

```
1
2 ****Examining the Association between Area Level Deprivation and Vehicle Collisions
  that Result in Injury****
3
4 *checking for duplicates*
5
6 duplicates report
7
8 ****Dropping Corman Park because only investigating Saskatoon and dropping all
  missing values****
9
10 tab municipali
11 drop if municipali == "Corman Park"
12 drop if municipali=="."
13 drop if dauid==.
14 drop if totaldeprivation==.
15
16
17 *****
18 *****Recoding variables*****
19 *****
20
21 *reategorize severity from sevcode*
22   tab (severity_d)
23     generate severity =0
24     replace severity=1 if severity_d == "PERSONAL INJURY"
25     replace severity=1 if severity_d == "FATAL"
26     replace severity=0 if severity_d == "PROPERTY DAMAGE ONLY"
27     replace severity=. if severity_d == "."
28
29     label define severity 1 "fatal/injury " 0 "property damage"
30     label values severity severity
31
32     tab severity_d severity
33
34 *categorize for vehichle type*
35
36   tab vehicle_ty
37     generate vehicletype=3
38     replace vehicletype = . if vehicle_ty == "NA"
39     replace vehicletype = 0 if vehicle_ty == "AUTOMOBILE"
40     replace vehicletype = 1 if vehicle_ty == "PANEL VAN"
41     replace vehicletype = 2 if vehicle_ty == "PICKUP TRUCK"
42     *code vehiclyetype = (other)*
43
44
45     label define vehicletype 0 "Automobile" 1 "Panel van" 2 "Pickup truck" 3
  "other"
46     label values vehicletype vehicletype
47
48     tab vehicle_ty vehicletype
49
50 *categorize for road condition*
51
52   tab roadcond_d
53     gen roadcondition=0
54     replace roadcondition = . if roadcond_d == "NA"
55     replace roadcondition = 1 if roadcond_d == "NORMAL/GOOD"
56     replace roadcondition = . if roadcond_d == "NOT STATED"
57     replace roadcondition = 2 if roadcond_d == "OBSCURED OR FADED MARKINGS"
58     replace roadcondition = 2 if roadcond_d == "POTHoles, RUTS, BUMPS"
59     replace roadcondition = 3 if roadcond_d == "UNDER CONSTRUCTION/REPAIR"
60     replace roadcondition = 3 if roadcond_d == "UNEVEN PAVEMENT/SHARP DROP OFF"
61     replace roadcondition = . if roadcond_d == "."
62
63   label define roadcondition 1 "good" 2 "faded/potholes" 3 "undercon/uneven"
```

```
64 label values roadcondition roadcondition
65
66     tab roadcond_d roadcondition
67
68     tab totaldeprivation roadcondition
69
70 *categorize for road surface condition*
71
72     tab roadsurf_d
73     gen roadsurfcondition = 0
74     replace roadsurfcondition = . if roadsurf_d == "NA"
75     replace roadsurfcondition = 1 if roadsurf_d == "DRY"
76     replace roadsurfcondition = 3 if roadsurf_d == "FRESH OIL"
77     replace roadsurfcondition = 3 if roadsurf_d == "LOOSE GRAVEL OR SAND"
78     replace roadsurfcondition = 3 if roadsurf_d == "LOOSE SNOW"
79     replace roadsurfcondition = 3 if roadsurf_d == "MUDDY"
80     replace roadsurfcondition = 2 if roadsurf_d == "PACKED SNOW/ICE"
81     replace roadsurfcondition = 3 if roadsurf_d == "SLUSH"
82     replace roadsurfcondition = 3 if roadsurf_d == "WET"
83     replace roadsurfcondition = . if roadsurf_d == "."
84
85 label define road_surf_fcondition 1 "Dry" 2 "Snow/Ice" 3 "Other"
86 label values roadsurfcondition road_surf_fcondition
87
88     tab roadsurf_d roadsurfcondition
89
90 *categorize for light condition*
91
92     tab morning
93     tab afternoon
94     tab evening
95     tab night
96     generate lightcondition = 0
97     replace lightcondition = 1 if morning == "1"
98     replace lightcondition = 2 if afternoon == "1"
99     replace lightcondition = 3 if evening == "1"
100    replace lightcondition = 4 if night == "1"
101    replace lightcondition = . if morning == "NA"
102    replace lightcondition = . if afternoon == "NA"
103    replace lightcondition = . if evening == "NA"
104    replace lightcondition = . if night == "NA"
105
106 label define light_condition 1 "morning" 2 "afternoon" 3 "evening" 4 "night"
107 label values lightcondition light_condition
108
109     tab morning lightcondition
110     tab afternoon lightcondition
111     tab evening lightcondition
112     tab night lightcondition
113
114 *categorize seasons*
115
116     tab month
117
118     generate seasons = 0
119
120     replace seasons = 1 if month == 3
121     replace seasons = 1 if month == 4
122     replace seasons = 1 if month == 5
123     replace seasons = 2 if month == 6
124     replace seasons = 2 if month == 7
125     replace seasons = 2 if month == 8
126     replace seasons = 3 if month == 9
127     replace seasons = 3 if month == 10
128     replace seasons = 3 if month == 11
129     replace seasons = 4 if month == 12
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```
130     replace seasons = 4 if month == 1
131     replace seasons = 4 if month == 2
132
133     *1=March to May (3,4,5)=Spring*
134     *2=June to August(6,7,8)= Summer*
135     *3=September to November (9,10,11)=Autumn*
136     *4=December to February (12,1,2)= Winter*
137
138     label define seasons 1 "Spring" 2 "Summer" 3 "Autumn" 4 "Winter"
139     label values seasons seasons
140
141     tab month seasons
142
143     *categorize for intersection*
144
145     tab intersect
146
147     generate intersection = 0
148     replace intersection = 1 if intersect == "1"
149     replace intersection = 0 if intersect == "0"
150     replace intersection = . if intersect == "NA"
151
152     *1=intersection, 2=non-intersection*
153     label define intersection 1 "intersection" 0 "non-interesection"
154     label values intersection intersection
155
156     tab intersect intersection
157
158     *categorize trafficvolume*
159
160     tab traffic_vo
161     destring traffic_vo, replace force
162
163     gen trafficvolume = 0
164     replace trafficvolume = 0 if traffic_vo<=10000
165     replace trafficvolume = 1 if traffic_vo>=10001
166
167
168     label define traffic_volume 0 "low traffic" 1 "high traffic"
169     label values trafficvolume traffic_volume
170
171     summarize trafficvolume
172     tab trafficvolume
173
174     *categorize speed*
175
176     tab less50km
177     tab eq50_60km
178     tab more70km
179
180     generate speed=0
181     replace speed=1 if less50km==1
182     replace speed=2 if eq50_60km==1
183     replace speed=3 if more70km ==1
184
185     label define speed 1 "less than 50km" 2 "50-60km" 3 "more than 70km"
186     label values speed speed
187
188     tab less50km speed
189     tab eq50_60km speed
190     tab more70km speed
191
192     *total prec mm to cm*
193
194     summarize totalpreci
195     tab totalpreci
```

```
196
197 generate preci_cm=0
198 replace preci_cm=totalpreci*0.1
199
200 summarize preci_cm
201
202 *missing values*
203
204 misstable summarize totaldeprivation vehicletype municipali dauid roadcondition
roadsurfcondition lightcondition seasons intersection trafficvolume speed, all
showzeros

205
206 *dropping all missing except road repair and road condition values from the created
variables*

207
208 drop if seasons==.
209 drop if vehicletype==.
210 drop if intersection==.
211 drop if lightcondition==.
212 drop if speed==.
213 drop if preci_cm==.
214 drop if trafficvolume==.
215
216 spearman totaldeprivation trafficvolume intersection preci_cm lightcondition
vehicletype roadcondition seasons speed roadsurfcondition

217
218
219 *****
*****
220 ***** Table_Supplement_Sensitivity Analysis Screening with roadcondition and
roadsurface condition not excluded
*****
221 *****
*****

222
223 ** Total deprivation
224
225 tab totaldeprivation severity, col
226 melogit severity i.totaldeprivation || dauid:,or intmethod(laplace) difficult
227
228 ** Traffic Volume
229
230 tab trafficvolume severity, col
231 melogit severity ib(0).trafficvolume || dauid:,or intmethod(laplace) difficult
232
233 ** Vehicle Type
234
235 tab vehicletype severity, col
236 melogit severity ib(0).vehicletype || dauid:,or intmethod(laplace) difficult
237
238 ** Speed
239
240 tab speed severity, col
241 melogit severity ib(1).speed || dauid:,or intmethod(laplace) difficult
242
243 ** Intersections
244
245 tab intersection severity, col
246 melogit severity ib(0).intersection || dauid:,or intmethod(laplace) difficult
247
248 ** Light Condition
249
250 tab lightcondition severity, col
251 melogit severity ib(1).lightcondition || dauid:,or intmethod(laplace) difficult
252
253 ** Season
254
```

```

255     tab seasons severity, col
256     melogit severity ib(1).seasons || dauid:,or intmethod(laplace) difficult
257
258     ** Precipitation
259
260     bysort severity: summarize preci_cm
261     melogit severity preci_cm || dauid:,or intmethod(laplace) difficult
262
263     *****
264     *** Variables removed form model for Sensitivity Analysis
265     *****
266
267     ** Road Repairs
268
269     tab roadcondition
270     melogit severity ib(1).roadcondition || dauid:,or intmethod(laplace) difficult
271
272     ** Road Surface Condition
273
274     tab roadsurfcondition severity, col
275     melogit severity ib(1).roadsurfcondition || dauid:,or intmethod(laplace)
difficult
276
277     *****Testings significance of entire category*****
278
279     testparm i.totaldeprivation
280     testparm i.vehicletype
281     testparm i.roadcondition
282     testparm i.roadsurfcondition
283     testparm i.lightcondition
284     testparm i.seasons
285     testparm i.speed
286     testparm i.trafficvolume
287     testparm i.intersection
288
289     *****
290     ***** Model Sensitivity Analysis
291     *****
292
293     *** Null Model
294
295     melogit severity || dauid:, intmethod(laplace) difficult
296     estat icc
297
298     *** Full Model
299
300     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).
lightcondition ib(1).seasons ib(1).speed ib(0).trafficvolume ib(0).intersection ||
dauid:, or intmethod(laplace) difficult
301     estat icc
302
303     *** Full Model GLLAMM
304
305     xi:gllamm severity i.totaldeprivation preci_cm i.vehicletype i.lightcondition i.
seasons i.speed i.trafficvolume i.intersection i.totaldeprivation*i.lightcondition i.
totaldeprivation*i.roadcondition i.totaldeprivation*i.trafficvolume, i(dauid) link(
logit) fam(binomial) adapt eform
306
307     **The gllamm code above gives an error message "can't continue r(198);" and this
is because gllamm cannot run categorical variables without them being expanded,
therefore the gllamm code has been to run again a second time with each of the
caetgories expanded for each of the variables and this was created from the previous
gllamm code***
308

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```

309     ***gllamm run 2***
310     gllamm severity preci_cm _Itotaldepr_2 _Itotaldepr_3 _Itotaldepr_4 _Itotaldepr_5
      _Ivehiclety_1 _Ivehiclety_2 _Ivehiclety_3 _Ilightcond_2 _Ilightcond_3 _Ilightcond_4
      _Iseasons_2 _Iseasons_3 _Iseasons_4 _Ispeed_2 _Ispeed_3 _Itrafficvo_1 _Iintersect_1
      _ItotXlig_2_2 _ItotXlig_2_3 _ItotXlig_2_4 _ItotXlig_3_2 _ItotXlig_3_3 _ItotXlig_3_4
      _ItotXlig_4_2 _ItotXlig_4_3 _ItotXlig_4_4 _ItotXlig_5_2 _ItotXlig_5_3 _ItotXlig_5_4
      _ItotXroa_2_2 _ItotXroa_2_3 _ItotXroa_3_2 _ItotXroa_3_3 _ItotXroa_4_2 _ItotXroa_4_3
      _ItotXroa_5_2 _ItotXroa_5_3 _ItotXtra_2_1 _ItotXtra_3_1 _ItotXtra_4_1 _ItotXtra_5_1 ,
      i(david) link(logit) fam(binomial) adapt eform

311
312
313     *****
314     ***** Paper Analysis
315     *****
316
317     drop if roadcondition==.
318     drop if roadsurfcondition==.
319
320
321     ** Total deprivation
322
323     tab totaldeprivation severity, col
324     melogit severity i.totaldeprivation || dauid:,or intmethod(laplace) difficult
325
326     ** Traffic Volume
327
328     tab trafficvolume severity, col
329     melogit severity ib(0).trafficvolume || dauid:,or intmethod(laplace) difficult
330
331     ** Road Repairs
332
333     tab roadcondition severity, col
334     melogit severity ib(1).roadcondition || dauid:,or intmethod(laplace) difficult
335
336     ** Road Surface Condition
337
338     tab roadsurfcondition severity, col
339     melogit severity ib(1).roadsurfcondition || dauid:,or intmethod(laplace) difficult
340
341     ** Vehicle Type
342
343     tab vehicletype severity, col
344     melogit severity ib(0).vehicletype || dauid:,or intmethod(laplace) difficult
345
346     ** Speed
347
348     tab speed severity, col
349     melogit severity ib(1).speed || dauid:,or intmethod(laplace) difficult
350
351     ** Intersections
352
353     tab intersection severity, col
354     melogit severity ib(0).intersection || dauid:,or intmethod(laplace) difficult
355
356     ** Light Condition
357
358     tab lightcondition severity, col
359     melogit severity ib(1).lightcondition || dauid:,or intmethod(laplace) difficult
360
361     ** Season
362
363     tab seasons severity, col
364     melogit severity ib(1).seasons || dauid:,or intmethod(laplace) difficult
365

```

```

366     ** Precipitation
367
368     bysort severity: summarize preci_cm
369     melogit severity preci_cm || dauid:,or intmethod(laplace) difficult
370
371     *****Testings significance of entire category*****
372
373     testparm i.totaldeprivation
374     testparm i.vehicletype
375     testparm i.roadcondition
376     testparm i.roadsurfcondition
377     testparm i.lightcondition
378     testparm i.seasons
379     testparm i.speed
380     testparm i.trafficvolume
381     testparm i.intersection
382
383     *****
384     ***** Table 2
385     *****
386
387     tabout trafficvolume roadcondition roadsurfcondition vehicletype speed intersection
388     lightcondition seasons totaldeprivation using table2.txt, replace ///
389     cells(freq row) format(0 1) clab(No. Row_%)
390     *****
391     ***** Model Analysis
392     *****
393
394     *** Null Model
395
396     melogit severity || dauid:, intmethod(laplace) difficult
397     estat icc
398
399     *** Full Model
400
401     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).
402     roadcondition ib(1).roadsurfcondition ib(1).lightcondition ib(1).seasons ib(1).speed
403     ib(0).trafficvolume ib(0).intersection ||dauid:, or intmethod(laplace) difficult
404
405     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).
406     roadcondition ib(1).roadsurfcondition ib(1).lightcondition ib(1).seasons ib(1).speed
407     ib(0).trafficvolume ib(0).intersection ||dauid:, intmethod(laplace) difficult
408     estat icc
409
410     *****Model 1-dropping variables based on p-value of 0.05*****
411
412     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).
413     roadcondition ib(1).roadsurfcondition ib(1).lightcondition ib(1).seasons ib(1).speed
414     ib(0).trafficvolume ib(0).intersection ||dauid:, intmethod(laplace) difficult
415
416     *****Withing category comparisons*****
417
418     pwcompare i.totaldeprivation, or
419     pwcompare i.vehicletype, or
420     pwcompare i.roadcondition,or
421     pwcompare i.roadsurfcondition,or
422     pwcompare i.lightcondition,or
423     pwcompare i.seasons,or
424     pwcompare i.speed,or
425     pwcompare i.trafficvolume,or

```

```
421     pwcompare i.intersection,or
422     pwcompare i.totaldeprivation#i.roadcondition i.totaldeprivation#i.lightcondition
      i.totaldeprivation#i.trafficvolume, or effects
423
424
425     *no variables had to be dropped and all were significant, therefore they were
      included in the final model*
426
427     *****Testing interactions*****
428     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).roadcondition ib
      (1).roadsurfcondition ib(1).lightcondition ib(1).seasons ib(1).speed ib(0).
      trafficvolume ib(0).intersection i.totaldeprivation#ib(1).lightcondition || dauid:,
      intmethod(laplace) difficult
429
430     testparm i.totaldeprivation#i.lightcondition
431
432     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).roadcondition ib
      (1).roadsurfcondition ib(1).lightcondition ib(1).seasons ib(1).speed ib(0).
      trafficvolume ib(0).intersection i.totaldeprivation#ib(1).roadcondition || dauid:,
      intmethod(laplace) difficult
433
434     testparm i.totaldeprivation#i.roadcondition
435
436     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).roadcondition ib
      (1).roadsurfcondition ib(1).lightcondition ib(1).seasons ib(1).speed ib(0).
      trafficvolume ib(0).intersection i.totaldeprivation#ib(0).trafficvolume || dauid:,
      intmethod(laplace) difficult
437     testparm i.totaldeprivation#i.trafficvolume
438
439
440
441     *All interactions significant and need to be included in the model*
442
443     melogit severity i.totaldeprivation preci_cm ib(0).vehicletype ib(1).roadcondition ib
      (1).roadsurfcondition ib(1).lightcondition ib(1).seasons ib(1).speed ib(0).
      trafficvolume ib(0).intersection i.totaldeprivation#ib(1).lightcondition i.
      totaldeprivation#ib(1).roadcondition i.totaldeprivation#ib(0).trafficvolume ||dauid
      :, intmethod(laplace) difficult
444     testparm i.totaldeprivation
445     testparm i.vehicletype
446     testparm i.roadcondition
447     testparm i.roadsurfcondition
448     testparm i.lightcondition
449     testparm i.seasons
450     testparm i.speed
451     testparm i.trafficvolume
452     testparm i.intersection
453     testparm i.totaldeprivation#i.lightcondition
454     testparm i.totaldeprivation#i.roadcondition
455     testparm i.totaldeprivation#i.trafficvolume
456
457
458     pwcompare i.totaldeprivation, or effects
459     pwcompare i.vehicletype, or effects
460     pwcompare i.roadcondition,or effects
461     pwcompare i.roadsurfcondition,or effects
462     pwcompare i.lightcondition,or effects
463     pwcompare i.seasons,or effects
464     pwcompare i.speed,or effects
465     pwcompare i.trafficvolume,or effects
466     pwcompare i.intersection,or effects
467     pwcompare i.totaldeprivation#i.roadcondition i.totaldeprivation#i.lightcondition i.
      totaldeprivation#i.trafficvolume, or effects
468
469     **Predicted values for fixed effects**
470     predict fv, mu fixedonly
```



```
471 list fv totaldeprivation
472
473
474 ***Final gllamm model***
475 ***gllamm run 1***
476
477 xi:gllamm severity i.totaldeprivation preci_cm i.vehicletype i.roadcondition i.
roadsurfcondition i.lightcondition i.seasons i.speed i.trafficvolume i.intersection i
.totaldeprivation*i.lightcondition i.totaldeprivation*i.roadcondition i.
totaldeprivation*i.trafficvolume, i(david) link(logit) fam(binomial) adapt eform
478
479 **The gllamm code above gives an error message "can't continue r(198);" and this is
because gllamm cannot run categorical variables without them being expanded,
therefore the gllamm code has been to run again a second time with each of the
caetgories expanded for each of the variables and this was created from the previous
gllamm code***
480
481 ***gllamm run 2***
482 gllamm severity preci_cm _Itotaldepr_2 _Itotaldepr_3 _Itotaldepr_4 _Itotaldepr_5
_ivehiclety_1 _ivehiclety_2 _ivehiclety_3 _iroadcondi_2 _iroadcondi_3 _iroadsurfc_2
_iroadsurfc_3 _ilightcond_2 _ilightcond_3 _ilightcond_4 _iseasons_2 _iseasons_3
_iseasons_4 _ispeed_2 _ispeed_3 _ittrafficvo_1 _intersect_1 _ItotXlig_2_2
_ItotXlig_2_3 _ItotXlig_2_4 _ItotXlig_3_2 _ItotXlig_3_3 _ItotXlig_3_4 _ItotXlig_4_2
_ItotXlig_4_3 _ItotXlig_4_4 _ItotXlig_5_2 _ItotXlig_5_3 _ItotXlig_5_4 _ItotXroa_2_2
_ItotXroa_2_3 _ItotXroa_3_2 _ItotXroa_3_3 _ItotXroa_4_2 _ItotXroa_4_3 _ItotXroa_5_2
_ItotXroa_5_3 _ItotXtra_2_1 _ItotXtra_3_1 _ItotXtra_4_1 _ItotXtra_5_1 , i(david) link
(logit) fam(binomial) adapt eform
483
484 log close
485
```