "...Results/Figure_S3A.svg", as(svg) name("Graph") replace
22 graph close _all
23
24 renames year_index indexn0 indexn1 \ year noT2DM T2DM
25 gen total = noT2DM + T2DM
26 gen p_noT2DM = noT2DM*100/total
27 gen p_T2DM = T2DM*100/total
28 cap export excel using "...Results/Figure_S3A.xls", firstrow(variables)
29 restore
30
31 preserve
32 groups ageg year_index if exp == 1, sep(21)
33 collapse (count) exp if exp == 1, by(ageg year_index)
34 reshape wide exp, i(year_index) j(ageg)
35 label variable exp1 "16-27"
36 label variable exp2 "28-31"
37 label variable exp3 "32-35"
38 label variable exp4 "36-39"
39 label variable exp5 "40-43"
40 label variable exp6 "44-47"
41 label variable exp7 "48-50"
42 set scheme tab2
43 graph bar (asis) exp1-exp7, over(year_index, gap(2) label(angle(ninety) labsz(size)(small))) stack ytitle("`No. of individuals") ylabel(0(1000)6000) legend(rows(1) position(12))
44 cap graph export "...Results/Figure_S3B.svg", as(svg) name("Graph") replace
45 graph close _all
46
47 renames year_index exp1-exp7 \ year age16_27 age28_31 age32_35 age36_39 age40_43 age44_47 age48_50
48 egen float total = rowtotal(age*)
49 foreach var of varlist age* {
50     gen p`var' = `var'*100/total
51 }
52 label variable page16_27 "16-27"
53 label variable page28_31 "28-31"
54 label variable page32_35 "32-35"
55 label variable page36_39 "36-39"
56 label variable page40_43 "40-43"
57 label variable page44_47 "44-47"
58 label variable page48_50 "48-50"
59 graph bar (asis) page16_27-page48_50, over(year, gap(2) label(angle(ninety) labsz(size)(small))) stack ytitle("`Percent of individuals with type 2 diabetes") ylabel(0(10)100) legend(rows

```

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(1) position(12))
cap graph export "...Results/Figure_S3C.svg", as(svg) name("Graph") replace
graph close _all
cap export excel using "...Results/Figure_S3BC.xls", firstrow(variables)
restore

*****
*SENSITIVITY ANALYSIS: BMI AS CONFOUNDER*****
*****

***MAIN: All-cause absolute difference***
cap use "...m3_survival_data.dta", clear
gen end_date="31/10/2020"
gen d_end=date(end_date, "DMY")
replace d_end=deathn if died==1
keep patid exp age_index sex eth imd smoke hypertension_5 d_end indexn died
gen time = (d_end-indexn)/365.25
replace time = .00136895 if time==0
stset time, f(died==1)
lab define exp_lab 0 "no" 1 "yes"
lab values exp exp_lab

gen age_exp = age_index*exp
replace sex = sex-1
tab eth, gen(d_eth)
tab imd, gen(d_imd)
stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke hypertension_5, df(4) scale(hazard) eform nolog
gen timep = 10 in 1

gen age_diag = ., before(patid)
gen unexp_surv = ., before(patid)
gen unexp_lci = ., before(patid)
gen unexp_uci = ., before(patid)
gen exp_surv = ., before(patid)
gen exp_lci = ., before(patid)
gen exp_uci = ., before(patid)
gen cont = ., before(patid)
gen cont_lci = ., before(patid)
gen cont_uci = ., before(patid)

forval i = 16/50 {
    replace age_diag = `i' in `i'
    standsurv, at1(exp 0 age_index `i' age_exp 0) at2(exp 1 age_index `i' age_exp `i') timevar(timep) ci contrast(difference)
    replace unexp_surv = _at1[1] in `i'
    replace unexp_lci = _at1_lci[1] in `i'
    replace unexp_uci = _at1_uci[1] in `i'
    replace exp_surv = _at2[1] in `i'
    replace exp_lci = _at2_lci[1] in `i'
    replace exp_uci = _at2_uci[1] in `i'
    replace cont = _contrast2_1[1] in `i'
    replace cont_lci = _contrast2_1_lci[1] in `i'
    replace cont_uci = _contrast2_1_uci[1] in `i'
    drop _at1-contrast2_1_uci
}

keep if age_diag != .
keep age_diag-cont_uci
gen scale = "Absolute"

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118 gen out = "All_cause"
119 gen sens = "MAIN"
120 save "...Results/abs_all_main", replace
121
122
123 ***SENSITIVITY: All-cause absolute difference + BMI***
124 cap use "...m3_survival_data.dta", clear
125 gen end_date="31/10/2020"
126 gen d_end=date(end_date, "DMY")
127 replace d_end=deathn if died==1
128 keep patid exp age_index sex eth imd smoke hypertension_5 bmi d_end indexn died death_cancer-death_other
129 gen death_cvd=0
130 replace death_cvd=1 if death_ihd==1 | death_str_cva==1
131 drop death_ihd death_str_cva
132 gen death_cr=0
133 replace death_cr=1 if death_cvd==1 | death_renal==1
134 drop death_renal death_cvd
135 mdesc
136 bys exp: groups death_* died
137
138 drop if bmi == .
139 groups death_* died
140 tab died
141 gen time = (d_end-indexn)/365.25
142 replace time = .00136895 if time==0
143 stset time, f(died==1)
144 lab define exp_lab 0 "no" 1 "yes"
145 lab values exp exp_lab
146
147 gen age_exp = age_index*exp
148 replace sex = sex-1
149 tab eth, gen(d_eth)
150 tab imd, gen(d_imd)
151 stpm2 exp age_index age_exp sex d_eth2-d_eth1 d_imd2-d_imd5 smoke hypertension_5 bmi, df(4) scale(hazard) eform nolog
152 gen timep = 10 in 1
153
154 gen age_diag = ., before(patid)
155 gen unexp_surv = ., before(patid)
156 gen unexp_lci = ., before(patid)
157 gen unexp_uci = ., before(patid)
158 gen exp_surv = ., before(patid)
159 gen exp_lci = ., before(patid)
160 gen exp_uci = ., before(patid)
161 gen cont = ., before(patid)
162 gen cont_lci = ., before(patid)
163 gen cont_uci = ., before(patid)
164
165 forval i = 16/50 {
166     replace age_diag = `i' in `i'
167     standsurv, at1(exp 0 age_index `i' age_exp 0) at2(exp 1 age_index `i' age_exp `i') timevar(timep) ci contrast(difference)
168     replace unexp_surv = _at1[1] in `i'
169     replace unexp_lci = _at1_lci[1] in `i'
170     replace unexp_uci = _at1_uci[1] in `i'
171     replace exp_surv = _at2[1] in `i'
172     replace exp_lci = _at2_lci[1] in `i'
173     replace exp_uci = _at2_uci[1] in `i'
174     replace cont = _contrast2_1[1] in `i'
175     replace cont_lci = _contrast2_1_lci[1] in `i'
176     replace cont_uci = _contrast2_1_uci[1] in `i'

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177     drop _at1-contrast2_1_uci
178 }
179
180 keep if age_diag != .
181 keep age_diag-cont_uci
182 gen scale = "Absolute"
183 gen out   = "All_cause"
184 gen sens  = "BMI"
185 save "...Results/abs_all_bmi", replace
186
187
188 ***MAIN: Cause-specific absolute difference***
189 cap use "...m3_survival_data.dta", clear
190 drop cancer_date-str_cva
191 gen death_cvd=0
192 replace death_cvd=1 if death_ihd==1 | death_str_cva==1
193 drop death_ihd death_str_cva
194 gen end_date="31/10/2020"
195 gen d_end=date(end_date, "DMY")
196 replace d_end=deathn if died==1
197 gen time = (d_end-indexn)/365.25
198 replace time = .00136895 if time==0
199
200 gen event=.
201 replace event=0 if died==0
202 replace event=1 if death_cancer==1
203 replace event=2 if death_cvd==1 | death_renal==1
204 replace event=3 if death_other==1
205 tab event, m
206
207 gen age_exp = age_index*exp
208 replace sex = sex-1
209 tab eth, gen(d_eth)
210 tab imd, gen(d_imd)
211
212 stset time, failure(event=1)
213 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke hypertension_5, df(4) scale(hazard) eform nolog
214 estimates store cancer
215 stset time, failure(event=2)
216 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke hypertension_5, df(4) scale(hazard) eform nolog
217 estimates store cvd
218 stset time, failure(event=3)
219 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke hypertension_5, df(4) scale(hazard) eform nolog
220 estimates store other
221
222 gen timep = 10 in 1
223
224 gen age_diag= ., before(patid)
225 gen exp_cancer = ., before(patid)
226 gen exp_cancer_lci = ., before(patid)
227 gen exp_cancer_uci = ., before(patid)
228 gen unexp_cancer = ., before(patid)
229 gen unexp_cancer_lci = ., before(patid)
230 gen unexp_cancer_uci = ., before(patid)
231 gen cancer_diff= ., before(patid)
232 gen cancer_diff_lci= ., before(patid)
233 gen cancer_diff_uci= ., before(patid)
234 gen exp_cvd = ., before(patid)
235 gen exp_cvd_lci = ., before(patid)

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236 gen exp_cvd_uci = ., before(patid)
237 gen unexp_cvd = ., before(patid)
238 gen unexp_cvd_lci = ., before(patid)
239 gen unexp_cvd_uci = ., before(patid)
240 gen cvd_diff= ., before(patid)
241 gen cvd_diff_lci= ., before(patid)
242 gen cvd_diff_uci= ., before(patid)
243 gen exp_oth = ., before(patid)
244 gen exp_oth_lci = ., before(patid)
245 gen exp_oth_uci = ., before(patid)
246 gen unexp_oth = ., before(patid)
247 gen unexp_oth_lci = ., before(patid)
248 gen unexp_oth_uci = ., before(patid)
249 gen oth_diff= ., before(patid)
250 gen oth_diff_lci= ., before(patid)
251 gen oth_diff_uci= ., before(patid)
252
253 forval i=16/50 {
254     qui replace age_diag = `i' in `i'
255     qui standsurv, crmodels(cancer cvd other) cif ci timevar(timep) ///
256     at1(exp 0 age_index `i' age_exp 0) at2(exp 1 age_index `i' age_exp `i') atvar(F_unexp F_exp) contrast(difference) contrastvar(cif_diff)
257     qui replace exp_cancer = F_exp_cancer[1] in `i'
258     qui replace exp_cancer_lci = F_exp_cancer_lci[1] in `i'
259     qui replace exp_cancer_uci = F_exp_cancer_uci[1] in `i'
260     qui replace unexp_cancer = F_unexp_cancer[1] in `i'
261     qui replace unexp_cancer_lci = F_unexp_cancer_lci[1] in `i'
262     qui replace unexp_cancer_uci = F_unexp_cancer_uci[1] in `i'
263     qui replace cancer_diff = cif_diff_cancer[1] in `i'
264     qui replace cancer_diff_lci = cif_diff_cancer_lci[1] in `i'
265     qui replace cancer_diff_uci = cif_diff_cancer_uci[1] in `i'
266     qui replace exp_cvd = F_exp_cvd[1] in `i'
267     qui replace exp_cvd_lci = F_exp_cvd_lci[1] in `i'
268     qui replace exp_cvd_uci = F_exp_cvd_uci[1] in `i'
269     qui replace unexp_cvd = F_unexp_cvd[1] in `i'
270     qui replace unexp_cvd_lci = F_unexp_cvd_lci[1] in `i'
271     qui replace unexp_cvd_uci = F_unexp_cvd_uci[1] in `i'
272     qui replace cvd_diff = cif_diff_cvd[1] in `i'
273     qui replace cvd_diff_lci = cif_diff_cvd_lci[1] in `i'
274     qui replace cvd_diff_uci = cif_diff_cvd_uci[1] in `i'
275     qui replace exp_oth = F_exp_other[1] in `i'
276     qui replace exp_oth_lci = F_exp_other_lci[1] in `i'
277     qui replace exp_oth_uci = F_exp_other_uci[1] in `i'
278     qui replace unexp_oth = F_unexp_other[1] in `i'
279     qui replace unexp_oth_lci = F_unexp_other_lci[1] in `i'
280     qui replace unexp_oth_uci = F_unexp_other_uci[1] in `i'
281     qui replace oth_diff = cif_diff_other[1] in `i'
282     qui replace oth_diff_lci = cif_diff_other_lci[1] in `i'
283     qui replace oth_diff_uci = cif_diff_other_uci[1] in `i'
284     qui drop F_unexp_cancer- cif_diff_other_uci
285
286     di "Age = `i' | sens = MAIN --- $S_TIME $S_DATE"
287 }
288
289 keep if age_diag != .
290 keep age_diag-oth_diff_uci
291 gen scale = "Absolute"
292 gen out = "Cause_specific"
293 gen sens = "MAIN"
294 save "...abs_cs_main", replace

```

```

295
296
297 ***SENSITIVITY: Cause-specific absolute difference + BMI***
298 cap use "...m3_survival_data.dta", clear
299 drop cancer_date-str_cva
300 drop if bmi == .
301
302 gen death_cvd=0
303 replace death_cvd=1 if death_ihd==1 | death_str_cva==1
304 drop death_ihd death_str_cva
305 gen end_date="31/10/2020"
306 gen d_end=date(end_date, "DMY")
307 replace d_end=deathn if died==1
308 gen time = (d_end-indexn)/365.25
309 replace time = .00136895 if time==0
310
311 gen event=.
312 replace event=0 if died==0
313 replace event=1 if death_cancer==1
314 replace event=2 if death_cvd==1 | death_renal==1
315 replace event=3 if death_other==1
316 tab event, m
317
318 gen age_exp = age_index*exp
319 replace sex = sex-1
320 tab eth, gen(d_eth)
321 tab imd, gen(d_imd)
322
323 stset time, failure(event=1)
324 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke hypertension_5 bmi, df(4) scale(hazard) eform nolog
325 estimates store cancer
326 stset time, failure(event=2)
327 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke hypertension_5 bmi, df(4) scale(hazard) eform nolog
328 estimates store cvd
329 stset time, failure(event=3)
330 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke hypertension_5 bmi, df(4) scale(hazard) eform nolog
331 estimates store other
332
333 gen timep = 10 in 1
334
335 gen age_diag= ., before(patid)
336 gen exp_cancer = ., before(patid)
337 gen exp_cancer_lci = ., before(patid)
338 gen exp_cancer_uci = ., before(patid)
339 gen unexp_cancer = ., before(patid)
340 gen unexp_cancer_lci = ., before(patid)
341 gen unexp_cancer_uci = ., before(patid)
342 gen cancer_diff= ., before(patid)
343 gen cancer_diff_lci= ., before(patid)
344 gen cancer_diff_uci= ., before(patid)
345 gen exp_cvd = ., before(patid)
346 gen exp_cvd_lci = ., before(patid)
347 gen exp_cvd_uci = ., before(patid)
348 gen unexp_cvd = ., before(patid)
349 gen unexp_cvd_lci = ., before(patid)
350 gen unexp_cvd_uci = ., before(patid)
351 gen cvd_diff= ., before(patid)
352 gen cvd_diff_lci= ., before(patid)
353 gen cvd_diff_uci= ., before(patid)

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```

354 gen exp_oth = ., before(patid)
355 gen exp_oth_lci = ., before(patid)
356 gen exp_oth_uci = ., before(patid)
357 gen unexp_oth = ., before(patid)
358 gen unexp_oth_lci = ., before(patid)
359 gen unexp_oth_uci = ., before(patid)
360 gen oth_diff= ., before(patid)
361 gen oth_diff_lci= ., before(patid)
362 gen oth_diff_uci= ., before(patid)
363
364 forval i=16/50 {
365     qui replace age_diag = `i' in `i'
366     qui standsurv, crmodels(cancer cvd other) cif ci timevar(timep) ///
367     at1(exp 0 age_index `i' age_exp 0) at2(exp 1 age_index `i' age_exp `i') atvar(F_unexp F_exp) contrast(difference) contrastvar(cif_diff)
368     qui replace exp_cancer = F_exp_cancer[1] in `i'
369     qui replace exp_cancer_lci = F_exp_cancer_lci[1] in `i'
370     qui replace exp_cancer_uci = F_exp_cancer_uci[1] in `i'
371     qui replace unexp_cancer = F_unexp_cancer[1] in `i'
372     qui replace unexp_cancer_lci = F_unexp_cancer_lci[1] in `i'
373     qui replace unexp_cancer_uci = F_unexp_cancer_uci[1] in `i'
374     qui replace cancer_diff = cif_diff_cancer[1] in `i'
375     qui replace cancer_diff_lci = cif_diff_cancer_lci[1] in `i'
376     qui replace cancer_diff_uci = cif_diff_cancer_uci[1] in `i'
377     qui replace exp_cvd = F_exp_cvd[1] in `i'
378     qui replace exp_cvd_lci = F_exp_cvd_lci[1] in `i'
379     qui replace exp_cvd_uci = F_exp_cvd_uci[1] in `i'
380     qui replace unexp_cvd = F_unexp_cvd[1] in `i'
381     qui replace unexp_cvd_lci = F_unexp_cvd_lci[1] in `i'
382     qui replace unexp_cvd_uci = F_unexp_cvd_uci[1] in `i'
383     qui replace cvd_diff = cif_diff_cvd[1] in `i'
384     qui replace cvd_diff_lci = cif_diff_cvd_lci[1] in `i'
385     qui replace cvd_diff_uci = cif_diff_cvd_uci[1] in `i'
386     qui replace exp_oth = F_exp_other[1] in `i'
387     qui replace exp_oth_lci = F_exp_other_lci[1] in `i'
388     qui replace exp_oth_uci = F_exp_other_uci[1] in `i'
389     qui replace unexp_oth = F_unexp_other[1] in `i'
390     qui replace unexp_oth_lci = F_unexp_other_lci[1] in `i'
391     qui replace unexp_oth_uci = F_unexp_other_uci[1] in `i'
392     qui replace oth_diff = cif_diff_other[1] in `i'
393     qui replace oth_diff_lci = cif_diff_other_lci[1] in `i'
394     qui replace oth_diff_uci = cif_diff_other_uci[1] in `i'
395     qui drop F_unexp_cancer- cif_diff_other_uci
396
397     di "Age = `i' | sens = BMI --- $S_TIME $S_DATE"
398
399 }
400
401 keep if age_diag != .
402 keep age_diag-oth_diff_uci
403 gen scale = "Absolute"
404 gen out = "Cause_specific"
405 gen sens = "BMI"
406 save "...abs_cs_bmi", replace
407
408
409 ***MAIN/SENSITIVITY: All-cause & cause-specific relative hazard MAIN + BMI***
410 cap use "...m3_survival_data.dta", clear
411 egen float agegr = cut(age_index), at(16 28 32 36 40 44 48 51) icodes
412 lab define agegr_1 0 "16-27" 1 "28-31" 2 "32-35" 3 "36-39" 4 "40-43" 5 "44-47" 6 "48-50"

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413 lab values agegr agegr_1
414 tab agegr, m
415 tabstat age_index, statistics(mean median min max count) by(agegr)
416 gen end_date="31/10/2020"
417 gen d_end=date(end_date, "DMY")
418 replace d_end=deathn if died==1
419 gen time = (d_end-indexn)/365.25
420 replace time = .00136895 if time==0
421 keep patid time died exp age_index sex eth imd smoke hypertension_5 agegr bmi death_str_cva death_ihd death_renal death_cancer death_other
422 lab define exp_lab 0 "no" 1 "yes"
423 lab values exp exp_lab
424 gen death_cardioren=0
425 replace death_cardioren=1 if death_str_cva==1 | death_ihd==1 | death_renal==1
426
427 foreach nm in died death_cancer death_cardioren death_other {
428
429     stset time, f(`nm'==1)
430
431     preserve
432     set showbaselevels on
433     stpm2 i.exp#i.agegr i.agegr sex i.eth i.imd smoke hypertension_5, df(4) scale(hazard) eform nolog
434     parmest, fast eform
435     split parm, p(#)
436     keep if parm1 == "1.exp"
437     sencode parm2, replace
438     replace parm2 = parm2 - 1
439     drop parm1
440     gen agegr      = "16-27" if parm2 == 0
441     replace agegr = "28-31" if parm2 == 1
442     replace agegr = "32-35" if parm2 == 2
443     replace agegr = "36-39" if parm2 == 3
444     replace agegr = "40-43" if parm2 == 4
445     replace agegr = "44-47" if parm2 == 5
446     replace agegr = "48-50" if parm2 == 6
447     drop parm2 parm eq
448     gen scale = "Relative"
449     gen out   = "`nm'"
450     gen sens  = "MAIN"
451     tempfile rel_`nm'_main
452     save `rel_`nm'_main', replace
453     restore
454
455     preserve
456     drop if bmi == .
457     set showbaselevels on
458     stpm2 i.exp#i.agegr i.agegr sex i.eth i.imd smoke hypertension_5 bmi, df(4) scale(hazard) eform nolog
459     parmest, fast eform
460     split parm, p(#)
461     keep if parm1 == "1.exp"
462     sencode parm2, replace
463     replace parm2 = parm2 - 1
464     drop parm1
465     gen agegr      = "16-27" if parm2 == 0
466     replace agegr = "28-31" if parm2 == 1
467     replace agegr = "32-35" if parm2 == 2
468     replace agegr = "36-39" if parm2 == 3
469     replace agegr = "40-43" if parm2 == 4
470     replace agegr = "44-47" if parm2 == 5
471     replace agegr = "48-50" if parm2 == 6

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```

472     drop parm2 parm eq
473     gen scale = "Relative"
474     gen out   = "`nm'"
475     gen sens  = "BMI"
476     tempfile rel_`nm'_bmi
477     save `rel_`nm'_bmi', replace
478     restore
479 }
480
481 *****
482 *COMBINED RELATIVE - BMI*
483 *****
484 clear
485 foreach nm in died death_cancer death_cardioren death_other {
486     append using `rel_`nm'_main'
487     append using `rel_`nm'_bmi'
488 }
489 save "...Results/Relative_all_cs_main_BMI", replace
490
491 *****
492 *SENSITIVITY ANALYSIS: HYPERTENSION WITH MEDICATIONS*****
493 *****
494
495 ***SENSITIVITY: All-cause absolute difference + hypertension***
496 cap use "...m3_survival_data.dta", clear
497 gen end_date="31/10/2020"
498 gen d_end=date(end_date, "DMY")
499 replace d_end=deathn if died==1
500 keep patid exp age_index sex eth imd smoke hypertension_5 bmi d_end indexn died death_cancer-death_other antihyp
501 gen death_cvd=0
502 replace death_cvd=1 if death_ihd==1 | death_str_cva==1
503 drop death_ihd death_str_cva
504 gen death_cr=0
505 replace death_cr=1 if death_cvd==1 | death_renal==1
506 drop death_renal death_cvd
507 mdesc
508 gen time = (d_end-indexn)/365.25
509 replace time = .00136895 if time==0
510 stset time, f(died==1)
511
512
513 gen age_exp = age_index*exp
514 replace sex = sex-1
515 tab eth, gen(d_eth)
516 tab imd, gen(d_imd)
517 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke antihyp, df(4) scale(hazard) eform nolog
518 gen timep = 10 in 1
519
520 gen age_diag = ., before(patid)
521 gen unexp_surv = ., before(patid)
522 gen unexp_lci = ., before(patid)
523 gen unexp_uci = ., before(patid)
524 gen exp_surv = ., before(patid)
525 gen exp_lci = ., before(patid)
526 gen exp_uci = ., before(patid)
527 gen cont = ., before(patid)
528 gen cont_lci = ., before(patid)
529 gen cont_uci = ., before(patid)
530

```

```

531 forval i = 16/50 {
532     replace age_diag = `i' in `i'
533     standsurv, at1(exp 0 age_index `i' age_exp 0) at2(exp 1 age_index `i' age_exp `i') timevar(timep) ci contrast(difference)
534     replace unexp_surv = _at1[1] in `i'
535     replace unexp_lci = _at1_lci[1] in `i'
536     replace unexp_uci = _at1_uci[1] in `i'
537     replace exp_surv = _at2[1] in `i'
538     replace exp_lci = _at2_lci[1] in `i'
539     replace exp_uci = _at2_uci[1] in `i'
540     replace cont = _contrast2_1[1] in `i'
541     replace cont_lci = _contrast2_1_lci[1] in `i'
542     replace cont_uci = _contrast2_1_uci[1] in `i'
543     drop _at1-contrast2_1_uci
544 }
545
546 keep if age_diag != .
547 keep age_diag-cont_uci
548 gen scale = "Absolute"
549 gen out = "All_cause"
550 gen sens = "HYP"
551 cap save "...Results/abs_all_hyp", replace
552
553
554 ***SENSITIVITY: Cause-specific absolute difference + hypertension***
555 cap use "...m3_survival_data.dta", clear
556 drop cancer_date-str_cva
557 gen death_cvd=0
558 replace death_cvd=1 if death_ihd==1 | death_str_cva==1
559 drop death_ihd death_str_cva
560 gen end_date="31/10/2020"
561 gen d_end=date(end_date, "DMY")
562 replace d_end=deathn if died==1
563 gen time = (d_end-indexn)/365.25
564 replace time = .00136895 if time==0
565
566 gen event=.
567 replace event=0 if died==0
568 replace event=1 if death_cancer==1
569 replace event=2 if death_cvd==1 | death_renal==1
570 replace event=3 if death_other==1
571 tab event, m
572
573 gen age_exp = age_index*exp
574 replace sex = sex-1
575 tab eth, gen(d_eth)
576 tab imd, gen(d_imd)
577
578 stset time, failure(event=1)
579 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke antihyp, df(4) scale(hazard) eform nolog
580 estimates store cancer
581 stset time, failure(event=2)
582 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke antihyp, df(4) scale(hazard) eform nolog
583 estimates store cvd
584 stset time, failure(event=3)
585 stpm2 exp age_index age_exp sex d_eth2-d_eth11 d_imd2-d_imd5 smoke antihyp, df(4) scale(hazard) eform nolog
586 estimates store other
587
588 gen timep = 10 in 1
589

```

```

590 gen age_diag= ., before(patid)
591 gen exp_cancer = ., before(patid)
592 gen exp_cancer_lci = ., before(patid)
593 gen exp_cancer_uci = ., before(patid)
594 gen unexp_cancer = ., before(patid)
595 gen unexp_cancer_lci = ., before(patid)
596 gen unexp_cancer_uci = ., before(patid)
597 gen cancer_diff= ., before(patid)
598 gen cancer_diff_lci= ., before(patid)
599 gen cancer_diff_uci= ., before(patid)
600 gen exp_cvd = ., before(patid)
601 gen exp_cvd_lci = ., before(patid)
602 gen exp_cvd_uci = ., before(patid)
603 gen unexp_cvd = ., before(patid)
604 gen unexp_cvd_lci = ., before(patid)
605 gen unexp_cvd_uci = ., before(patid)
606 gen cvd_diff= ., before(patid)
607 gen cvd_diff_lci= ., before(patid)
608 gen cvd_diff_uci= ., before(patid)
609 gen exp_oth = ., before(patid)
610 gen exp_oth_lci = ., before(patid)
611 gen exp_oth_uci = ., before(patid)
612 gen unexp_oth = ., before(patid)
613 gen unexp_oth_lci = ., before(patid)
614 gen unexp_oth_uci = ., before(patid)
615 gen oth_diff= ., before(patid)
616 gen oth_diff_lci= ., before(patid)
617 gen oth_diff_uci= ., before(patid)
618
619 forval i=16/50{
620     qui replace age_diag = `i' in `i'
621     qui standsurv, crmodels(cancer cvd other) cif ci timevar(timep) ///
622     at1(exp 0 age_index `i' age_exp 0) at2(exp 1 age_index `i' age_exp `i') atvar(F_unexp F_exp) contrast(difference) contrastvar(cif_diff)
623     qui replace exp_cancer = F_exp_cancer[1] in `i'
624     qui replace exp_cancer_lci = F_exp_cancer_lci[1] in `i'
625     qui replace exp_cancer_uci = F_exp_cancer_uci[1] in `i'
626     qui replace unexp_cancer = F_unexp_cancer[1] in `i'
627     qui replace unexp_cancer_lci = F_unexp_cancer_lci[1] in `i'
628     qui replace unexp_cancer_uci = F_unexp_cancer_uci[1] in `i'
629     qui replace cancer_diff = cif_diff_cancer[1] in `i'
630     qui replace cancer_diff_lci = cif_diff_cancer_lci[1] in `i'
631     qui replace cancer_diff_uci = cif_diff_cancer_uci[1] in `i'
632     qui replace exp_cvd = F_exp_cvd[1] in `i'
633     qui replace exp_cvd_lci = F_exp_cvd_lci[1] in `i'
634     qui replace exp_cvd_uci = F_exp_cvd_uci[1] in `i'
635     qui replace unexp_cvd = F_unexp_cvd[1] in `i'
636     qui replace unexp_cvd_lci = F_unexp_cvd_lci[1] in `i'
637     qui replace unexp_cvd_uci = F_unexp_cvd_uci[1] in `i'
638     qui replace cvd_diff = cif_diff_cvd[1] in `i'
639     qui replace cvd_diff_lci = cif_diff_cvd_lci[1] in `i'
640     qui replace cvd_diff_uci = cif_diff_cvd_uci[1] in `i'
641     qui replace exp_oth = F_exp_other[1] in `i'
642     qui replace exp_oth_lci = F_exp_other_lci[1] in `i'
643     qui replace exp_oth_uci = F_exp_other_uci[1] in `i'
644     qui replace unexp_oth = F_unexp_other[1] in `i'
645     qui replace unexp_oth_lci = F_unexp_other_lci[1] in `i'
646     qui replace unexp_oth_uci = F_unexp_other_uci[1] in `i'
647     qui replace oth_diff = cif_diff_other[1] in `i'
648     qui replace oth_diff_lci = cif_diff_other_lci[1] in `i'

```

```

649   qui replace oth_diff_uci      = cif_diff_other_uci[1]      in `i'
650   qui drop F_unexp_cancer- cif_diff_other_uci
651
652   di "Age = `i' | sens = HYP --- $S_TIME  $S_DATE"
653 }
654
655 keep if age_diag != .
656 keep age_diag-oth_diff_uci
657 gen scale = "Absolute"
658 gen out   = "Cause_specific"
659 gen sens  = "HYP"
660 save "...Results/abs_cs_hyp", replace
661
662
663 ***SENSITIVITY: All-cause & cause-specific relative hazard hypertension***
664 cap use "...m3_survival_data.dta", clear
665 egen float agegr = cut(age_index), at(16 28 32 36 40 44 48 51) icodes
666 lab define agegr_1 0 "16-27" 1 "28-31" 2 "32-35" 3 "36-39" 4 "40-43" 5 "44-47" 6 "48-50"
667 lab values agegr agegr_1
668 tab agegr, m
669 tabstat age_index, statistics(mean median min max count) by(agegr)
670 gen end_date="31/10/2020"
671 gen d_end=date(end_date, "DMY")
672 replace d_end=deathn if died==1
673 gen time = (d_end-indexn)/365.25
674 replace time = .00136895 if time==0
675 keep patid time died exp age_index sex eth imd smoke hypertension_5 agegr bmi death_str_cva death_ihd death_renal death_cancer death_other antihyp
676 lab define exp_lab 0 "no" 1 "yes"
677 lab values exp exp_lab
678 gen death_cardioren=0
679 replace death_cardioren=1 if death_str_cva==1 | death_ihd==1 | death_renal==1
680
681 foreach nm in died death_cancer death_cardioren death_other {
682
683     stset time, f(`nm'==1)
684
685     preserve
686     set showbaselevels on
687     stpm2 i.exp#i.agegr sex i.eth i.imd smoke antihyp, df(4) scale(hazard) eform nolog
688     parmest, fast eform
689     split parm, p(#)
690     keep if parm1 == "1.exp"
691     sencode parm2, replace
692     replace parm2 = parm2 - 1
693     drop parm1
694     gen agegr      = "16-27" if parm2 == 0
695     replace agegr = "28-31" if parm2 == 1
696     replace agegr = "32-35" if parm2 == 2
697     replace agegr = "36-39" if parm2 == 3
698     replace agegr = "40-43" if parm2 == 4
699     replace agegr = "44-47" if parm2 == 5
700     replace agegr = "48-50" if parm2 == 6
701     drop parm2 parm eq
702     gen scale = "Relative"
703     gen out   = "`nm'"
704     gen sens  = "HYP"
705     tempfile rel_`nm'_hyp
706     save `rel_`nm'_hyp', replace
707     restore

```

```

708 }
709
710 *****
711 *COMBINED RELATIVE - HYPERTENSION*
712 *****
713 clear
714 foreach nm in died death_cancer death_cardioren death_other {
715     append using `rel_nm'_hyp'
716 }
717 save "...Results/Relative_all_cs_HYP", replace
718
719 *****
720 ***Figure 2 | Absolute - All-cause by group**
721 use "...Results/Absolute_all_main_BMI_HYP", clear
722 foreach var of varlist unexp_surv-cont_uci {
723     replace `var' = `var'*100
724 }
725 keep if sens == "MAIN"
726 set scheme white_tableau
727 twoway (line unexp_surv age_diag, sort lcolor(red)) (rarea unexp_lci unexp_uci age_diag, sort fcolor(red%30) lwidth(none)) ///
728       (line exp_surv age_diag, sort lcolor(blue)) (rarea exp_lci exp_uci age_diag, sort fcolor(blue%30) lwidth(none)) ///
729       , ytitle("10-year survival (%)") ylabel(93(1)100) xtitle("Age at diagnosis (years)") xlabel(16(2)50) ///
730       legend(order(3 "Type 2 diabetes" 1 "No type 2 diabetes") rows(1) position(7)) xsize(5) ysize(4)
731 graph save "Graph" "...Figure_2_R1.gph", replace
732 graph close _all
733
734 *****
735 ***Figure 3 | Absolute - Cause-specific by group**
736 use "...Results/Absolute_cs_main_BMI_HYP", clear
737 foreach var of varlist exp_cancer-oth_diff_uci {
738     replace `var' = `var'*100
739 }
740 keep if sens == "MAIN"
741 keep age_diag exp* unexp*
742 foreach nm in cancer cvd oth {
743     rename exp_nm' exp_nm'_est
744     rename unexp_nm' unexp_nm'_est
745 }
746 foreach nm in cancer cvd oth {
747     foreach j in est lci uci {
748         rename exp_nm'_j' exp_j'_nm'
749         rename unexp_nm'_j' unexp_j'_nm'
750     }
751 }
752 reshape long exp_est_ exp_lci_ exp_uci_ unexp_est_ unexp_lci_ unexp_uci_, i(age_diag) j(cause) string
753 replace cause = "Cardiorenal" if cause == "cvd"
754 replace cause = "Noncancer/cardiorenal" if cause == "oth"
755 replace cause = "Cancer" if cause == "cancer"
756 set scheme white_tableau
757 sencode cause, replace
758 twoway (line unexp_est_ age_diag, sort lcolor(red)) (rarea unexp_lci_ unexp_uci_ age_diag, sort fcolor(red%30) lwidth(none)) ///
759       (line exp_est_ age_diag, sort lcolor(blue)) (rarea exp_lci_ exp_uci_ age_diag, sort fcolor(blue%30) lwidth(none)) ///
760       , ytitle("10-year cumulative incidence (%)") xtitle("Age at diagnosis (years)") xlabel(16(2)50, labsize(7pt)) ylab(0(0.5)4, format(%3.1f)) ///
761       by(cause, cols(3) note("")) legend(order(3 "Type 2 diabetes" 1 "No type 2 diabetes") rows(1) position(7)) xsize(8) ysize(4)
762 graph save "Graph" "...Figure_3_R1.gph", replace
763 graph close _all
764
765 *****
766 ***Figure S4 | Absolute - All-cause difference**

```

```

767 use "...Results/Absolute_all_main_BMI_HYP", clear
768 foreach var of varlist unexp_surv-cont_uci {
769     replace `var' = `var'*100
770 }
771 keep if sens == "MAIN"
772 keep age_diag cont*
773 twoway (line cont age_diag, sort lcolor(red)) (rarea cont_lci cont_uci age_diag, sort fcolor(red%30) lwidth(none)) ///
774     , ytitle("10-year survival difference (%)", T2DM vs noT2DM") xtitle("Age at diagnosis (years)") ///
775     xlabel(16(2)50, labsize(7pt)) ylab(0(-0.2)-2.6, format(%3.1f) gmax labsize(8pt)) legend(off) xsize(6) ysize(5)
776 graph save "Graph" "...Figure_S4_R1.gph", replace
777 graph close _all
778
779 *****
780 ***Figure S5 | Absolute - Cause-specific difference**
781 use "...Results/Absolute_cs_main_BMI_HYP", clear
782 foreach var of varlist exp_cancer-oth_diff_uci {
783     replace `var' = `var'*100
784 }
785 keep if sens == "MAIN"
786 keep age_diag cancer* cvd* oth*
787 foreach nm in cancer cvd oth {
788     rename `nm'_diff `nm'_diff_est
789 }
790 foreach nm in cancer cvd oth {
791     rename `nm'_diff_* *_`nm'
792 }
793 reshape long est_lci_uci_, i(age_diag) j(cause) string
794 replace cause = "Cardiorenal" if cause == "cvd"
795 replace cause = "Noncancer/cardiorenal" if cause == "oth"
796 replace cause = "Cancer" if cause == "cancer"
797 set scheme white_tableau
798 sencode cause, replace
799 twoway (line est_age_diag, sort lcolor(red)) (rarea lci_uci_age_diag, sort fcolor(red%30) lwidth(none)) ///
800     , ytitle("10-year cumulative incidence difference (%)", T2DM vs noT2DM") xtitle("Age at diagnosis (years)") ///
801     xlabel(16(2)50, labsize(7pt)) ylab(0(0.25)2, format(%3.2f) gmax) by(cause, cols(3) note("") legend(off)) xsize(8) ysize(4)
802 graph save "Graph" "...Figure_S5_R1.gph", replace
803 graph close _all
804
805 *****
806 ***Figure S7 | Absolute - SENSITIVITY: All-cause and cause-specific difference, MAIN/BMI/HYP**
807 use "...Results/Absolute_cs_main_BMI_HYP", clear
808 foreach var of varlist exp_cancer-oth_diff_uci {
809     replace `var' = `var'*100
810 }
811 keep age_diag cancer* cvd* oth* sens
812 foreach nm in cancer cvd oth {
813     rename `nm'_diff `nm'_diff_est
814 }
815 foreach nm in cancer cvd oth {
816     rename `nm'_diff_* *_`nm'
817 }
818 reshape long est_lci_uci_, i(age_diag sens) j(cause) string
819 replace cause = "Cardiorenal" if cause == "cvd"
820 replace cause = "Noncancer/cardiorenal" if cause == "oth"
821 replace cause = "Cancer" if cause == "cancer"
822 tempfile cs_sens
823 save `cs_sens', replace
824
825 use "...Results/Absolute_all_main_BMI_HYP", clear

```

```

826 foreach var of varlist unexp_surv-cont_uci {
827     replace `var' = `var'*100
828 }
829 keep age_diag sens out cont*
830 renames cont cont_lci cont_uci out \ est_ lci_ uci_ cause
831 order age_diag sens cause est_ lci_ uci_
832
833 append using `cs_sens'
834 sencode cause, replace
835 sencode sens, replace
836 sort cause sens age_diag
837 set scheme white_tableau
838
839 keep if inlist(age_diag, 16, 20, 30, 40, 50)
840 sort cause age_diag sens
841 label variable age_diag "Age (years)"
842 replace age_diag = . if sens != 1
843
844 forestplot est_ lci_ uci_ if cause == 1, effect("Difference, %") lcols(age_diag) ///
845     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105) ///
846     spacing(2) yline(3.5(3)12.5, lwidth(vthin) lpattern(vshortdash)) xtitle("10-year survival difference (%), T2DM vs noT2DM", size(5pt)) ///
847     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(0(-0.4)-2.6, force labsize(4pt) nogrid format(%3.1f)) ///
848     box1opts(mcolor(red)) ci1opts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue)) ///
849     title("All-cause", size(small)) name("All_s", replace) xsize(4) ysize(5) scale(1.15) nodraw
850
851 forestplot est_ lci_ uci_ if cause == 2, effect("Difference, %") lcols(age_diag) ///
852     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105) ///
853     spacing(2) yline(3.5(3)12.5, lwidth(vthin) lpattern(vshortdash)) xtitle("10-year cumulative incidence difference (%), T2DM vs noT2DM", size(5pt)) ///
854     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(0(0.2)0.8, force labsize(4pt) nogrid format(%3.1f)) ///
855     box1opts(mcolor(red)) ci1opts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue)) ///
856     title("Cancer", size(small)) name("Cancer_s", replace) xsize(4) ysize(5) scale(1.15) nodraw
857
858 forestplot est_ lci_ uci_ if cause == 3, effect("Difference, %") lcols(age_diag) ///
859     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105) ///
860     spacing(2) yline(3.5(3)12.5, lwidth(vthin) lpattern(vshortdash)) xtitle("10-year cumulative incidence difference (%), T2DM vs noT2DM", size(5pt)) ///
861     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(0(0.1)0.5, force labsize(4pt) nogrid format(%3.1f)) ///
862     box1opts(mcolor(red)) ci1opts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue)) ///
863     title("Cardiorenal", size(small)) name("Cardiorenal_s", replace) xsize(4) ysize(5) scale(1.15) nodraw
864
865 forestplot est_ lci_ uci_ if cause == 4, effect("Difference, %") lcols(age_diag) ///
866     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105) ///
867     spacing(2) yline(3.5(3)12.5, lwidth(vthin) lpattern(vshortdash)) xtitle("10-year cumulative incidence difference (%), T2DM vs noT2DM", size(5pt)) ///
868     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(0(0.2)1.8, force labsize(4pt) nogrid format(%3.1f)) ///
869     box1opts(mcolor(red)) ci1opts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue)) ///
870     title("Noncancer/cardiorenal", size(small)) name("NCNC_s", replace) xsize(4) ysize(5) scale(1.15) nodraw
871
872 graph combine All_s Cancer_s Cardiorenal_s NCNC_s, cols(4) xsize(8) ysize(2.5)
873 graph save "Graph" "...Figure_S7_R1.gph", replace
874 graph close _all
875
876
877 *****
878 *ALL COMBINED RELATIVE -- GRAPHS*****
879 *****
880
881 ***Fig 1***
882 cap use "...Results/Relative_all_cs_main_BMI.dta", clear
883 append using "...Results/Relative_all_cs_HYP.dta"
884 drop if sens != "MAIN"

```

```

885 drop sens
886 drop stderr z p scale
887 replace out = "All-cause"          if out == "died"
888 replace out = "Cancer"             if out == "death_cancer"
889 replace out = "Cardiorenal"        if out == "death_cardiorenal"
890 replace out = "Noncancer/cardiorenal" if out == "death_other"
891 sencode out, replace
892 sencode agegr, replace
893
894 set scheme white_tableau
895 twoway (scatter estimate agegr, sort mcolor(black) msize(small) msymbol(square)) (rspike min95 max95 agegr, sort lcolor(black)),
896       ytitle("Hazard Ratio") yscale(log) xtitle("Age group (years)") xlabel(1 "16-27" 2 "28-31" 3 "32-35" 4 "36-39" 5 "40-43" 6 "44-47" 7 "48-50")
897       by(, legend(off) note("")) by(out, cols(2) yrescale) yline(1, lcolor(blue) lpattern(shortdash))
898 graph save "Graph" "...Figure_1_R1.gph", replace
899
900 ***Fig S6***
901 cap use "...Results/Relative_all_cs_main_BMI.dta", clear
902 append using "...Results/Relative_all_cs_HYP.dta"
903 drop stderr z p scale
904 replace out = "All-cause"          if out == "died"
905 replace out = "Cancer"             if out == "death_cancer"
906 replace out = "Cardiorenal"        if out == "death_cardiorenal"
907 replace out = "Noncancer/cardiorenal" if out == "death_other"
908 sencode sens, replace
909 sort out agegr sens
910 foreach var of varlist estimate-max95 {
911     gen ln_`var' = ln(`var')
912 }
913 replace agegr = "" if sens != 1
914 label variable agegr "Age group at diagnosis (years)"
915
916 set scheme white_tableau
917
918 forestplot ln_estimate ln_min95 ln_max95 if out == "All-cause", eform effect("HR") lcols(agegr)
919     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105)
920     spacing(2.5) yline(3.5(3)18.5, lwidth(vthin) lpattern(vshortdash)) xtitle("Hazard ratio, T2DM vs noT2DM", size(6pt))
921     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(1 2 4 8, force labsize(6pt) nogrid)
922     box1opts(mcolor(red)) cilopts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue))
923     title("All-cause", size(small)) name("All", replace) xsize(4) ysize(5) scale(1) nodraw
924
925 forestplot ln_estimate ln_min95 ln_max95 if out == "Cancer", eform effect("HR") lcols(agegr)
926     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105)
927     spacing(2.5) yline(3.5(3)18.5, lwidth(vthin) lpattern(vshortdash)) xtitle("Hazard ratio, T2DM vs noT2DM", size(6pt))
928     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(0.5 1 2 4 8 16, force labsize(6pt) nogrid)
929     box1opts(mcolor(red)) cilopts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue))
930     title("Cancer", size(small)) name("Cancer", replace) xsize(4) ysize(5) scale(1) nodraw
931
932 forestplot ln_estimate ln_min95 ln_max95 if out == "Cardiorenal", eform effect("HR") lcols(agegr)
933     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105)
934     spacing(2.5) yline(3.5(3)18.5, lwidth(vthin) lpattern(vshortdash)) xtitle("Hazard ratio, T2DM vs noT2DM", size(6pt))
935     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(1 2 4 8 16 32, force labsize(6pt) nogrid)
936     box1opts(mcolor(red)) cilopts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue))
937     title("Cardiorenal", size(small)) name("Cardiorenal", replace) xsize(4) ysize(5) scale(1) nodraw
938
939 forestplot ln_estimate ln_min95 ln_max95 if out == "Noncancer/cardiorenal", eform effect("HR") lcols(agegr)
940     nonames noov nosu nowt dp(2) classic boxscale(60) astext(40) textsize(105)
941     spacing(2.5) yline(3.5(3)18.5, lwidth(vthin) lpattern(vshortdash)) xtitle("Hazard ratio, T2DM vs noT2DM", size(6pt))
942     leftjustify ciopts(lwidth(vthin)) plotid(sens) xlabel(1 2 4 8, force labsize(6pt) nogrid)
943     box1opts(mcolor(red)) cilopts(lcolor(red)) box2opts(mcolor(black)) ci2opts(lcolor(black)) box3opts(mcolor(blue)) ci3opts(lcolor(blue))

```



```

944     title("Noncancer/cardiorenal", size(small)) name("NCNC", replace) xsize(4) ysize(5) scale(1) nodraw
945
946 graph combine All Cancer Cardiorenal NCNC, rows(1) scale(0.9) xsize(6) ysize(4) name("FigS6", replace) nocopies
947 graph export "...Figure_S6_R1.svg", as(svg) name("FigS6")
948 graph close _all
949
950
951 *****
952 *DURATION (IQR) BY AGE GROUP, ALL INDIVIDUALS*****
953 *****
954 cap use "...m3_survival_data.dta", clear
955 gen end_date="31/10/2020"
956 gen d_end=date(end_date, "DMY")
957 replace d_end=deathn if died==1
958 gen time = (d_end-indexn)/365.25
959 replace time = .00136895 if time==0
960 keep exp age_index died time
961 sum age_index
962 egen float ageg = cut(age_index), at(0 16 28 32 36 40 44 48 100) icodes label
963
964 preserve
965 gen t25 = time
966 gen t50 = time
967 gen t75 = time
968 collapse (p25) t25 (p50) t50 (p75) t75, by(ageg)
969 foreach var of varlist t25 t50 t75 {
970     tostring `var', format(%3.1f) force replace
971 }
972 gen m_iqr = t50 + " (" + t25 + "-" + t75 + ")"
973 gen agegr = "16-27" if ageg == 1
974 replace agegr = "28-31" if ageg == 2
975 replace agegr = "32-35" if ageg == 3
976 replace agegr = "36-39" if ageg == 4
977 replace agegr = "40-43" if ageg == 5
978 replace agegr = "44-47" if ageg == 6
979 replace agegr = "48-50" if ageg == 7
980 order agegr m_iqr, first
981 cap export excel using "...FollowUp_Agegroups.xls", firstrow(variables) replace
982 restore
983
984 sort ageg
985 gen agegr = "16-27" if ageg == 1
986 replace agegr = "28-31" if ageg == 2
987 replace agegr = "32-35" if ageg == 3
988 replace agegr = "36-39" if ageg == 4
989 replace agegr = "40-43" if ageg == 5
990 replace agegr = "44-47" if ageg == 6
991 replace agegr = "48-50" if ageg == 7
992 tab ageg agegr
993 set scheme tab2
994 distplot time, over(agegr) ylabel(0(10)100, labsize(8pt)) legend(rows(1) position(12)) trscale(100*%) xlabel(0(2)20, labsize(8pt)) xsize(5) ysize(5) xtitle("Follow-up time (years)")
995 ytitle("Cumulative probability (%)")
996 cap graph export "...FollowUp_Agegroups.emf", as(emf) name("Graph") replace
997 graph close _all
998
999 *****
1000 *SEPARATE CARDIO AND RENAL*****
1001 *****

```

```

1002
1003 ***RELATIVE: Cause-specific difference***
1004 cap use "...m3_survival_data.dta", clear
1005 egen float agegr = cut(age_index), at(16 28 32 36 40 44 48 51) icodes
1006 lab define agegr_1 0 "16-27" 1 "28-31" 2 "32-35" 3 "36-39" 4 "40-43" 5 "44-47" 6 "48-50"
1007 lab values agegr agegr_1
1008 tab agegr, m
1009 tabstat age_index, statistics(mean median min max count) by(agegr)
1010 gen end_date="31/10/2020"
1011 gen d_end=date(end_date, "DMY")
1012 replace d_end=deathn if died==1
1013 gen time = (d_end-indexn)/365.25
1014 replace time = .00136895 if time==0
1015 keep patid time died exp age_index sex eth imd smoke hypertension_5 agegr bmi death_str_cva death_ihd death_renal death_cancer death_other
1016 lab define exp_lab 0 "no" 1 "yes"
1017 lab values exp exp_lab
1018 gen death_cvd=0
1019 replace death_cvd=1 if death_ihd==1 | death_str_cva==1
1020 drop death_ihd death_str_cva
1021 groups death_cvd death_renal died
1022 renames death_cvd death_renal \ sdeath_cvd sdeath_renal
1023
1024 groups sdeath_cvd agegr if sdeath_cvd == 1, clean
1025 groups sdeath_renal agegr if sdeath_renal == 1, clean
1026
1027 foreach nm in sdeath_cvd sdeath_renal {
1028
1029     stset time, f(`nm'==1)
1030
1031     preserve
1032     set showbaselevels on
1033     stpm2 i.exp#i.agegr i.agegr sex i.eth i.imd smoke hypertension_5, df(4) scale(hazard) eform nolog
1034     parmest, fast eform
1035     split parm, p(#)
1036     keep if parm1 == "1.exp"
1037     sencode parm2, replace
1038     replace parm2 = parm2 - 1
1039     drop parm1
1040     gen agegr      = "16-27" if parm2 == 0
1041     replace agegr = "28-31" if parm2 == 1
1042     replace agegr = "32-35" if parm2 == 2
1043     replace agegr = "36-39" if parm2 == 3
1044     replace agegr = "40-43" if parm2 == 4
1045     replace agegr = "44-47" if parm2 == 5
1046     replace agegr = "48-50" if parm2 == 6
1047     drop parm2 parm eq
1048     gen scale = "Relative"
1049     gen out   = "`nm'"
1050     gen sens  = "MAIN"
1051     tempfile rel_`nm'_main
1052     save `rel_`nm'_main', replace
1053     restore
1054 }
1055
1056 *****
1057 *COMBINED RELATIVE - CARDIO_RENAL*
1058 *****
1059 clear
1060 foreach nm in sdeath_cvd sdeath_renal {

```

```
1061     append using `rel_nm'_main'
1062   }
1063   save "...Results/Relative_CR_main", replace
1064
1065
1066   *****
1067   *TABLE RELATIVE - CARDIO_RENAL*
1068   *****
1069   cap use "...Results/Relative_CR_main", clear
1070   keep estimate min95 max95 agegr out
1071   foreach var of varlist estimate-max95 {
1072     tostring `var', replace force format(%20.2f)
1073   }
1074   gen hr_ci = estimate + " (" + min95 + " to " + max95 + ")"
1075   order out agegr hr_ci
1076   drop estimate-max95
1077   replace out = "CVD only" if out == "sdeath_cvd"
1078   replace out = "Renal only" if out == "sdeath_renal"
1079   cap export excel using "...Cardio_Renal_Separate.xls", firstrow(variables) replace
```