

Yang, Kun 301178299

Assignment 5 Part 2 - Accidents
part of the accident_info data

Obs	accidentid	accident severity	Speed limit	Urban or Rural	fatal	area	speed
1	201001BS70003	3	30	1	no	urban	00+-30
2	201001BS70004	3	30	1	no	urban	00+-30
3	201001BS70006	3	30	1	no	urban	00+-30
4	201001BS70007	3	30	1	no	urban	00+-30
5	201001BS70008	3	30	1	no	urban	00+-30
6	201001BS70009	3	30	1	no	urban	00+-30
7	201001BS70010	3	30	1	no	urban	00+-30
8	201001BS70011	3	30	1	no	urban	00+-30
9	201001BS70012	3	30	1	no	urban	00+-30
10	201001BS70013	3	30	1	no	urban	00+-30

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	fatal	
	no	yes
	N	N
accident_severity		
1	.	1,731
2	20,440	.
3	132,243	.

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	area	
	rural	urban
	N	N
Urban_or_Rural		
1	.	99,488
2	54,926	.

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Assignment 5 Part 2 - Accidents
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	speed			
		00+-30	30+-50	60+
	N	N	N	N
Speed_limit				
10	.	2	.	.
15	.	1	.	.
20	.	1,548	.	.
30	.	100,261	.	.
40	.	.	12,591	.
50	.	.	5,193	.
60	23,510	.	.	.
70	.	.	.	11,308

Assignment 5 Part 2 - Accidents
check the recodes

The GENMOD Procedure

Model Information	
Data Set	WORK.ACCIDENT_INFO
Distribution	Multinomial
Link Function	Cumulative Logit
Dependent Variable	fatal

Number of Observations Read	130904
Number of Observations Used	130904

Class Level Information		
Class	Levels	Values
area	2	rural urban
speed	3	00+-30 30+-50 60+

Response Profile		
Ordered Value	fatal	Total Frequency
1	yes	1073
2	no	129831

PROC GENMOD is modeling the probabilities of levels of fatal having LOWER Ordered Values in the response profile table.

Parameter Information			
Parameter	Effect	area	speed
Prm1	area	rural	
Prm2	area	urban	
Prm3	speed		00+-30
Prm4	speed		30+-50
Prm5	speed		60+
Prm6	area*speed	rural	00+-30
Prm7	area*speed	rural	30+-50
Prm8	area*speed	rural	60+
Prm9	area*speed	urban	00+-30

Assignment 5 Part 2 - Accidents
check the recodes

The GENMOD Procedure

Parameter Information			
Parameter	Effect	area	speed
Prm10	area*speed	urban	30+-50
Prm11	area*speed	urban	60+

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Log Likelihood		-6011.3829	
Full Log Likelihood		-6011.3829	
AIC (smaller is better)		12034.7658	
AICC (smaller is better)		12034.7665	
BIC (smaller is better)		12093.4592	

Algorithm converged.

Analysis Of Maximum Likelihood Parameter Estimates									
Parameter			DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept1			1	-4.4705	0.2597	-4.9794	-3.9615	296.39	<.0001
area	rural		1	0.7839	0.2676	0.2593	1.3084	8.58	0.0034
area	urban		0	0.0000	0.0000	0.0000	0.0000	.	.
speed	00+-30		1	-0.8051	0.2639	-1.3224	-0.2878	9.31	0.0023
speed	30+-50		1	0.0283	0.2781	-0.5168	0.5734	0.01	0.9189
speed	60+		0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	rural	00+-30	1	-0.3872	0.2896	-0.9547	0.1803	1.79	0.1811
area*speed	rural	30+-50	1	-0.3490	0.2964	-0.9300	0.2320	1.39	0.2390
area*speed	rural	60+	0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	urban	00+-30	0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	urban	30+-50	0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	urban	60+	0	0.0000	0.0000	0.0000	0.0000	.	.
Scale			0	1.0000	0.0000	1.0000	1.0000		

Note: The scale parameter was held fixed.

Assignment 5 Part 2 - Accidents
check the recodes

The GENMOD Procedure

LR Statistics For Type 3 Analysis			
Source	DF	Chi-Square	Pr > ChiSq
area	1	31.84	<.0001
speed	2	115.20	<.0001
area*speed	2	1.96	0.3744

area*speed Least Squares Means									
fatal	area	speed	Estimate	Standard Error	z Value	Pr > z	Alpha	Lower	Upper
yes	rural	00+-30	-4.8790	0.09988	-48.85	<.0001	0.05	-5.0747	-4.6832
yes	rural	30+-50	-4.0073	0.07952	-50.39	<.0001	0.05	-4.1632	-3.8515
yes	rural	60+	-3.6866	0.06482	-56.88	<.0001	0.05	-3.8137	-3.5596
yes	urban	00+-30	-5.2756	0.04726	-111.63	<.0001	0.05	-5.3682	-5.1830
yes	urban	30+-50	-4.4422	0.09960	-44.60	<.0001	0.05	-4.6374	-4.2470
yes	urban	60+	-4.4705	0.2597	-17.22	<.0001	0.05	-4.9794	-3.9615

Assignment 5 Part 2 - Accidents
check the recodes

The GENMOD Procedure

Differences of area*speed Least Squares Means Adjustment for Multiple Comparisons: Tukey-Kramer											
area	speed	_area	_speed	Estimate	Standard Error	z Value	Pr > z	Adj P	Alpha	Lower	Upper
rural	00+-30	rural	30+-50	-0.8716	0.1277	-6.83	<.0001	<.0001	0.05	-1.1219	-0.6214
rural	00+-30	rural	60+	-1.1923	0.1191	-10.01	<.0001	<.0001	0.05	-1.4257	-0.9590
rural	00+-30	urban	00+-30	0.3966	0.1105	3.59	0.0003	0.0045	0.05	0.1801	0.6132
rural	00+-30	urban	30+-50	-0.4368	0.1411	-3.10	0.0020	0.0240	0.05	-0.7132	-0.1603
rural	00+-30	urban	60+	-0.4085	0.2782	-1.47	0.1421	0.6847	0.05	-0.9538	0.1368
rural	30+-50	rural	60+	-0.3207	0.1026	-3.13	0.0018	0.0219	0.05	-0.5218	-0.1196
rural	30+-50	urban	00+-30	1.2683	0.09251	13.71	<.0001	<.0001	0.05	1.0870	1.4496
rural	30+-50	urban	30+-50	0.4349	0.1274	3.41	0.0006	0.0085	0.05	0.1851	0.6847
rural	30+-50	urban	60+	0.4632	0.2716	1.71	0.0881	0.5281	0.05	-0.06912	0.9954
rural	60+	urban	00+-30	1.5890	0.08022	19.81	<.0001	<.0001	0.05	1.4318	1.7462
rural	60+	urban	30+-50	0.7556	0.1188	6.36	<.0001	<.0001	0.05	0.5227	0.9885
rural	60+	urban	60+	0.7839	0.2676	2.93	0.0034	0.0398	0.05	0.2593	1.3084
urban	00+-30	urban	30+-50	-0.8334	0.1102	-7.56	<.0001	<.0001	0.05	-1.0495	-0.6174
urban	00+-30	urban	60+	-0.8051	0.2639	-3.05	0.0023	0.0277	0.05	-1.3224	-0.2878
urban	30+-50	urban	60+	0.02831	0.2781	0.10	0.9189	1.0000	0.05	-0.5168	0.5734

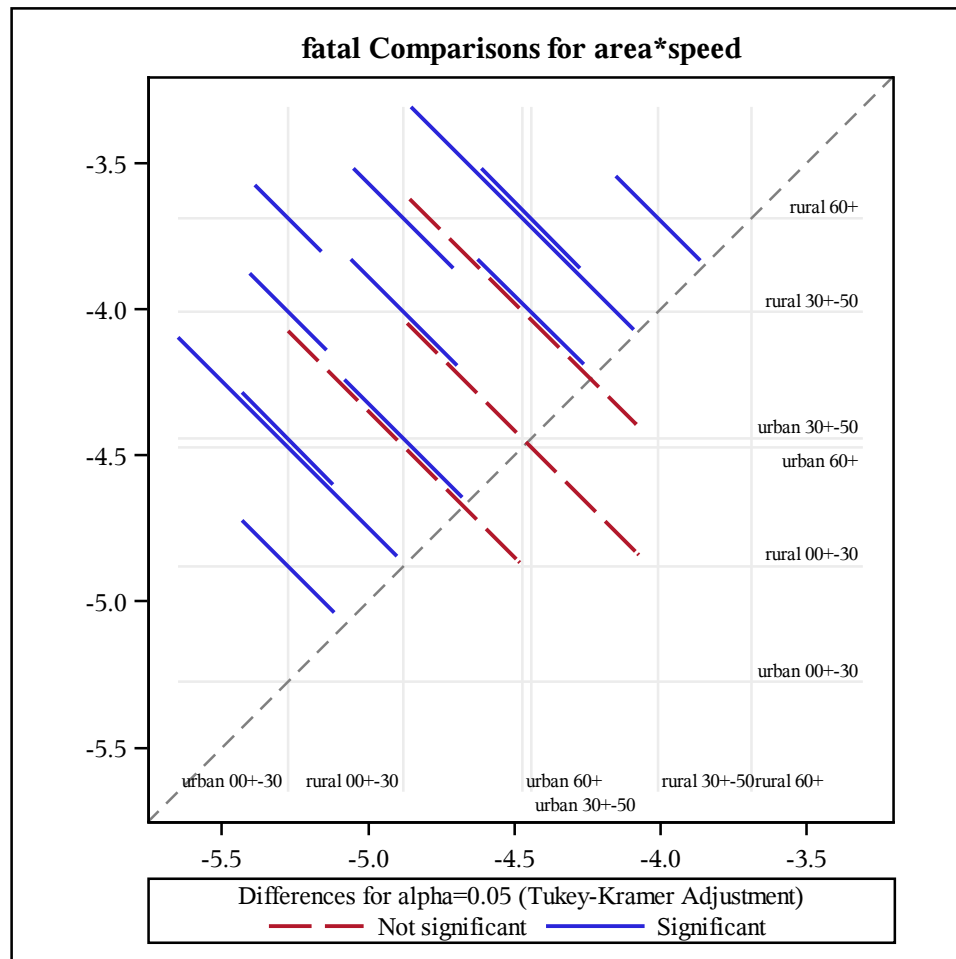
Assignment 5 Part 2 - Accidents
check the recodes

The GENMOD Procedure

Differences of area*speed Least Squares Means Adjustment for Multiple Comparisons: Tukey-Kramer					
area	speed	_area	_speed	Adj Lower	Adj Upper
rural	00+-30	rural	30+-50	-1.2355	-0.5078
rural	00+-30	rural	60+	-1.5317	-0.8530
rural	00+-30	urban	00+-30	0.08176	0.7115
rural	00+-30	urban	30+-50	-0.8387	-0.03482
rural	00+-30	urban	60+	-1.2013	0.3844
rural	30+-50	rural	60+	-0.6131	-0.02835
rural	30+-50	urban	00+-30	1.0047	1.5319
rural	30+-50	urban	30+-50	0.07166	0.7981
rural	30+-50	urban	60+	-0.3107	1.2371
rural	60+	urban	00+-30	1.3604	1.8176
rural	60+	urban	30+-50	0.4169	1.0942
rural	60+	urban	60+	0.02118	1.5466
urban	00+-30	urban	30+-50	-1.1476	-0.5193
urban	00+-30	urban	60+	-1.5573	-0.05298
urban	30+-50	urban	60+	-0.7642	0.8209

Assignment 5 Part 2 - Accidents
check the recodes

The GENMOD Procedure



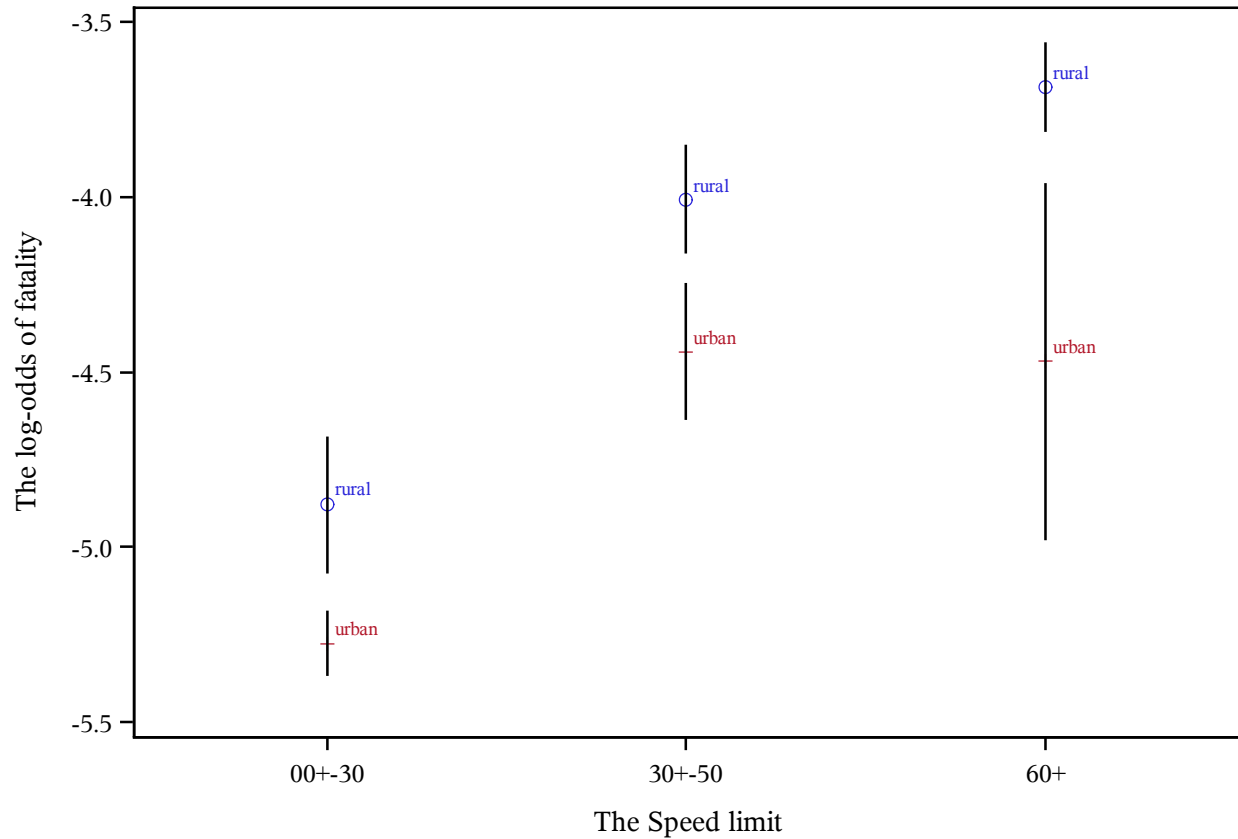
Assignment 5 Part 2 - Accidents
Estimated log-odds and 95% CIs

Effect	fatal	area	speed	log-odds	Standard Error	^z Value	Pr > z	Alpha	Lower limit 95% CI	Upper limit 95% CI
area*speed	yes	rural	00+-30	-4.88	0.10	-48.85	<.0001	0.05	-5.07	-4.68
area*speed	yes	rural	30+-50	-4.01	0.08	-50.39	<.0001	0.05	-4.16	-3.85
area*speed	yes	rural	60+	-3.69	0.06	-56.88	<.0001	0.05	-3.81	-3.56
area*speed	yes	urban	00+-30	-5.28	0.05	-111.6	<.0001	0.05	-5.37	-5.18
area*speed	yes	urban	30+-50	-4.44	0.10	-44.60	<.0001	0.05	-4.64	-4.25
area*speed	yes	urban	60+	-4.47	0.26	-17.22	<.0001	0.05	-4.98	-3.96

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Assignment 5 Part 2 - Accidents

the estimated logodds of a fatality (along with a CI) by area and speed



Assignment 5 Part 2 - Accidents
the estimated logodds of a fatality (along with a CI) by area and speed

The GENMOD Procedure

Model Information	
Data Set	WORK.ACCIDENT_INFO
Distribution	Multinomial
Link Function	Cumulative Logit
Dependent Variable	fatal

Number of Observations Read	130904
Number of Observations Used	130904

Class Level Information		
Class	Levels	Values
area	2	rural urban
speed	3	00+-30 30+-50 60+

Response Profile		
Ordered Value	fatal	Total Frequency
1	no	129831
2	yes	1073

PROC GENMOD is modeling the probabilities of levels of fatal having LOWER Ordered Values in the response profile table. One way to change this to model the probabilities of HIGHER Ordered Values is to specify the DESCENDING option in the PROC statement.

Parameter Information			
Parameter	Effect	area	speed
Prm1	area	rural	
Prm2	area	urban	
Prm3	speed		00+-30
Prm4	speed		30+-50
Prm5	speed		60+
Prm6	area*speed	rural	00+-30
Prm7	area*speed	rural	30+-50
Prm8	area*speed	rural	60+

Assignment 5 Part 2 - Accidents
the estimated logodds of a fatality (along with a CI) by area and speed

The GENMOD Procedure

Parameter Information			
Parameter	Effect	area	speed
Prm9	area*speed	urban	00+-30
Prm10	area*speed	urban	30+-50
Prm11	area*speed	urban	60+

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Log Likelihood		-6011.3829	
Full Log Likelihood		-6011.3829	
AIC (smaller is better)		12034.7658	
AICC (smaller is better)		12034.7665	
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Algorithm converged.

Analysis Of Maximum Likelihood Parameter Estimates									
Parameter			DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept1			1	4.4705	0.2597	3.9615	4.9794	296.39	<.0001
area	rural		1	-0.7839	0.2676	-1.3084	-0.2593	8.58	0.0034
area	urban		0	0.0000	0.0000	0.0000	0.0000	.	.
speed	00+-30		1	0.8051	0.2639	0.2878	1.3224	9.31	0.0023
speed	30+-50		1	-0.0283	0.2781	-0.5734	0.5168	0.01	0.9189
speed	60+		0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	rural	00+-30	1	0.3872	0.2896	-0.1803	0.9547	1.79	0.1811
area*speed	rural	30+-50	1	0.3490	0.2964	-0.2320	0.9300	1.39	0.2390
area*speed	rural	60+	0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	urban	00+-30	0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	urban	30+-50	0	0.0000	0.0000	0.0000	0.0000	.	.
area*speed	urban	60+	0	0.0000	0.0000	0.0000	0.0000	.	.
Scale			0	1.0000	0.0000	1.0000	1.0000		

Yang, Kun 301178299**Assignment 5 Part 2 - Accidents*****the estimated logodds of a fatality (along with a CI) by area and speed******The GENMOD Procedure*****Note:** The scale parameter was held fixed.

LR Statistics For Type 3 Analysis			
Source	DF	Chi-Square	Pr > ChiSq
area	1	31.84	<.0001
speed	2	115.20	<.0001
area*speed	2	1.96	0.3744

area*speed Least Squares Means													
fatal	area	speed	Estimate	Standard Error	z Value	Pr > z	Alpha	Lower	Upper	Mean	Standard Error of Mean	Lower Mean	Upper Mean
no	rural	00+-30	4.8790	0.09988	48.85	<.0001	0.05	4.6832	5.0747	0.9925	0.000748	0.9908	0.9938
no	rural	30+-50	4.0073	0.07952	50.39	<.0001	0.05	3.8515	4.1632	0.9821	0.001395	0.9792	0.9847
no	rural	60+	3.6866	0.06482	56.88	<.0001	0.05	3.5596	3.8137	0.9756	0.001546	0.9723	0.9784
no	urban	00+-30	5.2756	0.04726	111.63	<.0001	0.05	5.1830	5.3682	0.9949	0.000239	0.9944	0.9954
no	urban	30+-50	4.4422	0.09960	44.60	<.0001	0.05	4.2470	4.6374	0.9884	0.001145	0.9859	0.9904
no	urban	60+	4.4705	0.2597	17.22	<.0001	0.05	3.9615	4.9794	0.9887	0.002904	0.9813	0.9932

The GENMOD Procedure

Differences of area*speed Least Squares Means Adjustment for Multiple Comparisons: Tukey-Kramer											
area	speed	_area	_speed	Estimate	Standard Error	z Value	Pr > z	Adj P	Alpha	Lower	Upper
rural	00+-30	rural	30+-50	0.8716	0.1277	6.83	<.0001	<.0001	0.05	0.6214	1.1219
rural	00+-30	rural	60+	1.1923	0.1191	10.01	<.0001	<.0001	0.05	0.9590	1.4257
rural	00+-30	urban	00+-30	-0.3966	0.1105	-3.59	0.0003	0.0045	0.05	-0.6132	-0.1801
rural	00+-30	urban	30+-50	0.4368	0.1411	3.10	0.0020	0.0240	0.05	0.1603	0.7132
rural	00+-30	urban	60+	0.4085	0.2782	1.47	0.1421	0.6847	0.05	-0.1368	0.9538
rural	30+-50	rural	60+	0.3207	0.1026	3.13	0.0018	0.0219	0.05	0.1196	0.5218
rural	30+-50	urban	00+-30	-1.2683	0.09251	-13.71	<.0001	<.0001	0.05	-1.4496	-1.0870
rural	30+-50	urban	30+-50	-0.4349	0.1274	-3.41	0.0006	0.0085	0.05	-0.6847	-0.1851
rural	30+-50	urban	60+	-0.4632	0.2716	-1.71	0.0881	0.5281	0.05	-0.9954	0.06912
rural	60+	urban	00+-30	-1.5890	0.08022	-19.81	<.0001	<.0001	0.05	-1.7462	-1.4318
rural	60+	urban	30+-50	-0.7556	0.1188	-6.36	<.0001	<.0001	0.05	-0.9885	-0.5227
rural	60+	urban	60+	-0.7839	0.2676	-2.93	0.0034	0.0398	0.05	-1.3084	-0.2593
urban	00+-30	urban	30+-50	0.8334	0.1102	7.56	<.0001	<.0001	0.05	0.6174	1.0495
urban	00+-30	urban	60+	0.8051	0.2639	3.05	0.0023	0.0277	0.05	0.2878	1.3224
urban	30+-50	urban	60+	-0.02831	0.2781	-0.10	0.9189	1.0000	0.05	-0.5734	0.5168

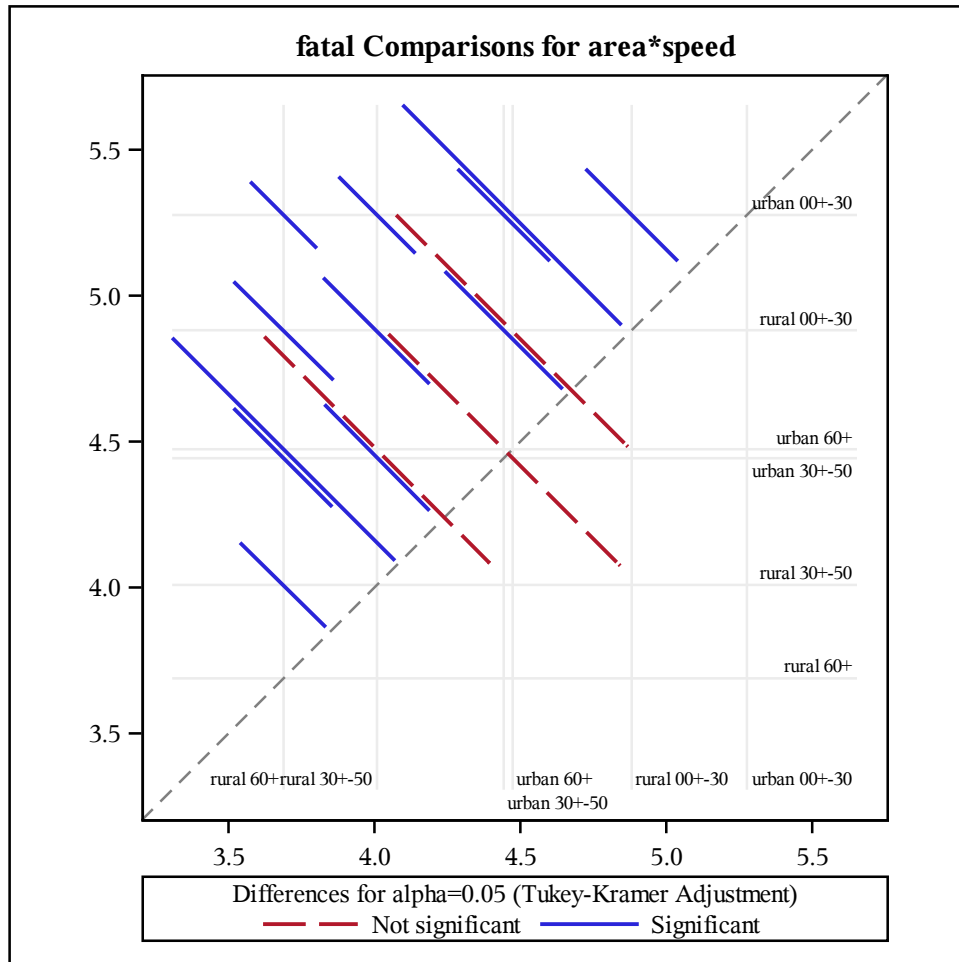
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Assignment 5 Part 2 - Accidents***the estimated logodds of a fatality (along with a CI) by area and speed******The GENMOD Procedure***

Differences of area*speed Least Squares Means Adjustment for Multiple Comparisons: Tukey-Kramer					
area	speed	_area	_speed	Adj Lower	Adj Upper
rural	00+-30	rural	30+-50	0.5078	1.2355
rural	00+-30	rural	60+	0.8530	1.5317
rural	00+-30	urban	00+-30	-0.7115	-0.08176
rural	00+-30	urban	30+-50	0.03482	0.8387
rural	00+-30	urban	60+	-0.3844	1.2013
rural	30+-50	rural	60+	0.02835	0.6131
rural	30+-50	urban	00+-30	-1.5319	-1.0047
rural	30+-50	urban	30+-50	-0.7981	-0.07166
rural	30+-50	urban	60+	-1.2371	0.3107
rural	60+	urban	00+-30	-1.8176	-1.3604
rural	60+	urban	30+-50	-1.0942	-0.4169
rural	60+	urban	60+	-1.5466	-0.02118
urban	00+-30	urban	30+-50	0.5193	1.1476
urban	00+-30	urban	60+	0.05298	1.5573
urban	30+-50	urban	60+	-0.8209	0.7642

Assignment 5 Part 2 - Accidents
the estimated logodds of a fatality (along with a CI) by area and speed

The GENMOD Procedure



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Assignment 5 Part 2 - Accidents

the estimated probability of survival (along with a CI) by area and speed

