

Department for
Transport

Research into Changing Trip Rates over Time and Implications for the National Trip End Model:

Appendix E

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Appendix E Detailed Findings



E.1 INTRODUCTION

E.1.1 This Appendix presents the detailed results from the estimation of trip production models for the outbound weekly trips per person for each of the home-based trip purposes. The most important results have been presented and discussed in the main report. This Appendix provides a comprehensive catalogue of model results charts in a standardised order. This provides a resource for the interest of those readers who would like to investigate and interpret the detailed findings or to compare models across purposes in order to develop a deeper understanding of the influences on trip rates.

E.1.2 For each of the eight home-based trip purposes (except education for which only some of the models have been estimated) individual results charts are provided the set of eight models indicated in Table A.1.1.

Table A.1.1 Model code number and description

Model	Content
1	Model of year alone
2	Simple model, which includes all variables used in the original NTEM
3	Simple model plus interaction terms for those purposes for which interaction terms were statistically significant
4	The best form of the model of accessibility variables with area type
5	The best form of the model of accessibility variables with population density
6	Simple model plus socio-economic class (NS-SeC)
7	Simple model plus income
8	Simple model plus NS-SeC and income

E.1.3 The specific models for trips by rail and for the escort purpose have been presented in the charts in the main report and so they are not duplicated here.

E.1.1 Table E.1.2 provides the list of variables and of their associated categories and reference categories that are used in the set of charts presented in this Appendix.

Table E.1.2 List of variables and categories used in the tests

Variables	Categories	Description
H96	2002 (reference) 2003 2004 2005 2006	Survey Year
a_Household	1 Adult (reference) 2+ Adult	Household Size
b_Carown	No Car 1 Car (reference) 2+ Car	Car Ownership
c_Gender	Female (reference) Male	Gender
d_Age_Workstatus	16-65FT (reference) 16-65PT 65+FT 65+PT	Age and work status: full-time or part-time
d3_Age_work_NSSEC	2_Student 3_NoEmp_O	Combination of age, work status and NS-



Variables	Categories	Description
	4_NoEmp_Y 6_PY_01_M&P ¹ 6_PY_03_InterOcc 6_PY_04_SmallandOwn 6_PY_05_LowsupTech 6_PY_06_SemiRoutine 6_PY_07_Routine 5_PO 7_FO 8_FY_01_M&P 8_FY_03_InterOcc 8_FY_04_SmallandOwn 8_FY_05_LowsupTech 8_FY_06_SemiRoutine 8_FY_07_Routine Children	SeC of individuals
e_Income	1_less 4k (reference) 2_4k-9k 3_9k-20k 4_20k-35k 5_35k-60k 6_over60k	Income groups for individuals
e3_Age_Work_Income	FO FY_20k-35k FY_35k-60k FY_4k-9k FY_9k-20k FY_be4k FY_ov60k NoEmpO_20k-35k NoEmpO_4k-9k NoEmpO_9k-20k NoEmpO_be4k NoEmpO_Over35k NoEmpY_20k-35k NoEmpY_4k-9k NoEmpY_9k-20k NoEmpY_be4k NoEmpY_Over35 PO PY_20k-35k PY_35k-60k PY_4k-9k PY_9k-20k PY_be4k PY_ov60k Children Student	Combination of age, work status and income
D4_Age_Work_NSSec_Income	FO FY_01_M&P_01_below9k FY_01_M&P_02_9k-20k FY_01_M&P_03_20k-35k FY_01_M&P_04_35k-60k	Combination of age, work status, NS-SeC and income

¹ F and P denote "Full-Time and Part-Time", Y and O denote age "16-64" and "65+"



Variables	Categories	Description
	FY_01_M&P_05_over60k FY_03_InterOcc ² FY_Rest ³ NoEmpO_01_below4k NoEmpO_02_4k-9k NoEmpO_03_9k-20k NoEmpO_04_20K-35k NoEmpO_05_over35k NoEmpY_01_below4k NoEmpY_02_4k-9k NoEmpY_03_9k-20k NoEmpY_04_20k-35k NoEmpY_05_over35k PO PY_01_M&P_01_below9k PY_01_M&P_02_9k-20k PY_01_M&P_03_20k-35k PY_01_M&P_04_over35k PY_03_InterOcc_01_below9k PY_03_InterOcc_02_9k-20k PY_03_InterOcc_03_20k-35k PY_03_InterOcc_04_over35k PY_04_SmallandOwn_01_below9k PY_04_SmallandOwn_02_9k-20k PY_04_SmallandOwn_03_20k-35k PY_04_SmallandOwn_04_over35k PY_05_LowsupTech PY_06_SemiRoutine PY_07_Routine Student Children	
g_Area	1.InnerLon (reference for income, NS-SeC tests) 2.OutLon 3.Metropolitan 4.Urban over 250K 5.Urban 25K to 250K 6.small urban 10k-25k 7.Rural (reference, except income, NS-SeC tests)	Area type of residence
Interaction terms		These are the combination of two of the variables which are normally provided as int1, int2 etc.
Pop Density	0 (Under 1) (reference) 1 (1 to 4.99) 2 (5 to 9.99)	Residence population density

² The first few tests showed that the rest of the full-time workers aged 16-64 who are in the third NS-SeC group have similar travel behaviour with little variance by income for any of the purposes tested so they were set as one combined level.

³ The first few tests showed that the rest of the full time workers aged 16-64 have similar travel behaviour for all of the purposes tested so they were set as one combined level.



Variables	Categories	Description		
j_1_WT_to_busstop	3 (10 to 14.99)	Walk time to bus stop		
	4 (15 to 19.99)			
	5 (20 to 24.99)			
	6 (25 to 29.99)			
	7 (30 to 34.99)			
	8 (35 to 39.99)			
	9 (40 to 44.99)			
	10 (45 to 49.99)			
	11 (50 to 59.99)			
	12 (60 to 74.99)			
	13 (75 and over)			
	j_2_frequency_bus		0 (6 mins or less) (reference)	Frequency of buses
			1 (7-13 mins)	
2 (14-26 mins)				
3 (27-43 mins)				
4 (44 mins or more)				
j_3_WT_to_RS	0 (Less than once a day) (reference)	Walk time to rail station		
	1 (At least once a day)			
	2 (At least 1 an hour)			
	3 (At least 1 every half hour)			
	4 (At least 1 every quarter hour)			
j_4_BT_to_RS	0 (6 mins or less) (reference)	Bus time to rail station		
	1 (7-13 mins)			
	2 (14-26 mins)			
	3 (27-43 mins)			
	4 (44 mins or more)			
j_5_train_station_type	0 (No bus/quicker to walk) (reference)	Train station type		
	1 (6 mins or less)			
	2 (7-13 mins)			
	3 (14-26 mins)			
	4 (27-43 mins)			
j_9_Bus.Satisfaction	5 (44 mins or more)	Bus satisfaction		
	0 (Freq service all day) (reference)			
	1 (Freq service rush hour only)			
	2 (Less freq service)			
	3 (Fairly satisfied)			
	4 (Fairly dissatisfied)			
	5 (Very dissatisfied)			
6 (Do not use buses)				
j_11_RateBusFrequency	7 (NA)	Local bus frequency		
	0 (Very frequent) (reference)			
	1 (Fairly frequent)			
	2 (Neither frequent nor infrequent)			
	3 (Fairly infrequent)			
	4 (Very infrequent)			
	5 (o local service)			
	6 (Do not use)			
7 (No opinion/do not know)				
j_10_Deprivation	8 (DNA)	Deprivation		
	Index of Deprivation			



E.1.2 Those records which were always selected as the reference category are indicated in Table E.1.2 but in some of the models those categories with similar behaviour were combined so that there were then some differences between tables in the reference category adopted.

E.1.3 It should be noted that sometimes some of the categories of some variables are combined with each other. This is reflected in their names and so can be worked out from the charts

E.1.4 A numbering convention was developed for reporting the results to facilitate comparisons across purposes or across various tests of one purpose. Each Figure number is formed from two digits (i.e. Figure E.x.y). The first (x) denotes the trip purpose as specified in Table E.1.3 while the second (y) denotes the set of variables included in that type of test as specified previously in Table A.1.1. For instance the simple model of shopping is denoted by Figure E.4.2. Model results are not presented in cases where the test is not relevant, e.g. no significant interaction terms needed to be added to the simple model. However, the table numbering sequence is retained for ease of comparison between tests.

Table E.1.3 Trip purpose code

Purpose code	Trip purpose
2	Commuting
3	Employed Business
4	Shopping
5	Personal Business
6	Holiday
7	Recreation
8	Visiting Friends

E.1.5 Comparisons across purposes can help in evaluating the variation of the strength and directional effects of any variable involved in the model. The model tests are conducted in a similar format to make this sort of comparison as easy as possible

E.1.6 Comparisons across various test models within a purpose, can evaluate the strength and the direction of the effects on existing variables from adding one or more new variables.

E.1.7 For the accessibility test runs, records are excluded from the dataset for those individuals who had not responded fully to questions on those accessibility variables that had some significant categories for some purposes (e.g. “walk time to bus stop”). This has reduced the size of the dataset compared to that used for other tests and so the AIC or variables from the accessibility tests (i.e. Tables E.x.4 and E.x.5) should not be compared directly with the other tests done for the same purpose.

E.1.8 To appreciate the range of change in AIC which can be considered as noticeable, readers should first for each travel purpose do a comparison between the model (1) for the variable year alone and the simple model (2).

E.1.9 The rest of this Appendix provides the results charts from testing various aspects of each travel purpose. Refer to Appendix D for information on how to interpret the charts.



E.2 COMMUTING (FT/PT)

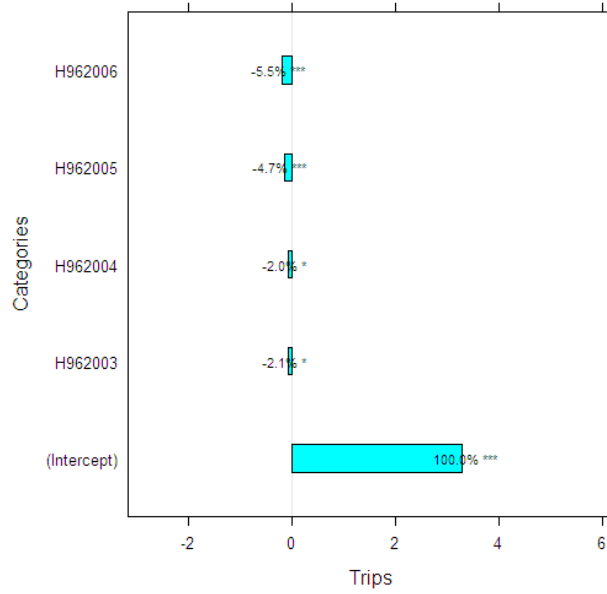


Figure A.2.1 Commuting model of year alone (AIC: 207476)

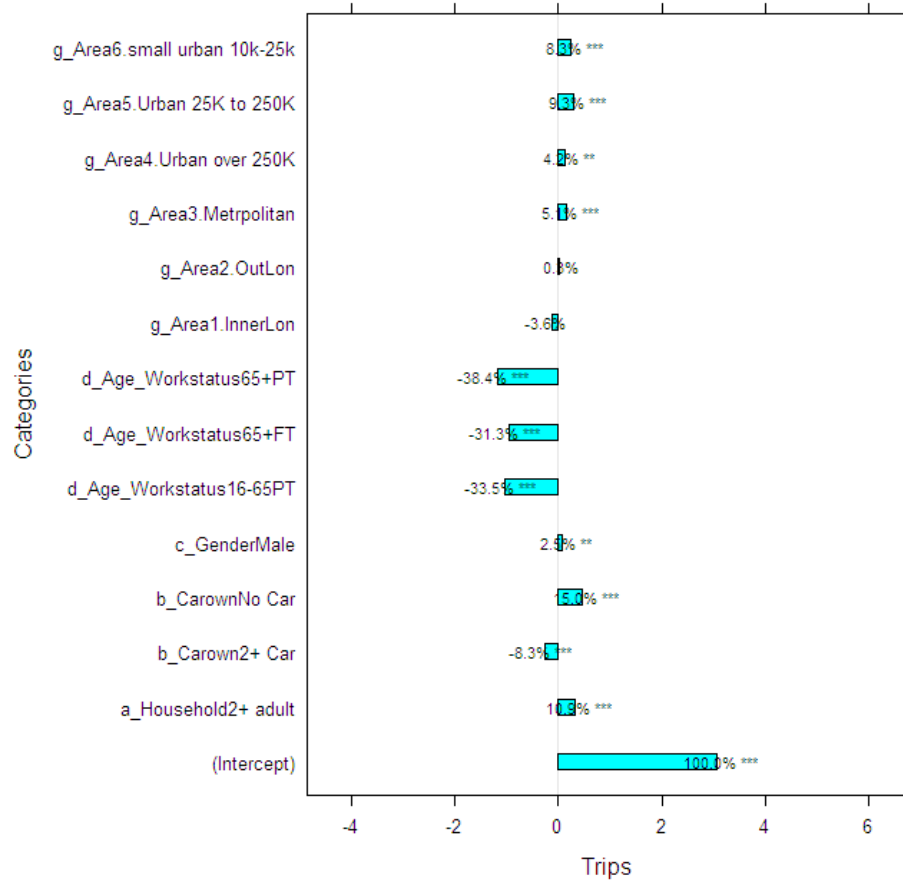
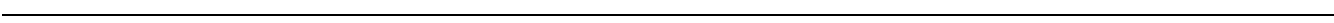


Figure E.2.2 Commuting simple model (AIC: 205476)





Not found to be relevant

Figure E.2.3 Commuting simple model plus interaction terms

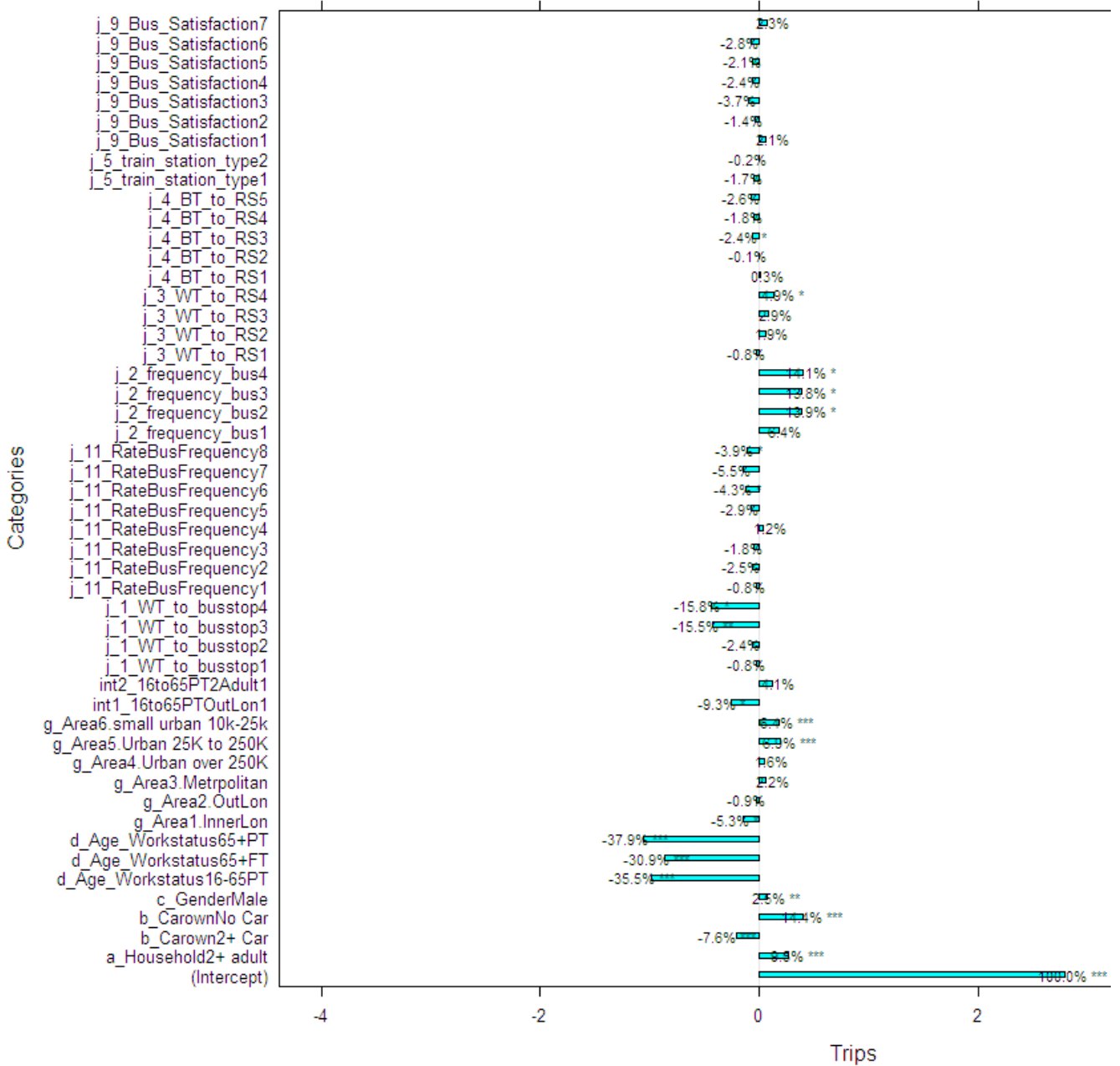


Figure E.2.4 Commuting model of accessibility variables with area type (AIC: 205446)

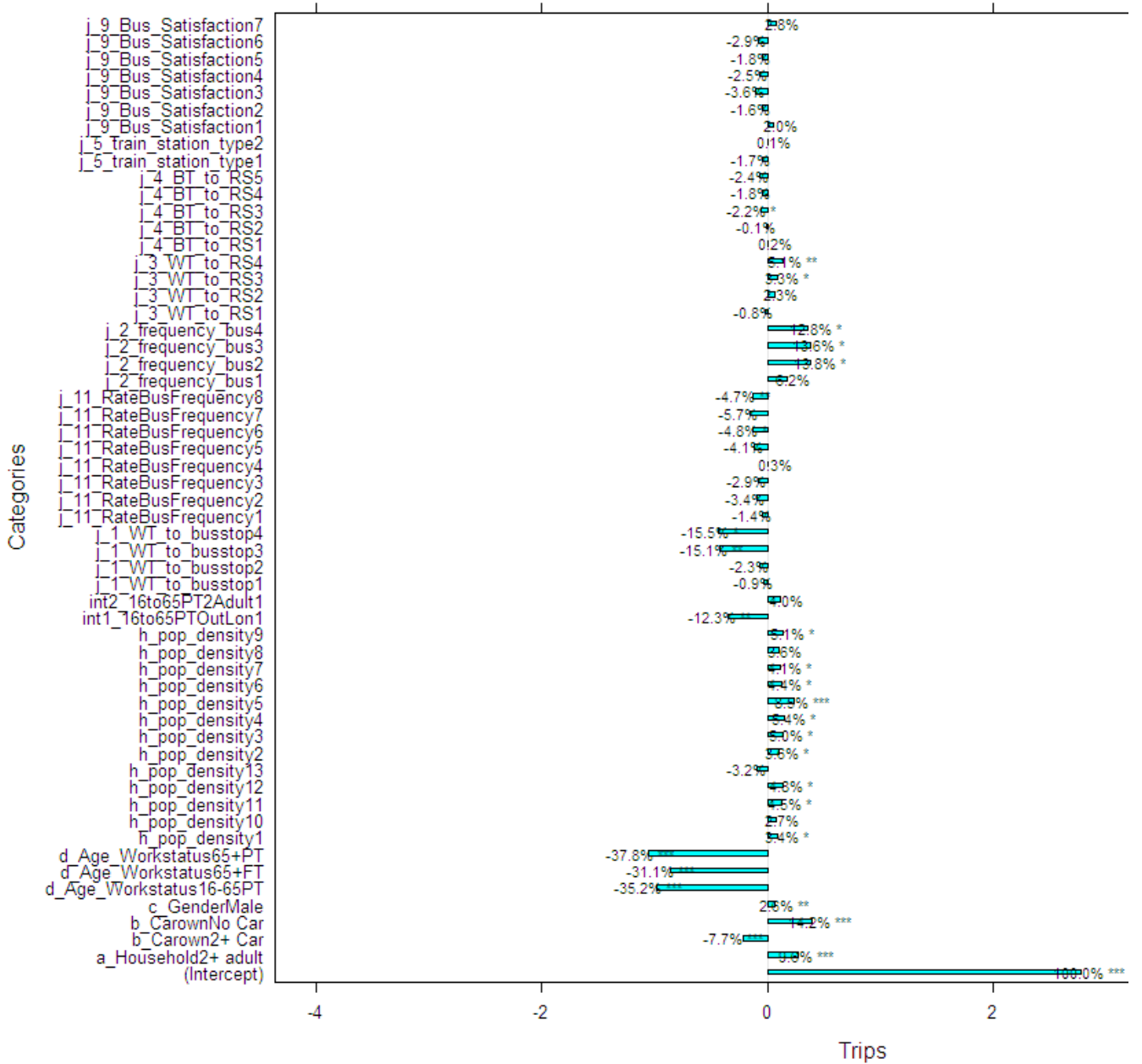


Figure E.2.5 Commuting model of accessibility variables with population density (AIC: 205489)

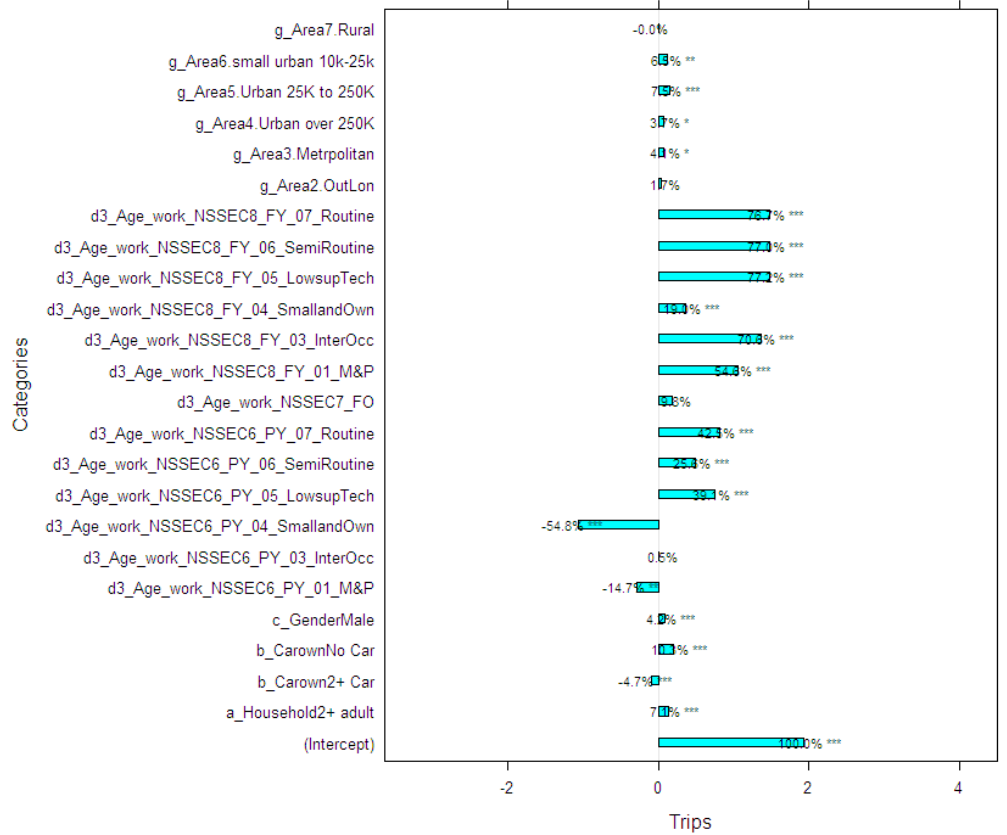


Figure E.2.6 Commuting simple model plus NS-SeC (AIC: 204142)

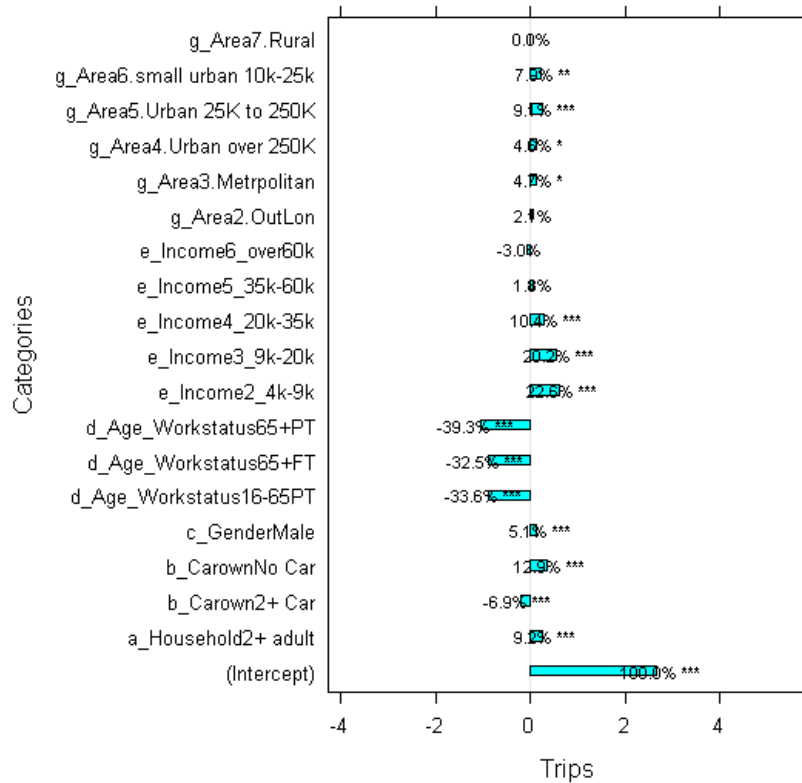


Figure E.2.7 Commuting simple model plus income (AIC: 205180)

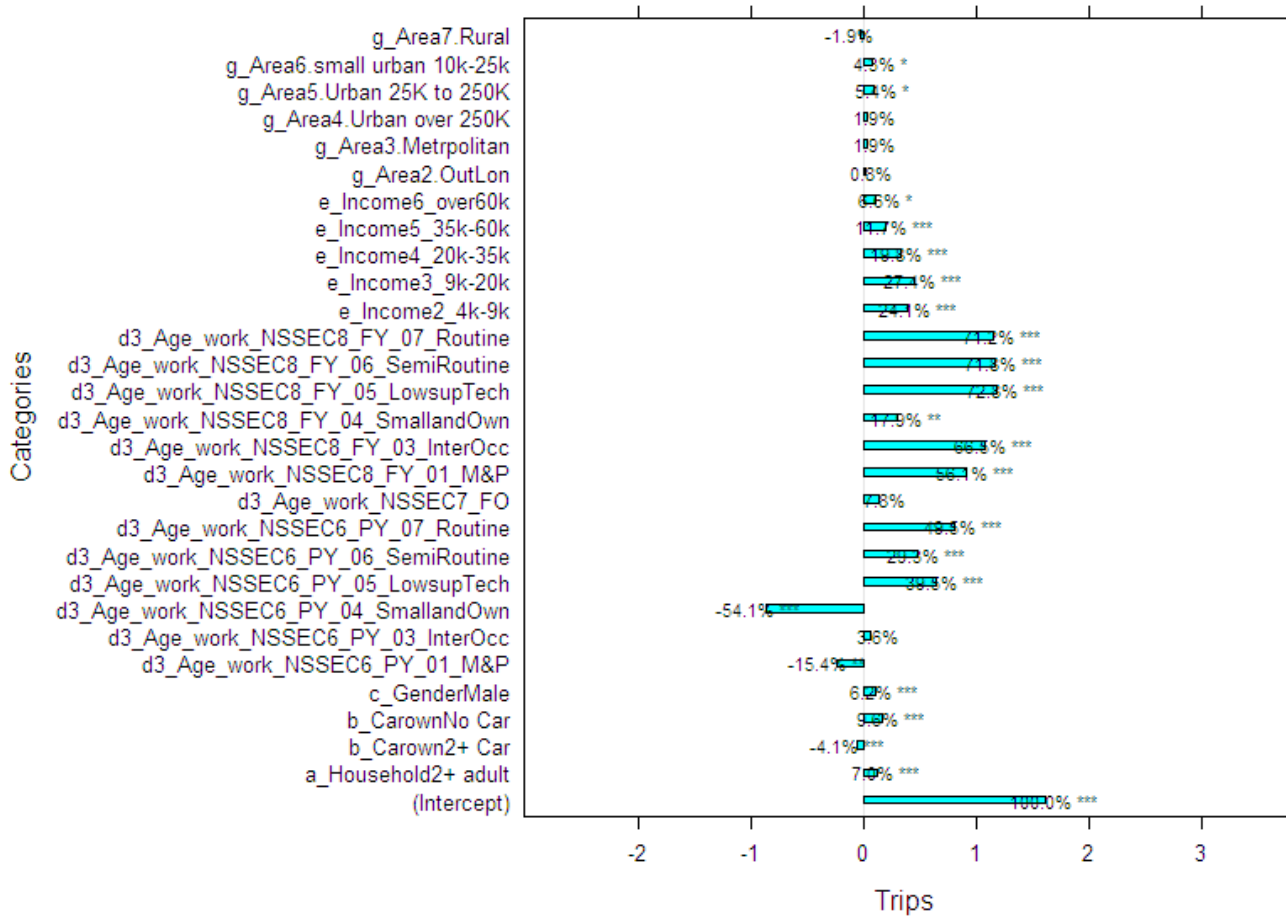


Figure E.2.8 Commuting simple model plus Income and NS-SeC (AIC: 203890)



E.3 EMPLOYER'S BUSINESS

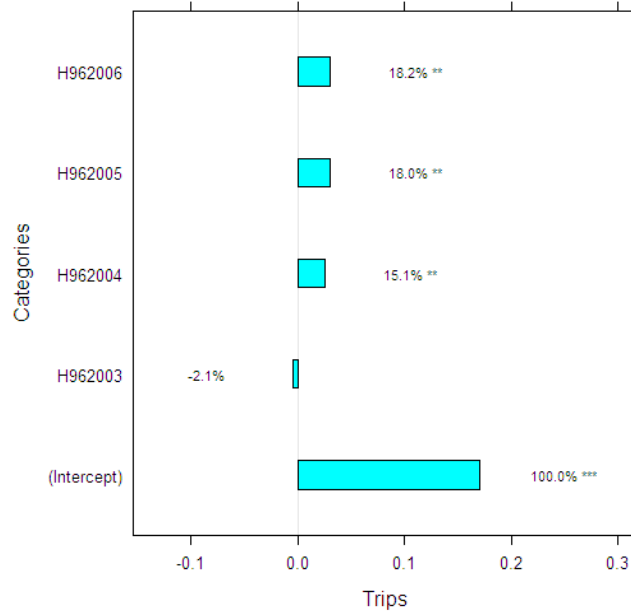


Figure A.3.1 Employer's Business model of year alone (AIC: 75227)

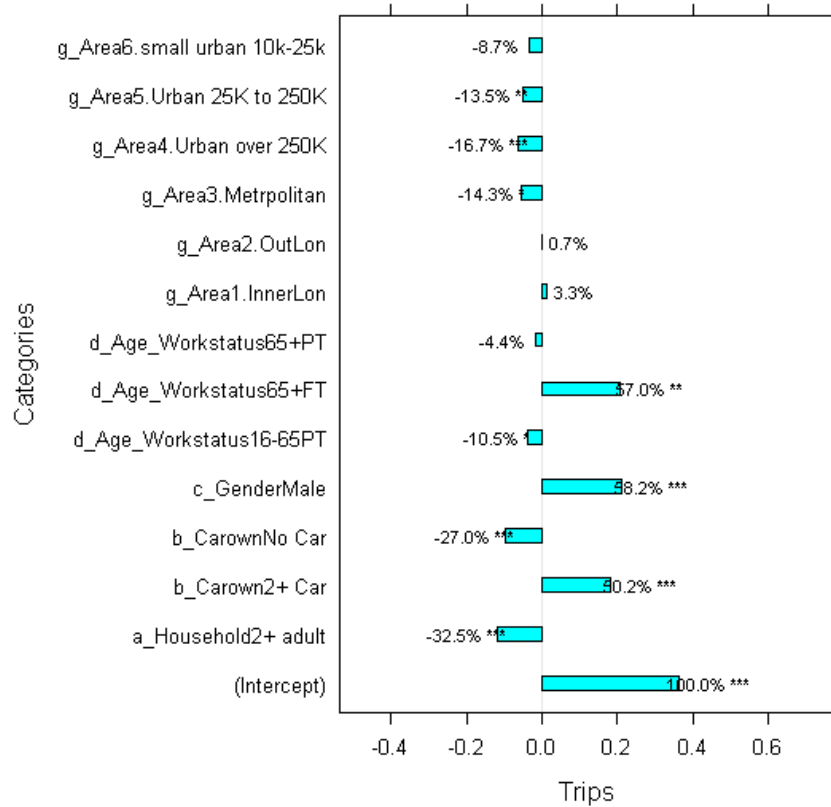


Figure E.3.2 Employer's Business simple model (AIC: 60906)



Not found to be relevant

Figure E.3.3 Employer's Business simple model plus interaction terms

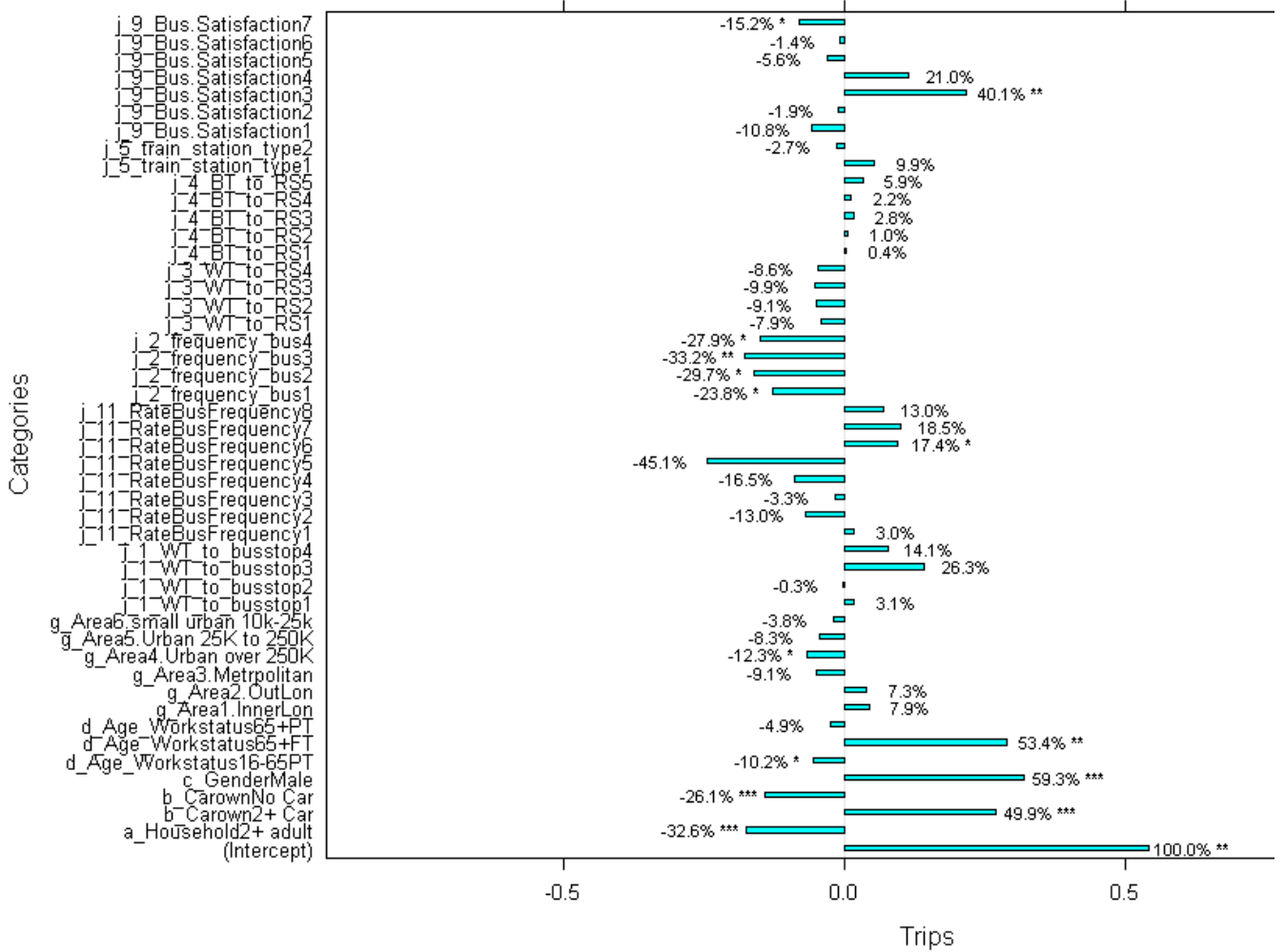


Figure E.3.4 Employer's Business model of accessibility variables with area type (AIC: 60913)

Not found to be relevant

Figure E.3.5 Employer's Business model of accessibility variables with population density

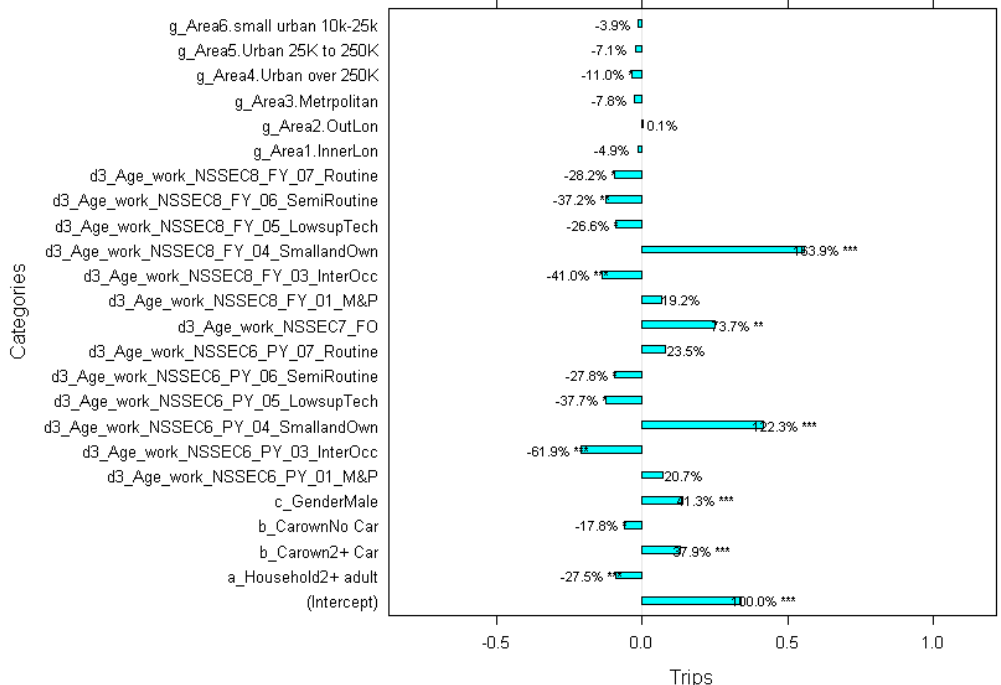


Figure E.3.6 Employer's Business simple model plus NS-SeC (AIC: 60062)

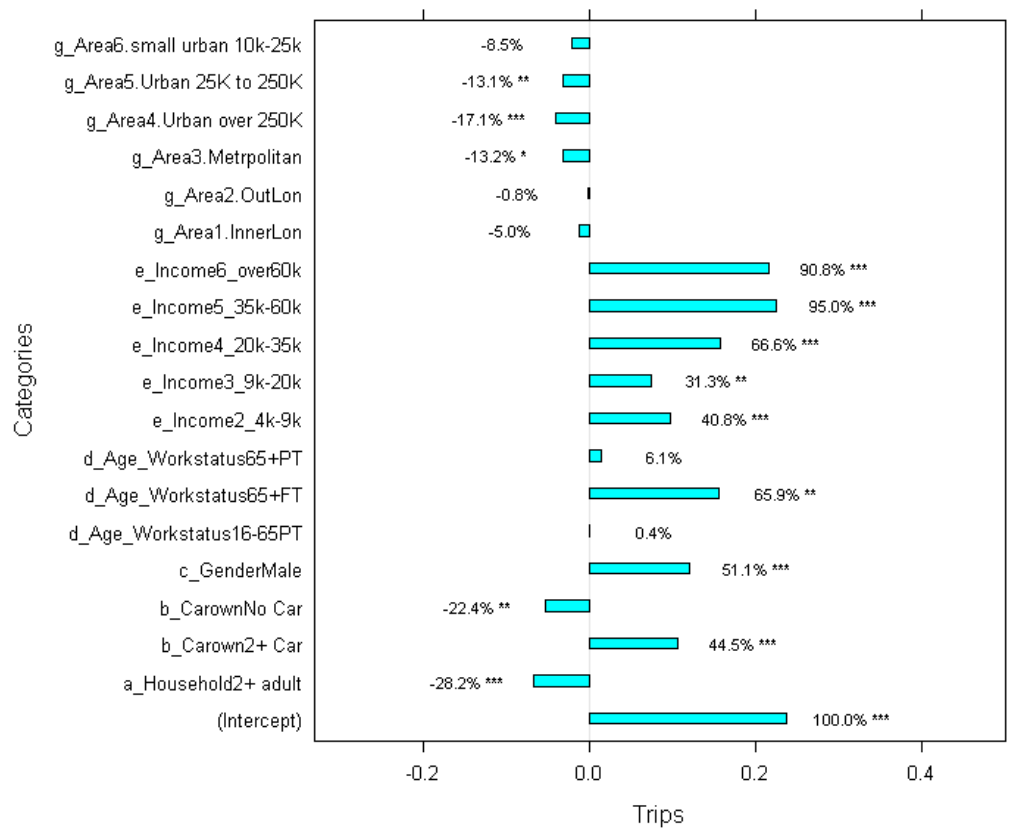


Figure E.3.7 Employer's Business simple model plus income (AIC: 60816)

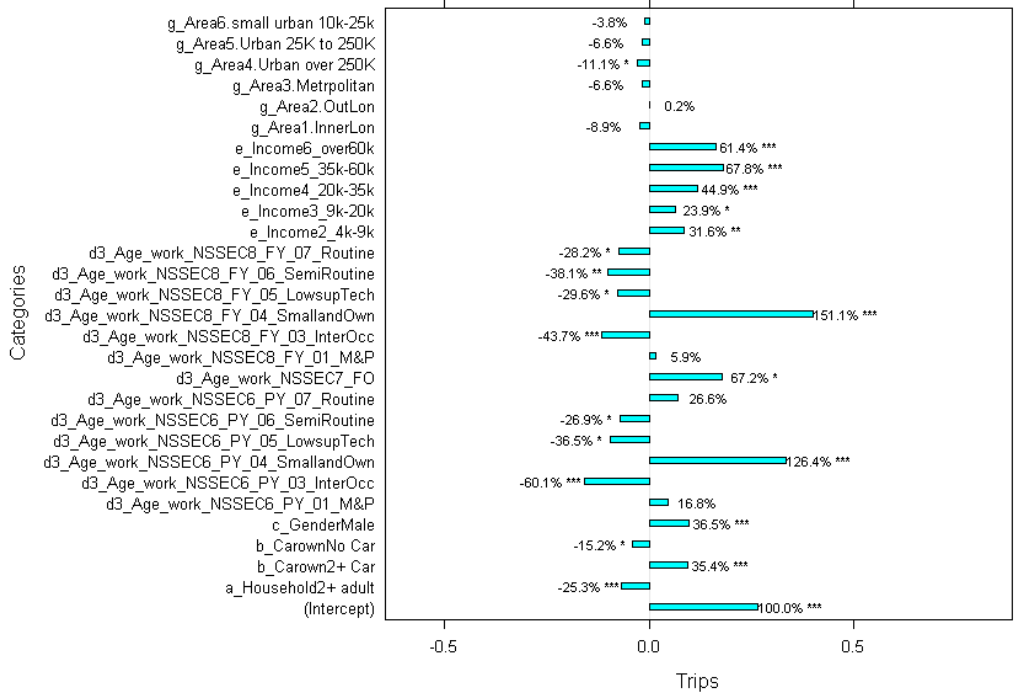


Figure E.3.8 Employer's Business simple model plus Income and NS-SeC (AIC: 60021)



E.4 SHOPPING

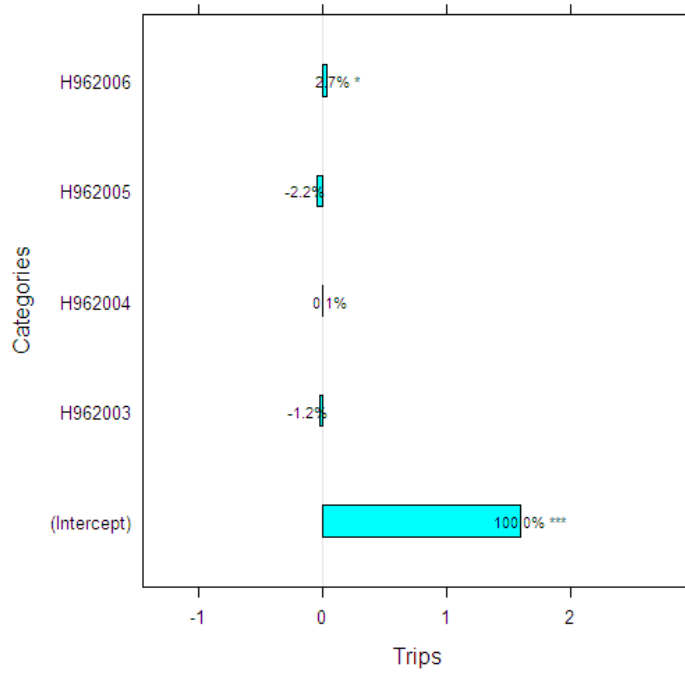


Figure A.4.1 Shopping model of year alone (AIC: 329711)

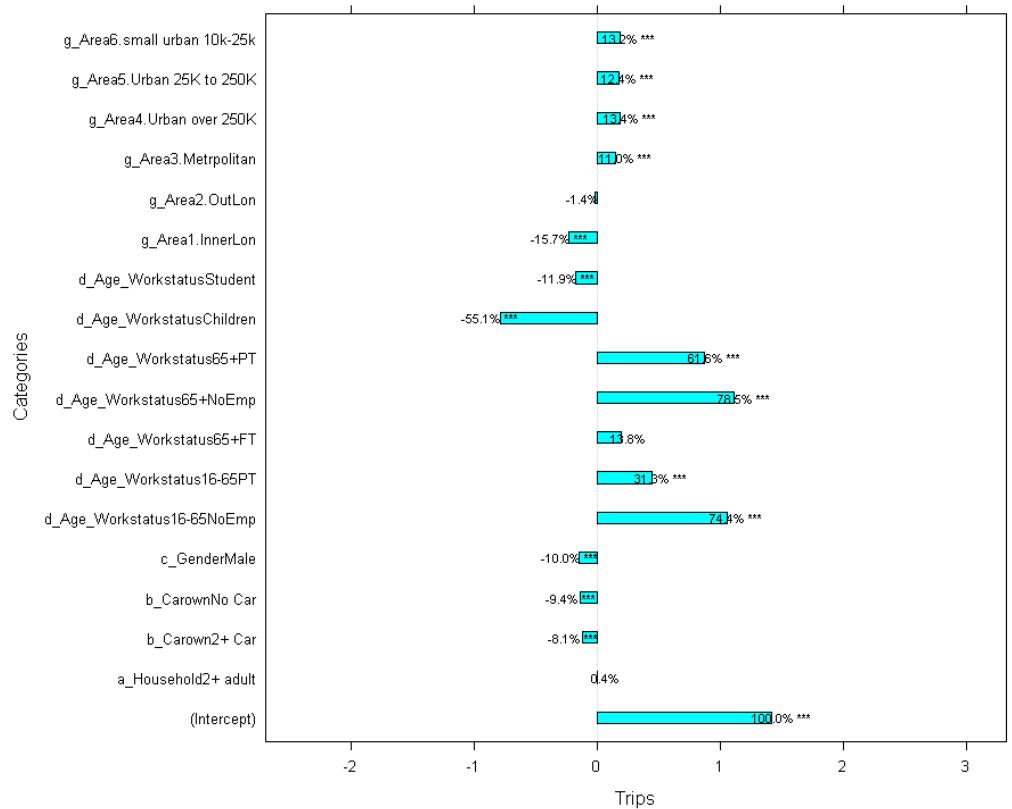


Figure E.4.2 Shopping simple model (AIC: 317432)

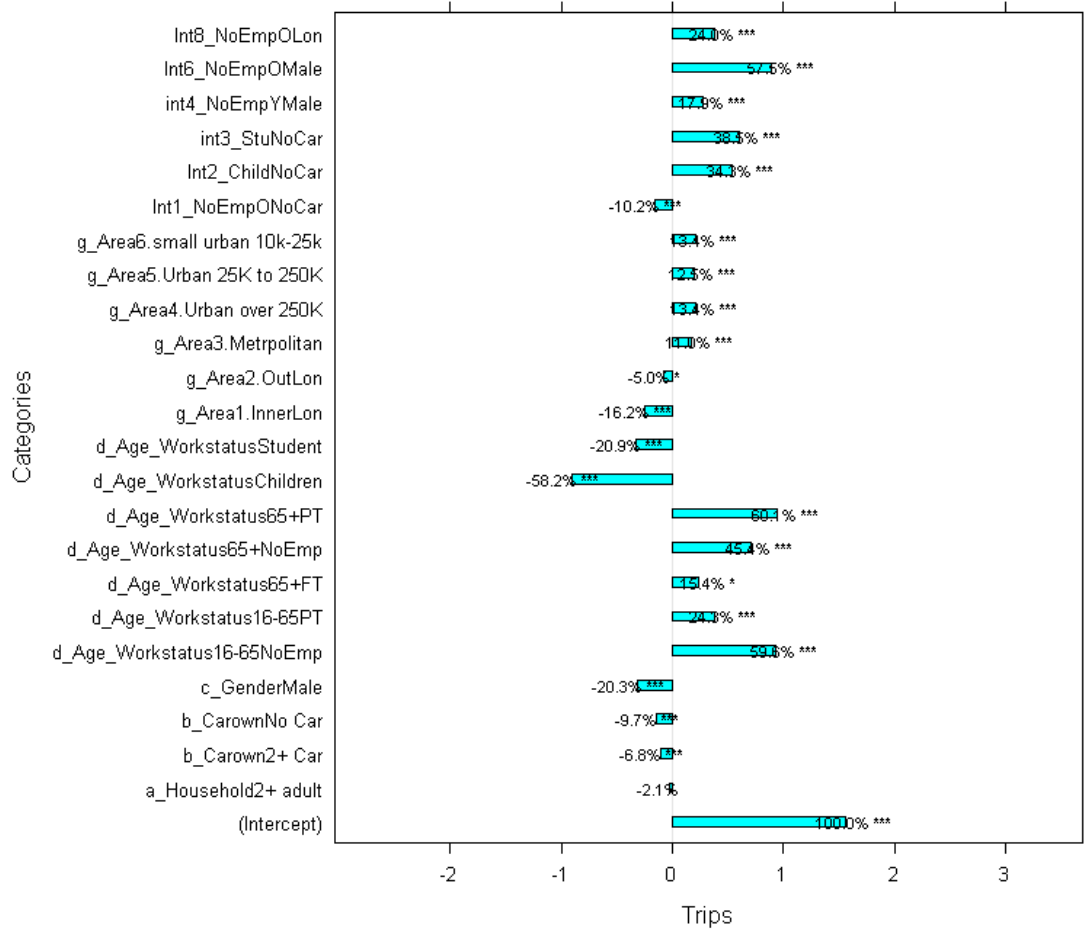


Figure E.4.3 Shopping simple model plus interaction terms (AIC: 316760)

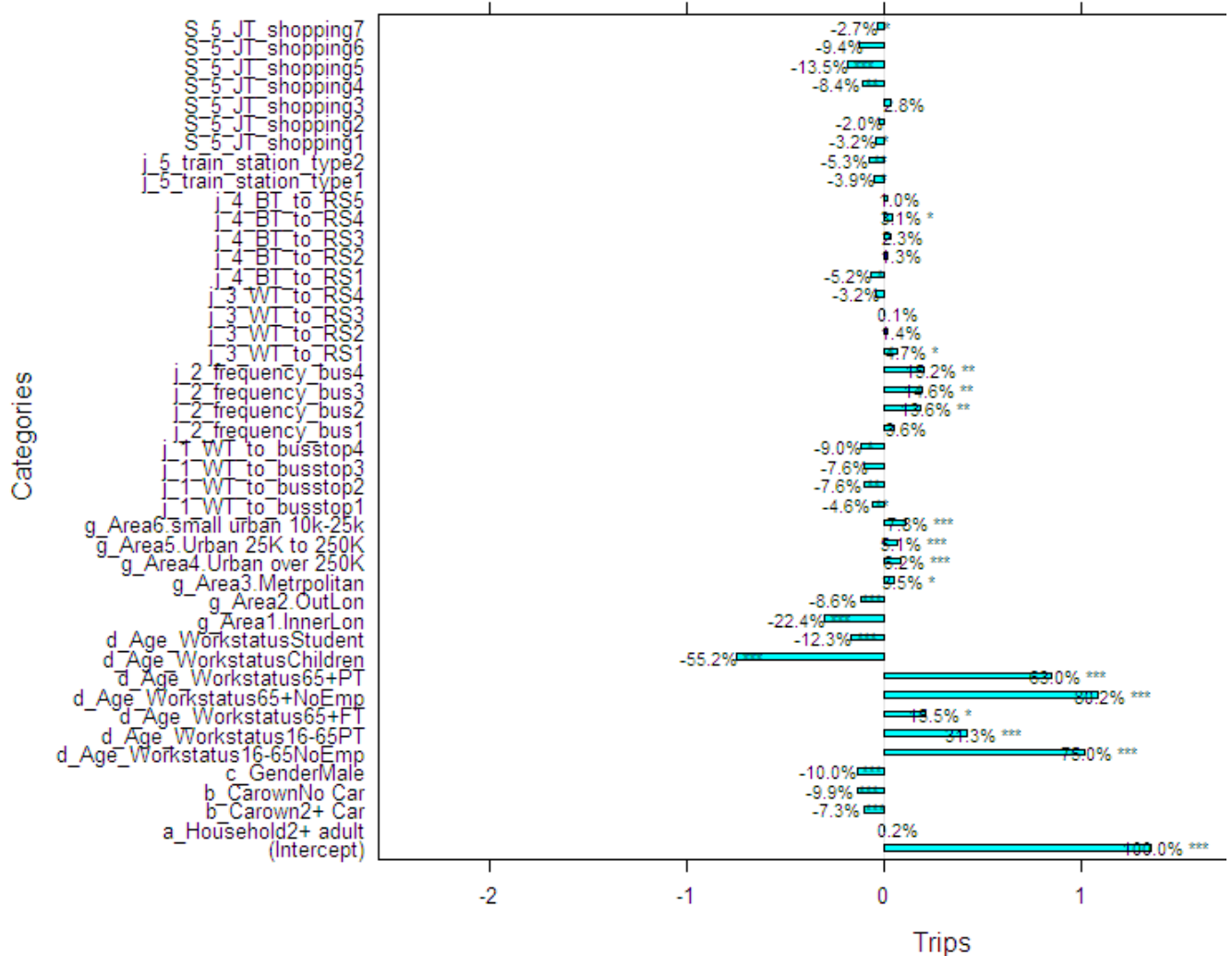


Figure E.4.4 Shopping model of accessibility variables with area type (AIC: 317320)

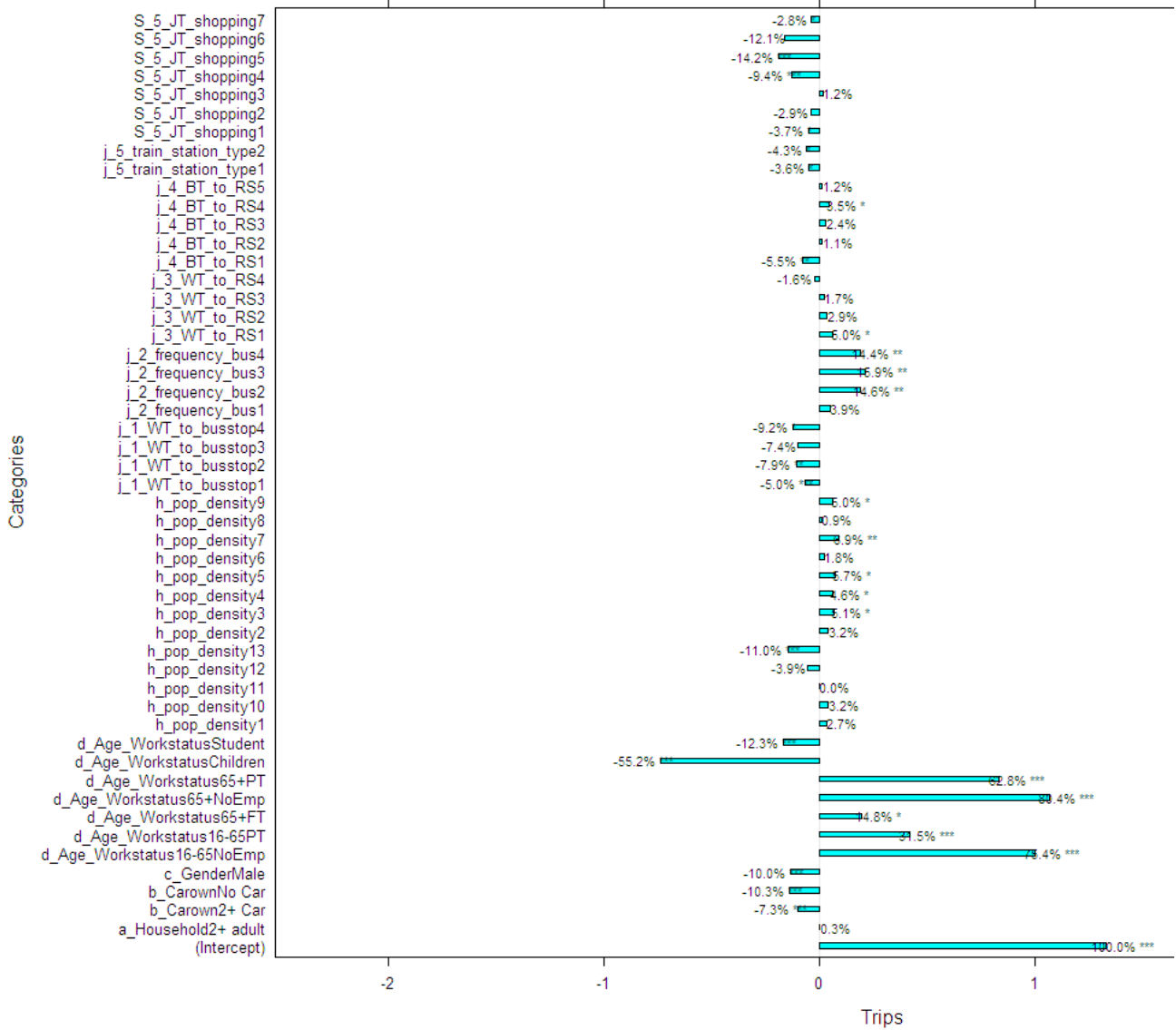


Figure E.4.5 Shopping model of accessibility variables with population density (AIC: 317508)

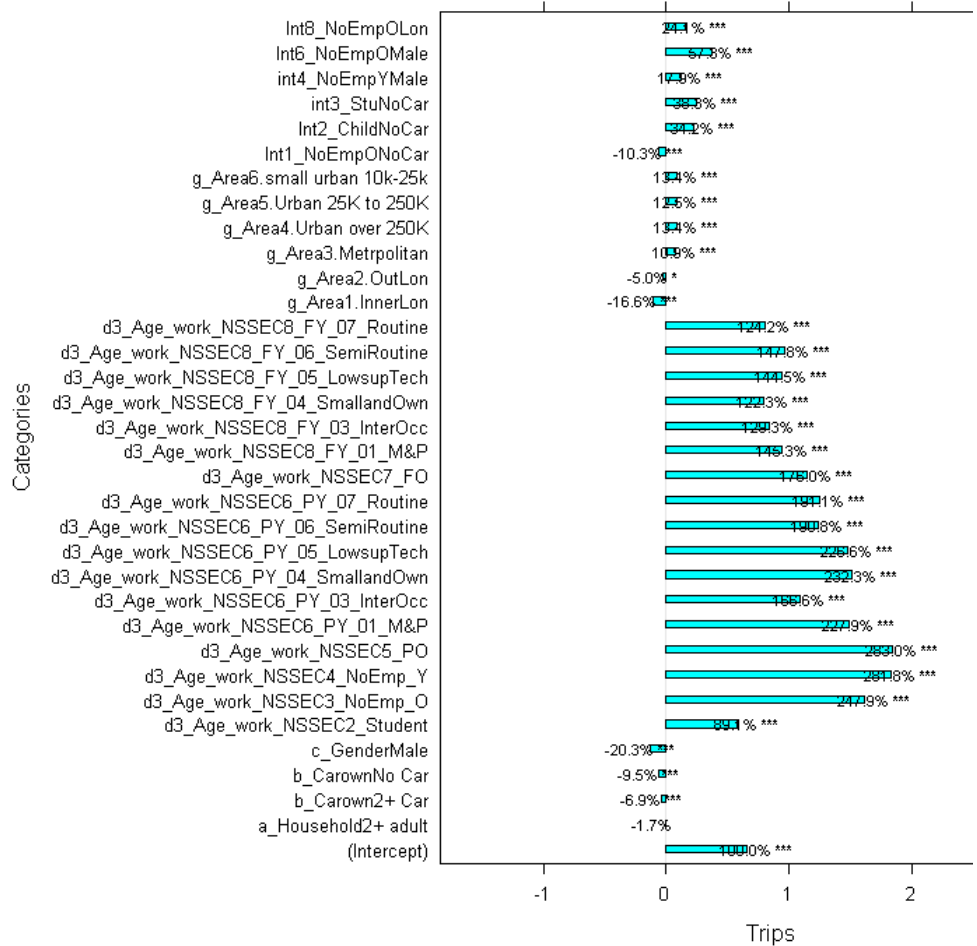


Figure E.4.6 Shopping simple model plus NS-SeC (AIC: 316696)

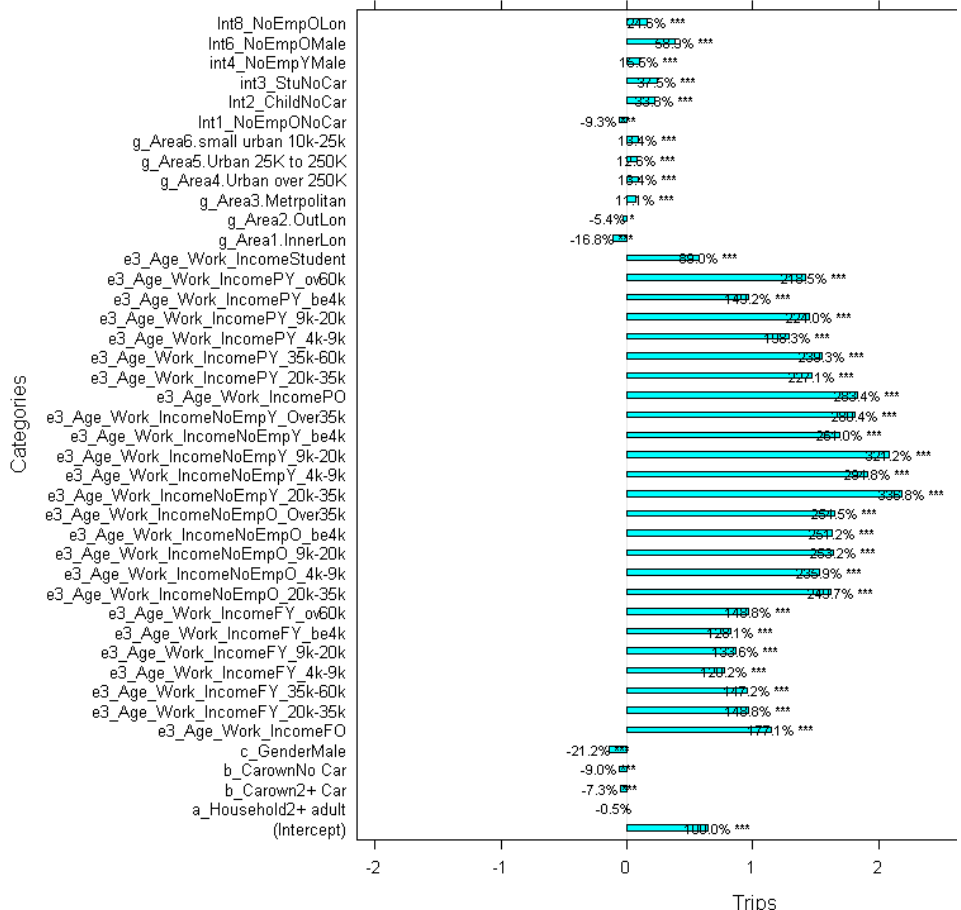


Figure E.4.7 Shopping simple model plus income (AIC: 316645)

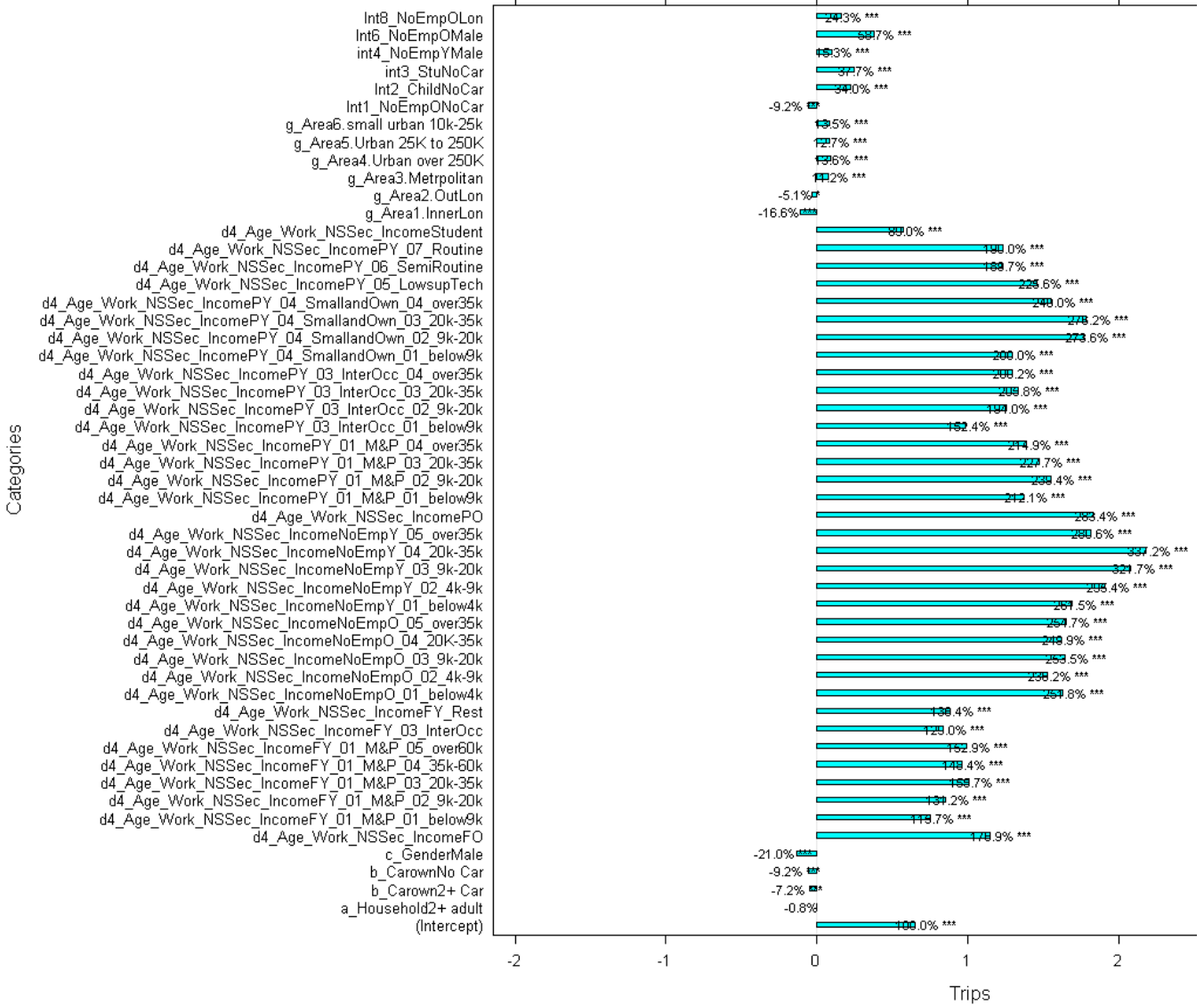


Figure E.4.8 Shopping simple model plus Income and NS-SeC (AIC: 316667)



E.5 PERSONAL BUSINESS

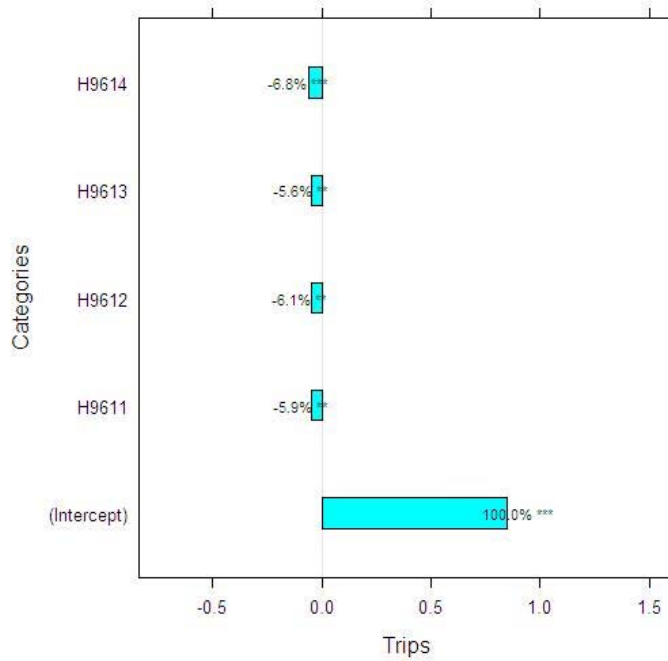


Figure A.5.1 Personal Business model of year alone (AIC: 230535)

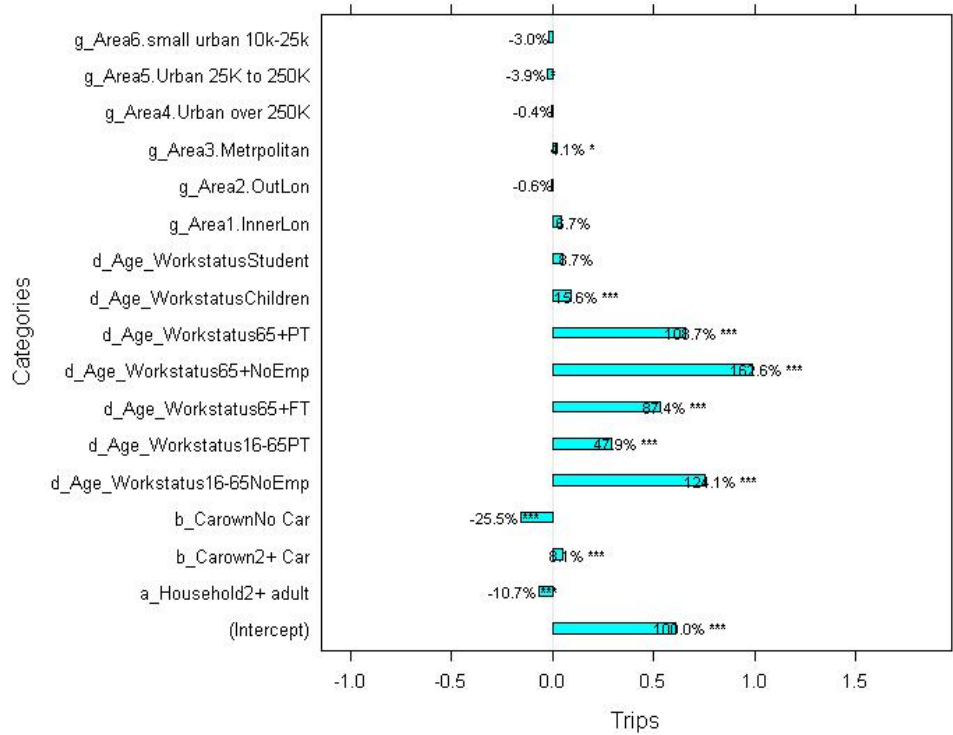


Figure E.5.2 Personal Business simple model (AIC: 226542)

Not found to be relevant

Figure E.5.3 Personal Business simple model plus interaction terms

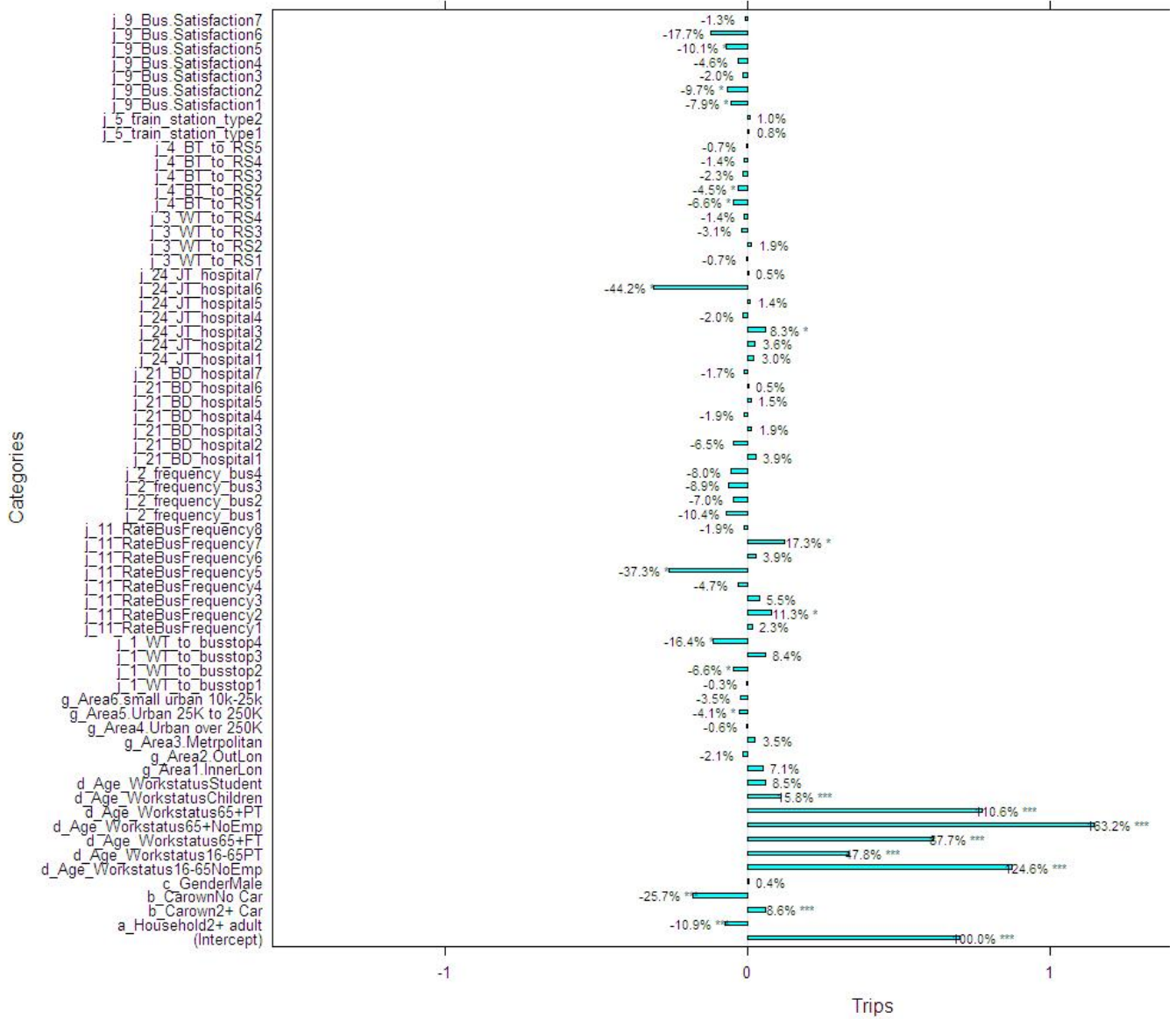


Figure E.5.4 Personal Business model of accessibility variables with area type (AIC: 226535)

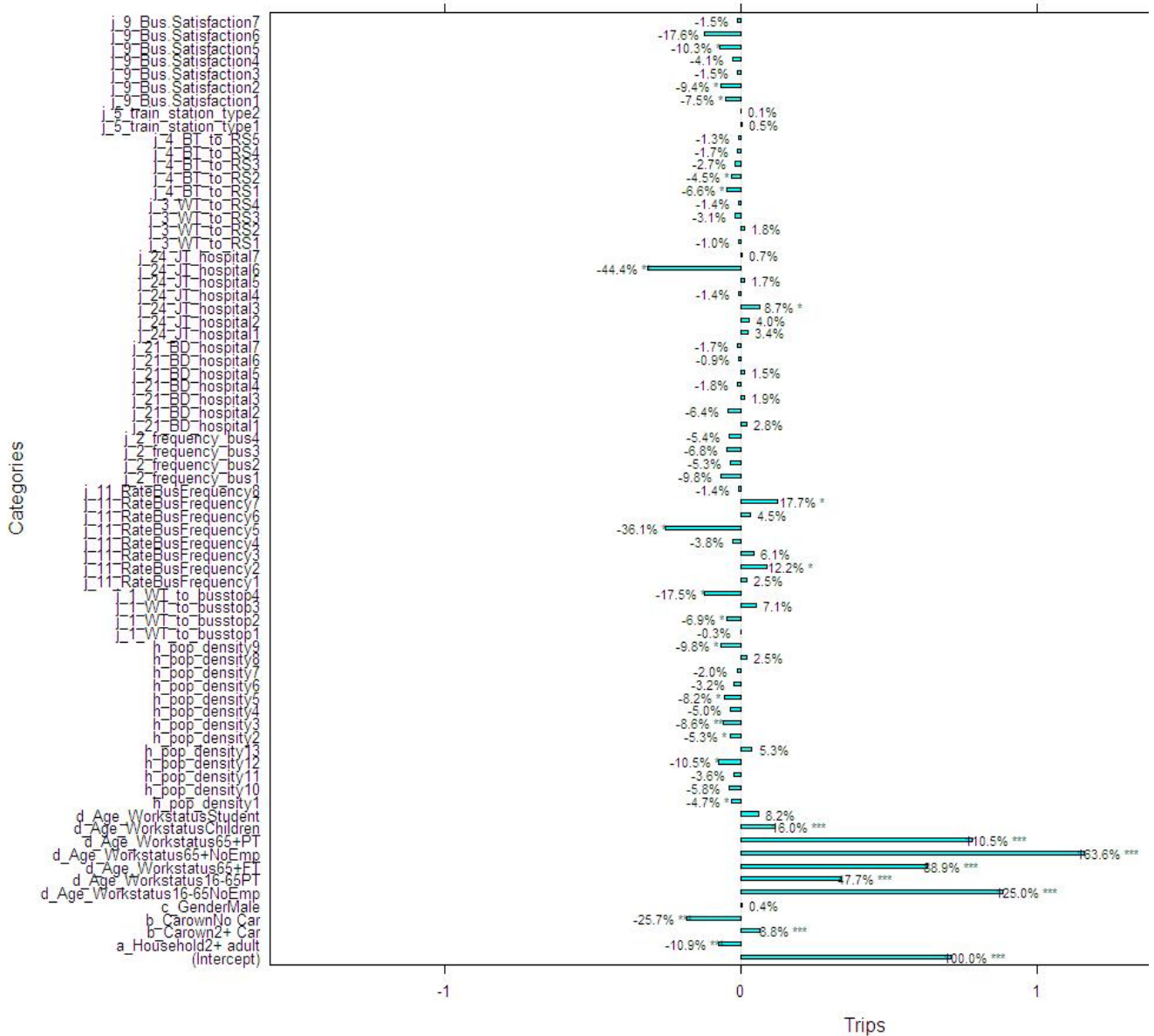


Figure E.5.5 Personal Business model of accessibility variables with population density (AIC: 226529)

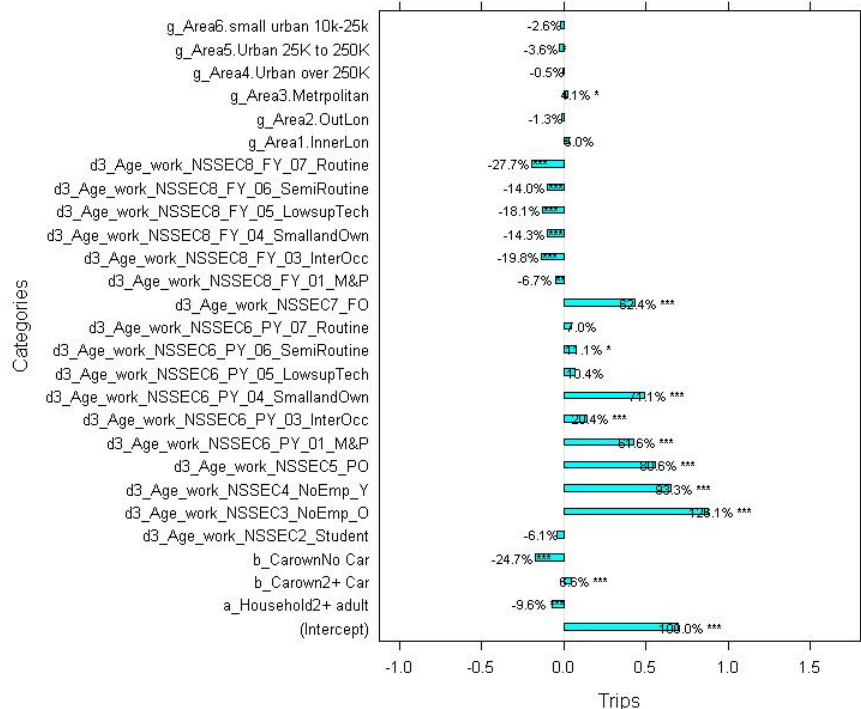


Figure E.5.6 Personal Business simple model plus NS-SeC (AIC: 226404)

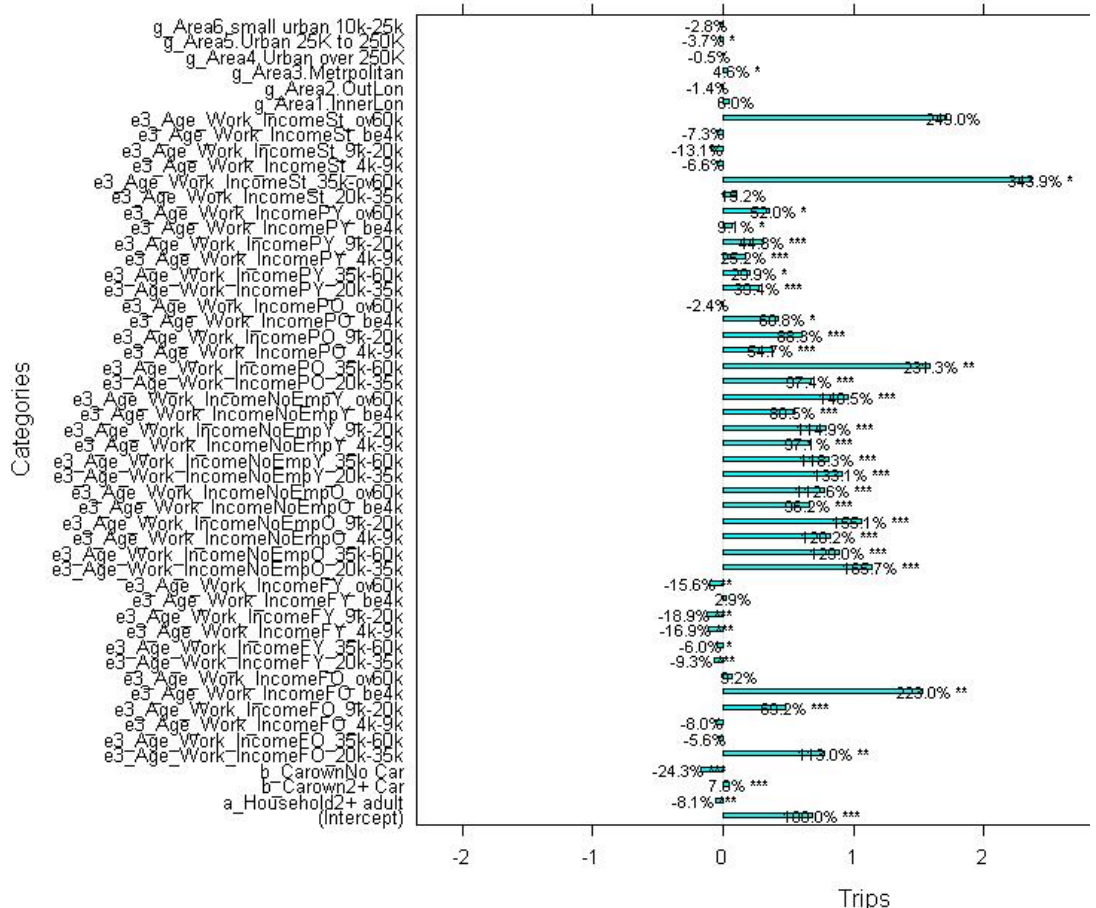


Figure E.5.7 Personal Business simple model plus income (AIC: 226432)

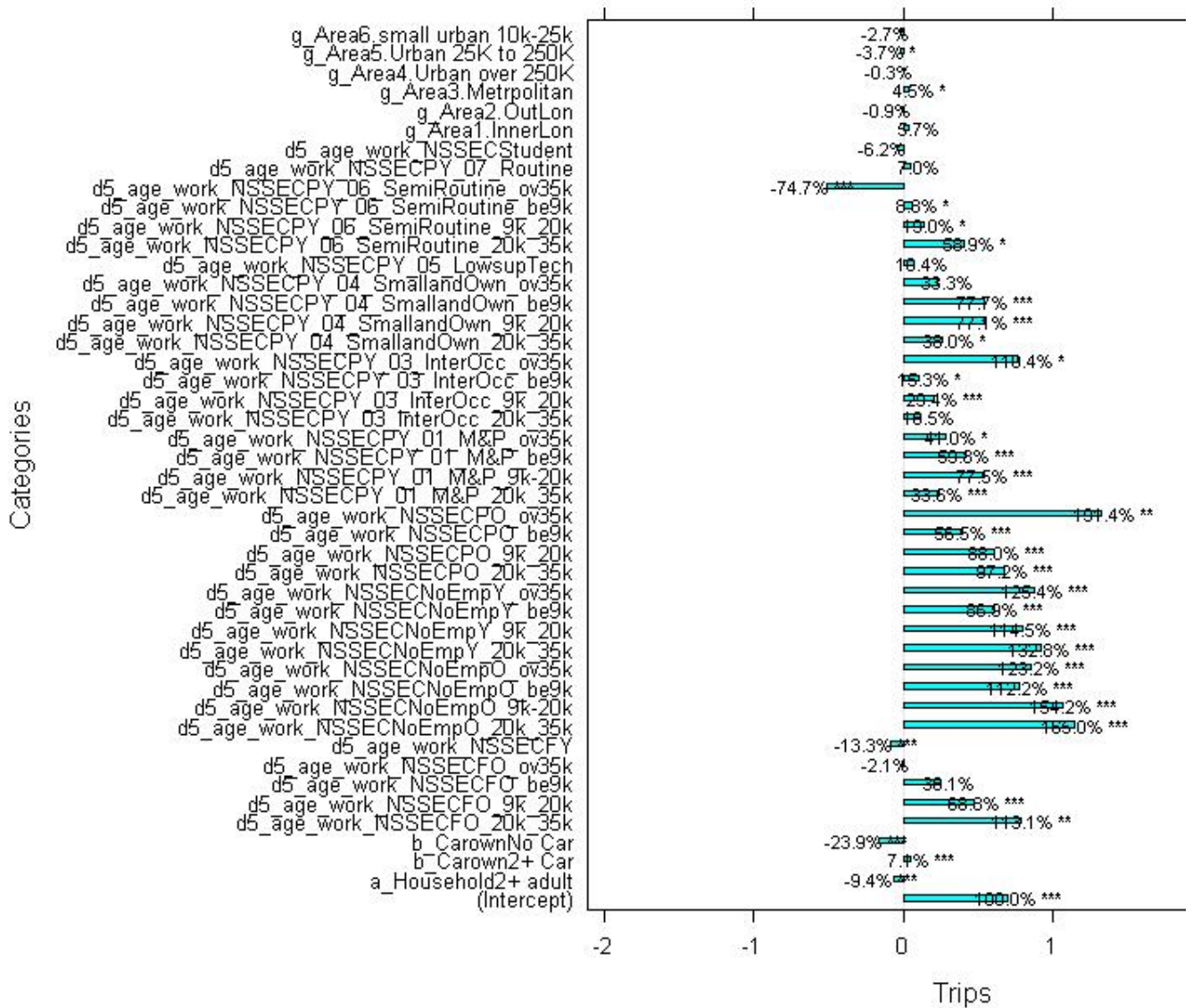


Figure E.5.8 Personal Business simple model plus Income and NS-SeC (AIC: 226399)



E.6 HOLIDAY

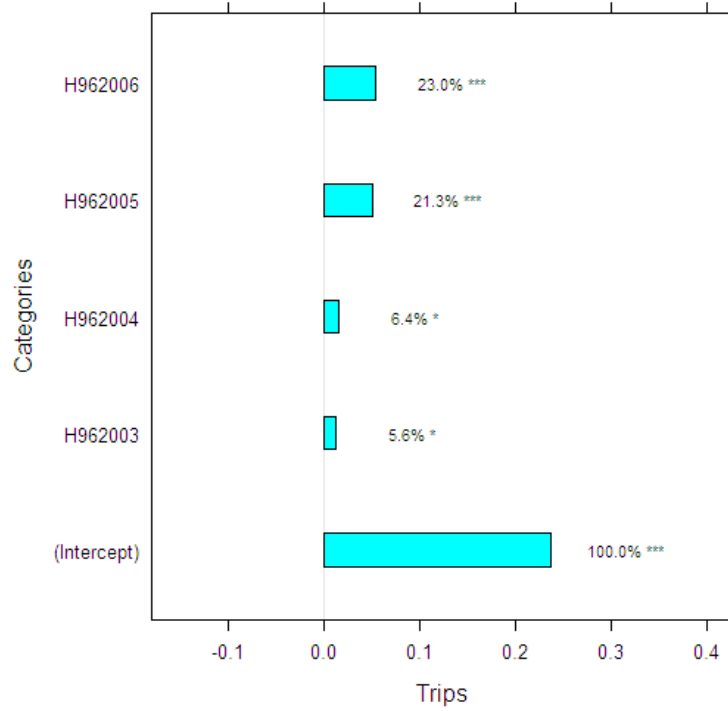


Figure A.6.1 Holiday model of year alone (AIC: 120260)

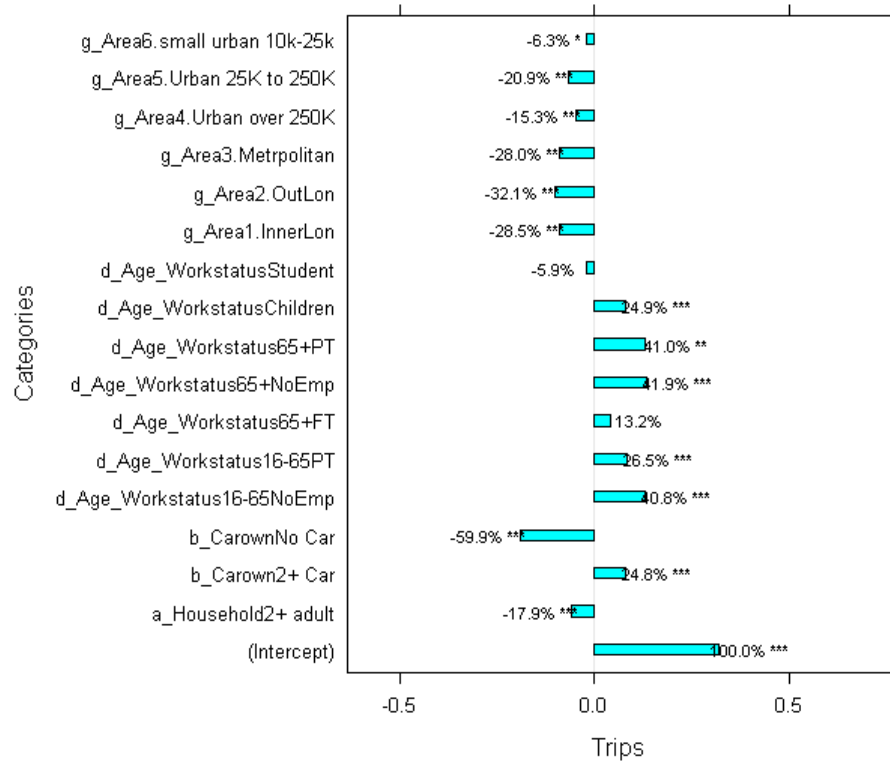


Figure E.6.2 Holiday simple model (AIC: 118366)

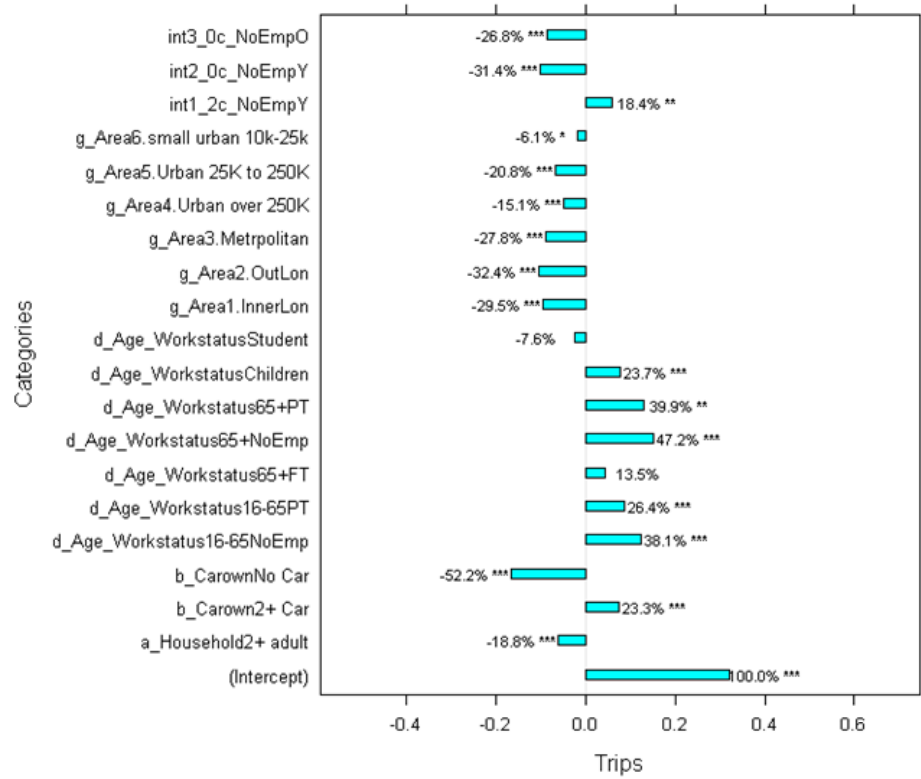


Figure E.6.3 Holiday simple model plus interaction terms (AIC: 118312)

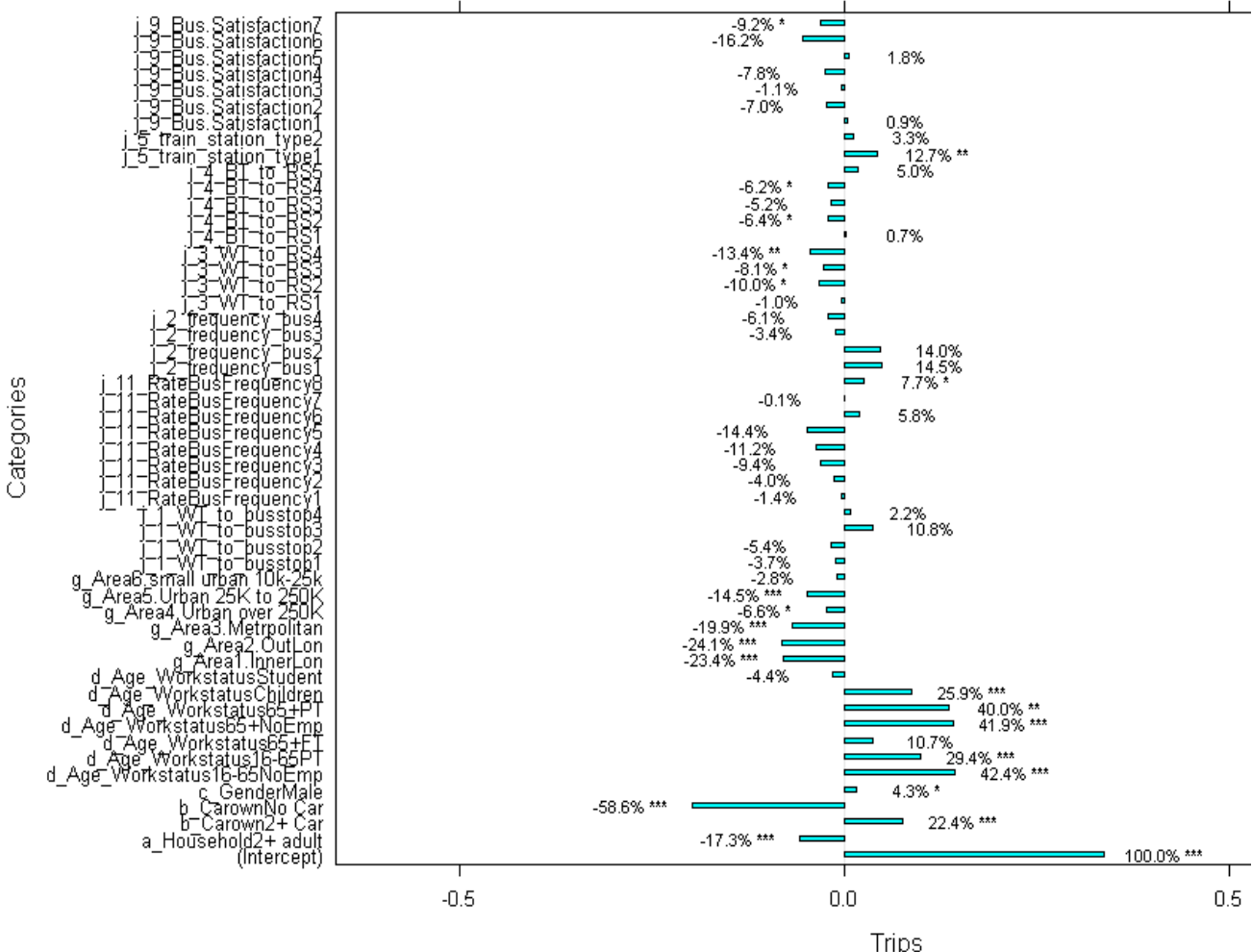


Figure E.6.4 Holiday model of accessibility variables with area type (AIC: 118238)

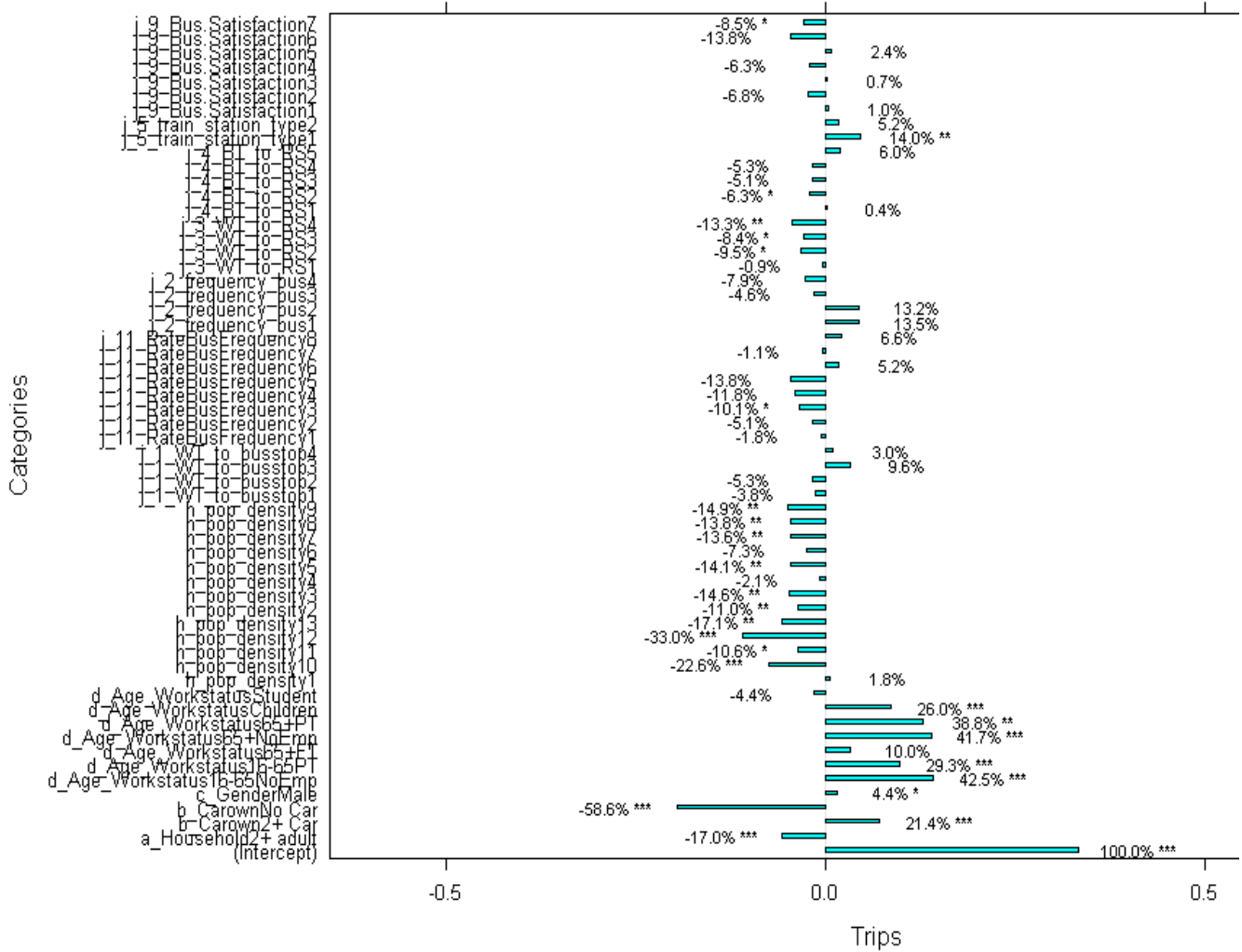


Figure E.6.5 Holiday model of accessibility variables with population density (AIC: 118243)

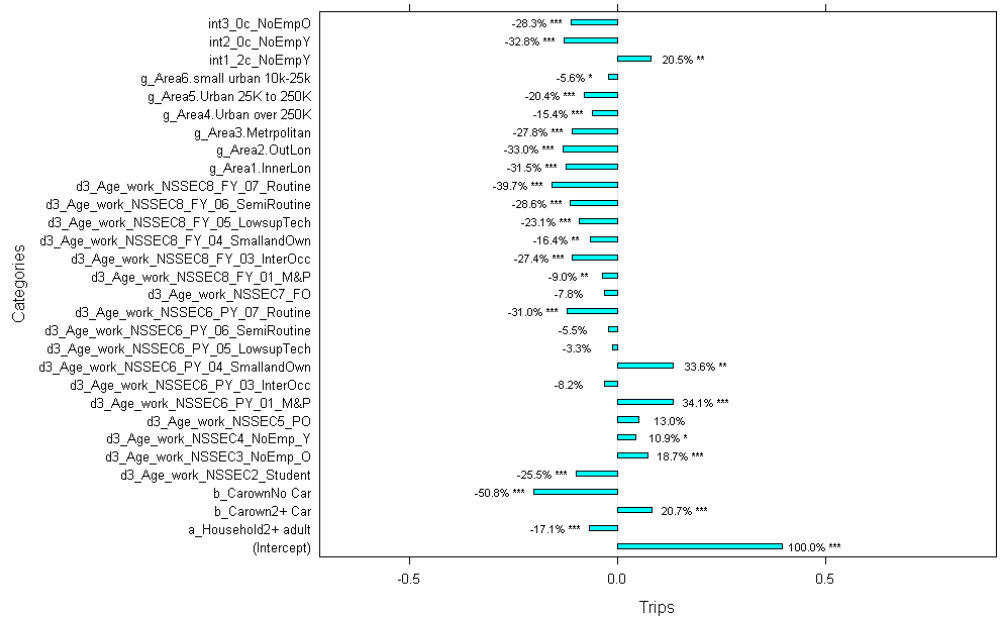


Figure E.6.6 Holiday simple model plus NS-SeC (AIC: 118175)

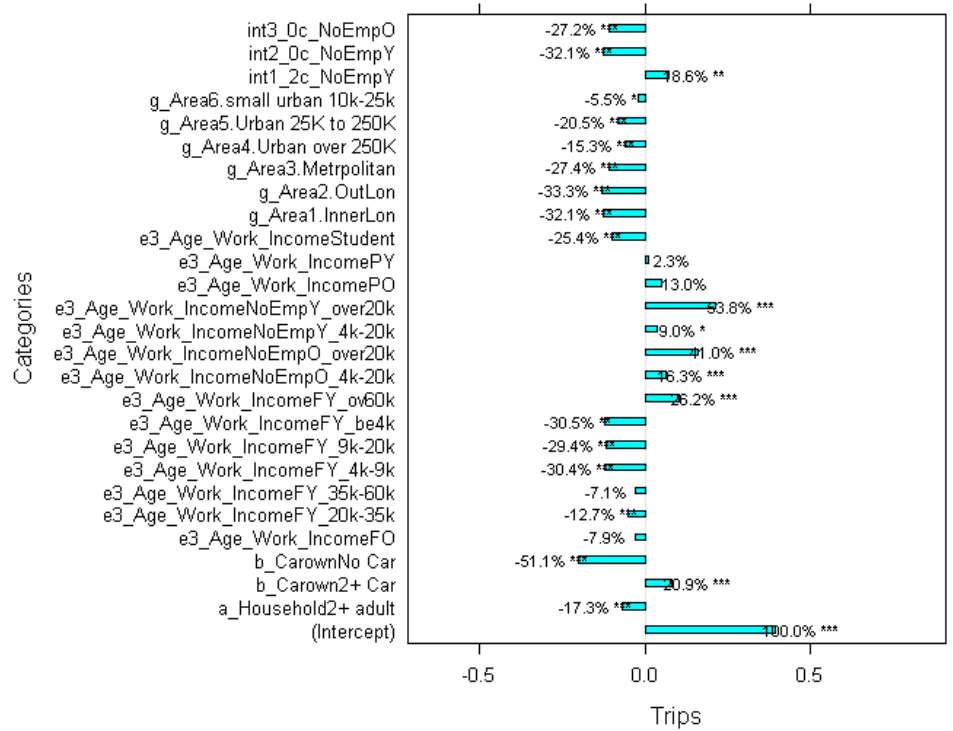


Figure E.6.7 Holiday simple model plus income (AIC: 118191)

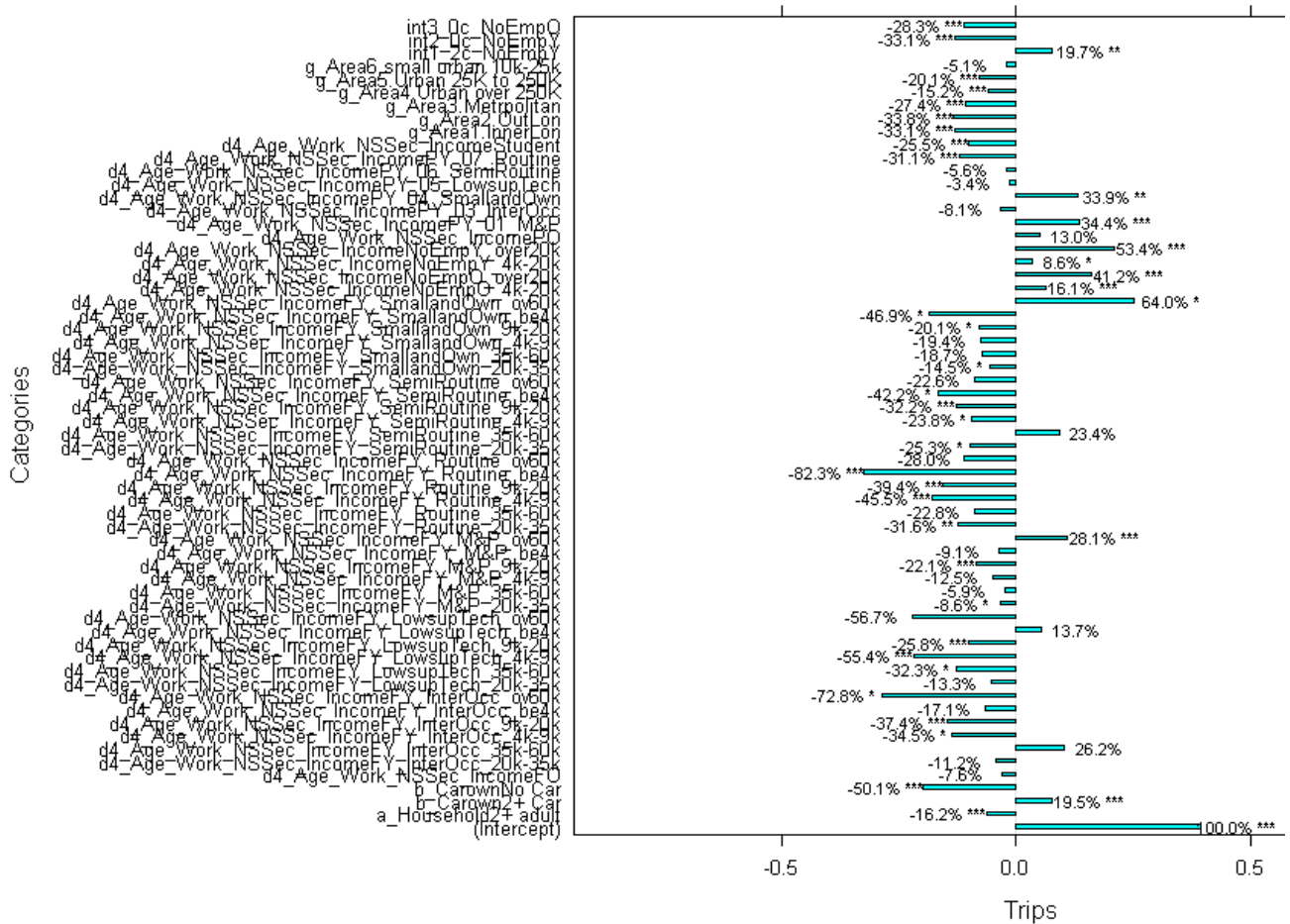


Figure E.6.8 Holiday simple model plus Income and NS-Sec (AIC: 118100)



E.7 RECREATION

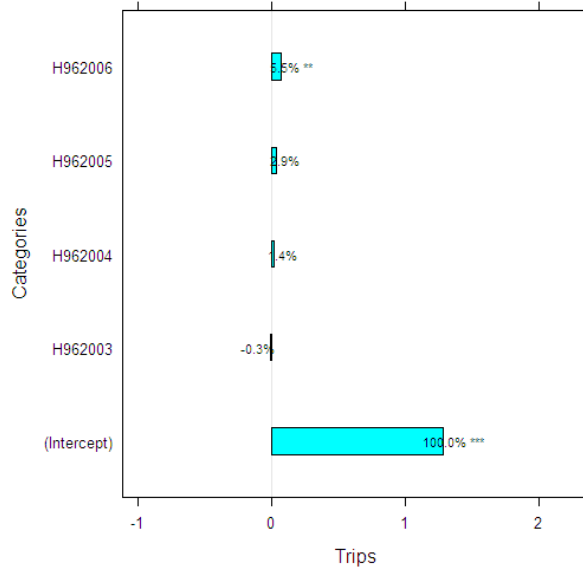


Figure A.7.1 Recreation model of year alone (AIC: 295570)

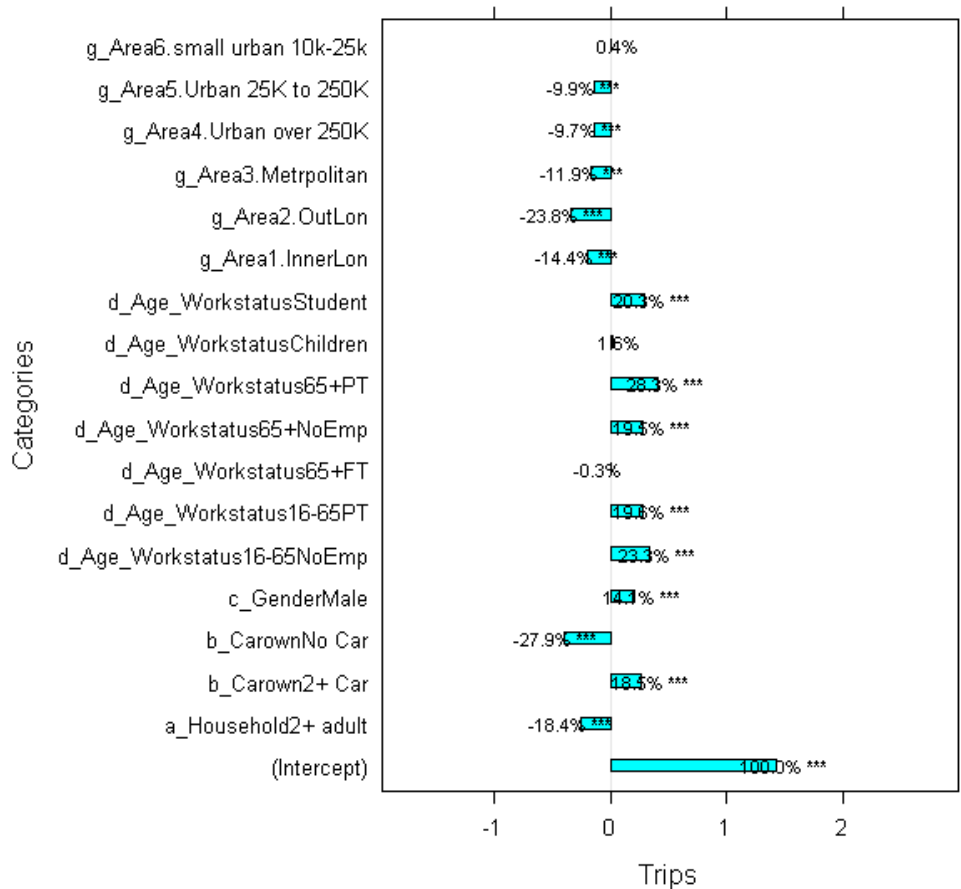


Figure E.7.2 Recreation simple model (AIC: 294200)

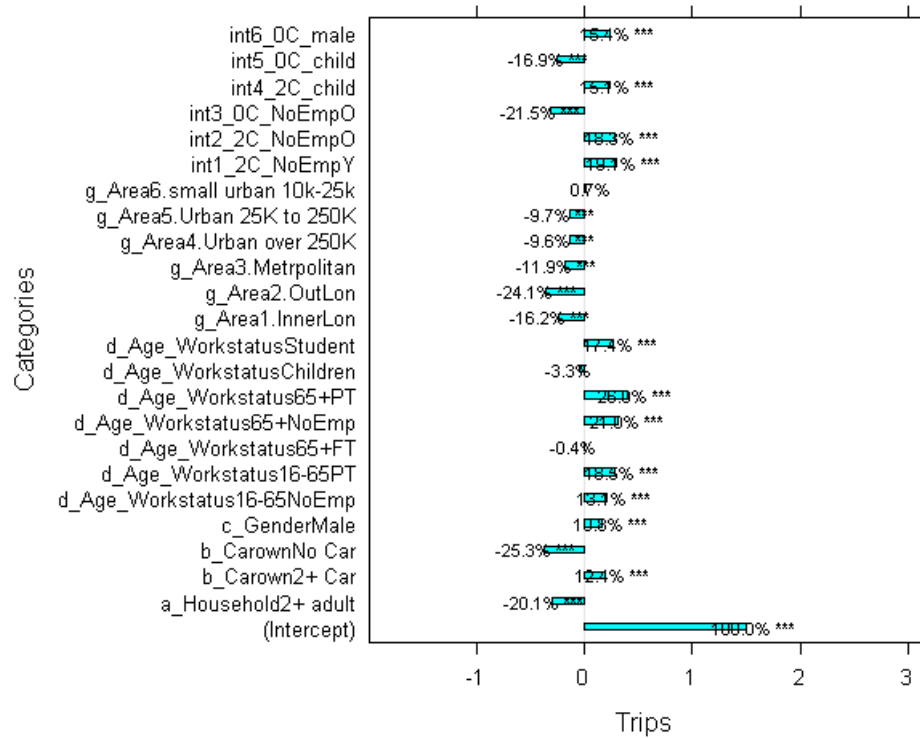


Figure E.7.3 Recreation simple model plus interaction terms (AIC: 294056)

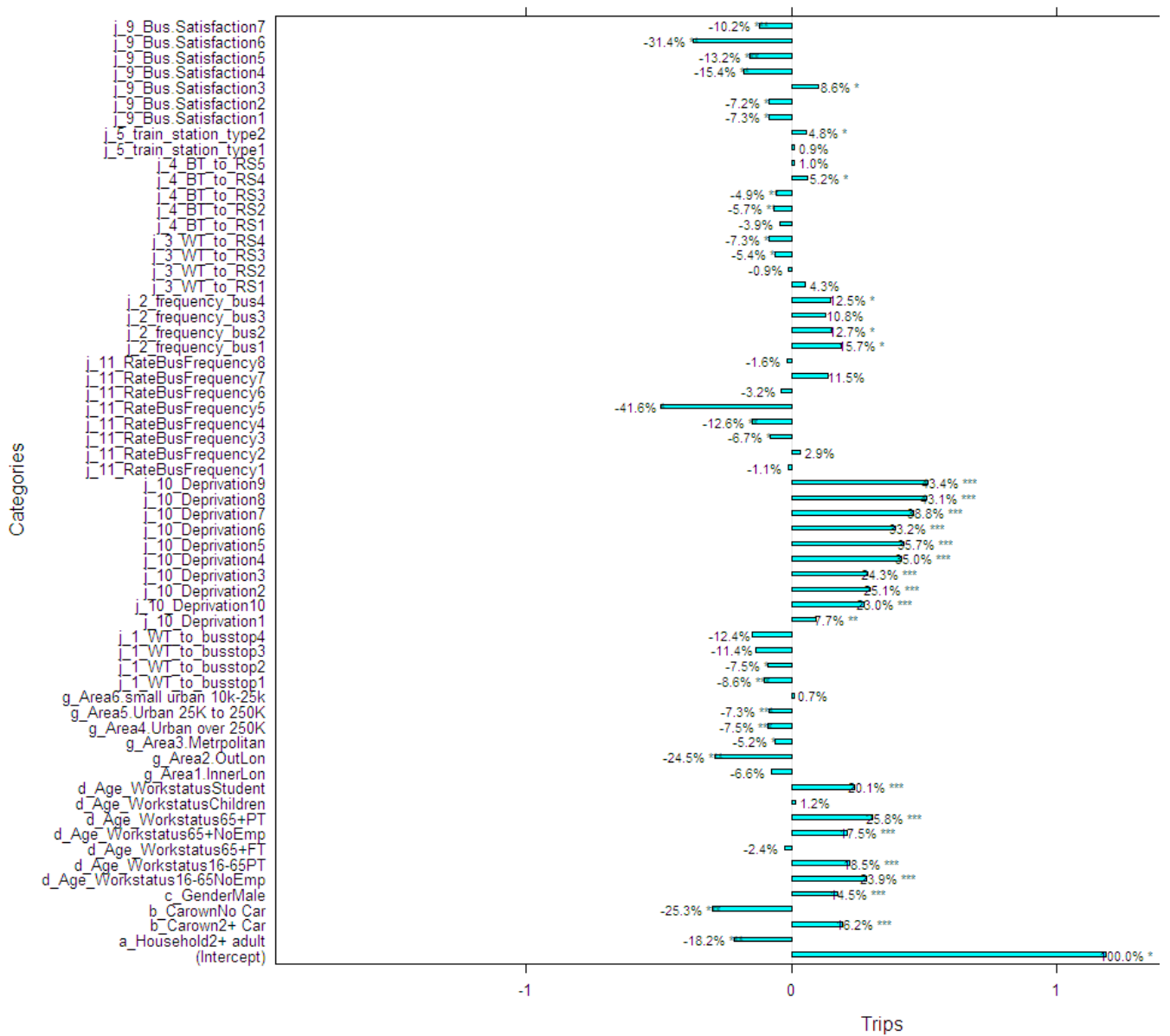


Figure E.7.4 Recreation model of accessibility variables with area type (AIC: 293663)

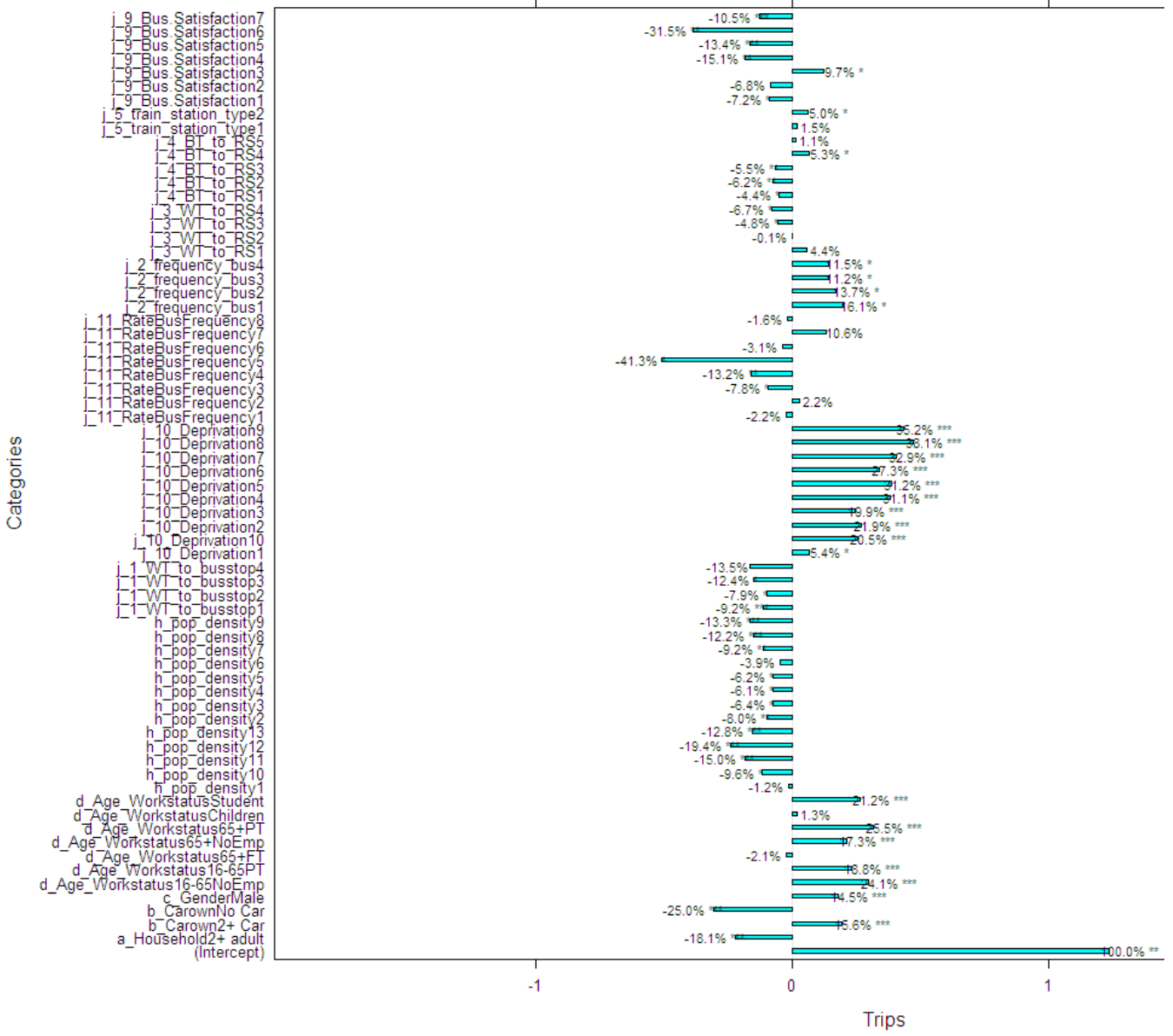


Figure E.7.5 Recreation model of accessibility variables with population density (AIC: 293751)

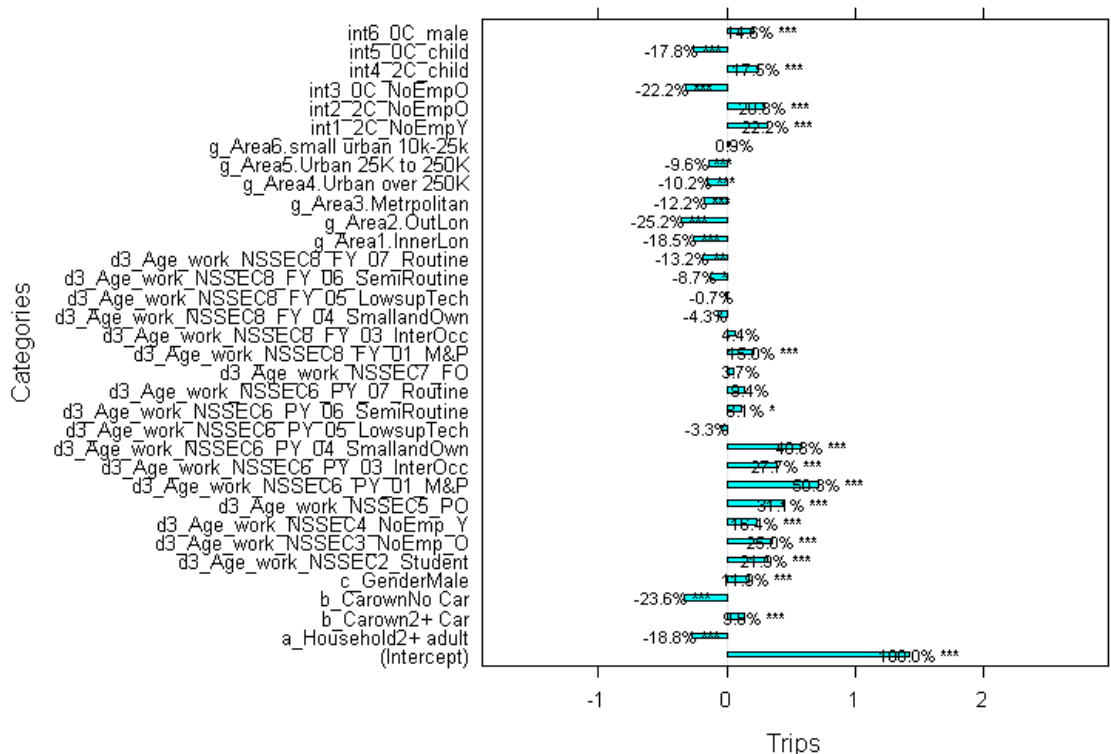


Figure E.7.6 Recreation simple model plus NS-SeC (AIC: 293861)

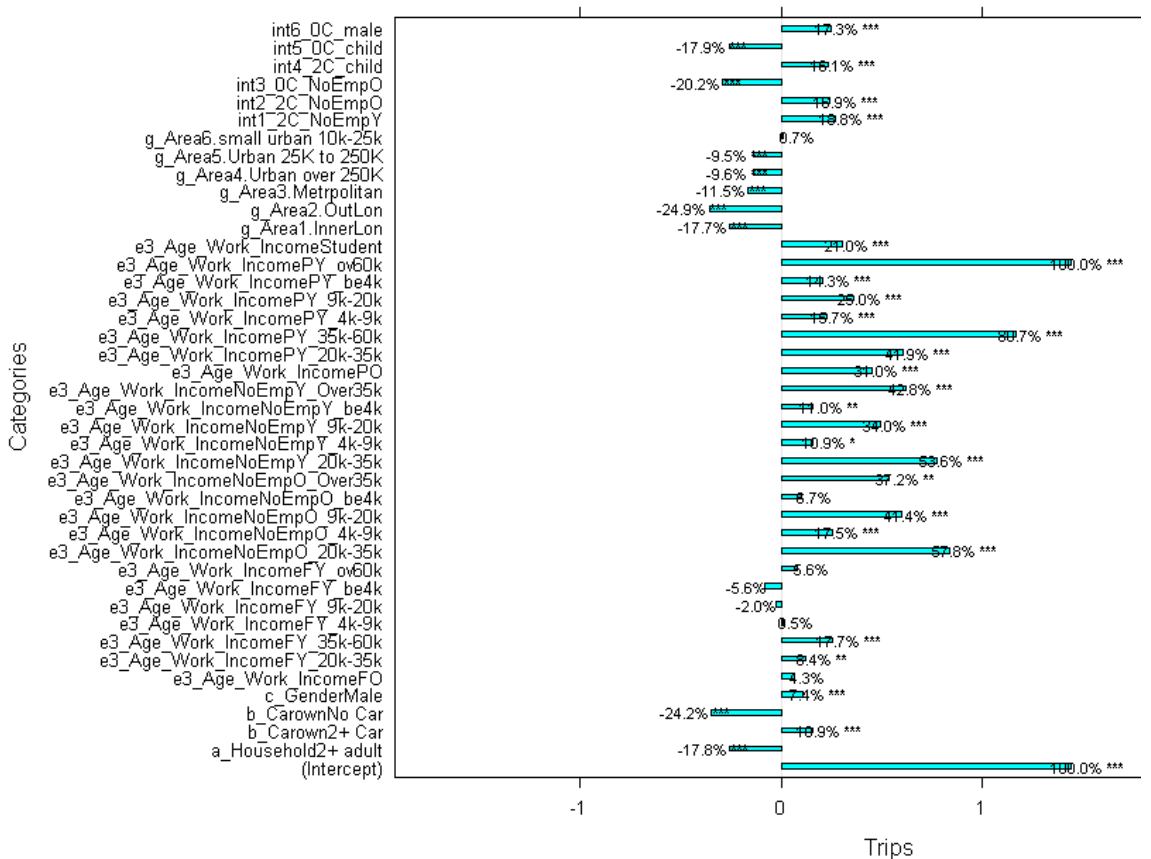


Figure E.7.7 Recreation simple model plus income (AIC: 293885)

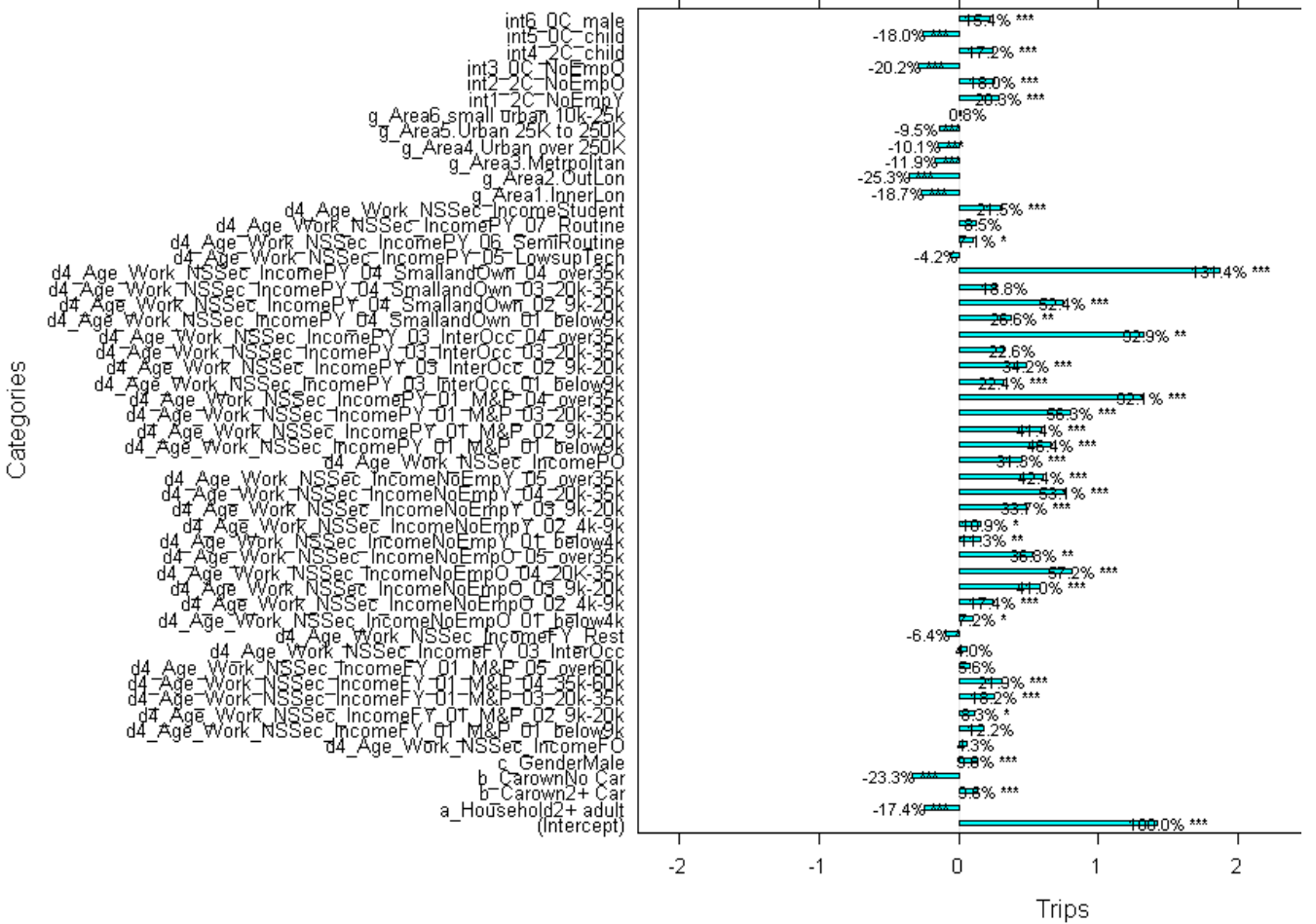


Figure E.7.8 Recreation simple model plus Income and NS-Sec (AIC: 293764)



E.8 VISITING FRIENDS

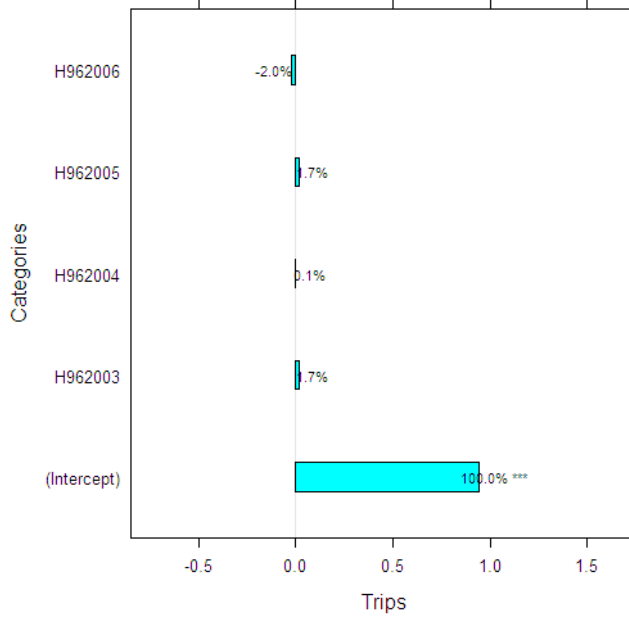


Figure A.8.1 Visiting Friends model of year alone (AIC: 253823)

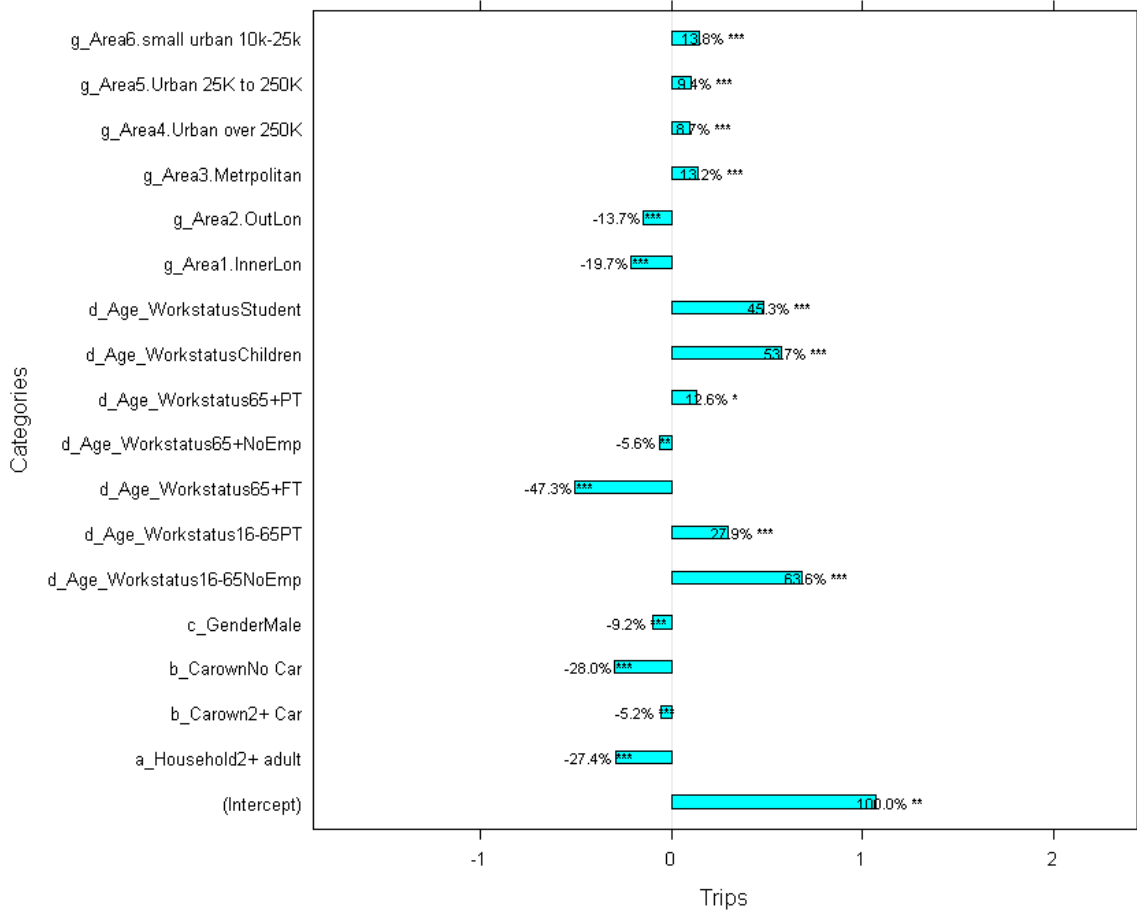


Figure E.8.2 Visiting Friends simple model (AIC: 251139)

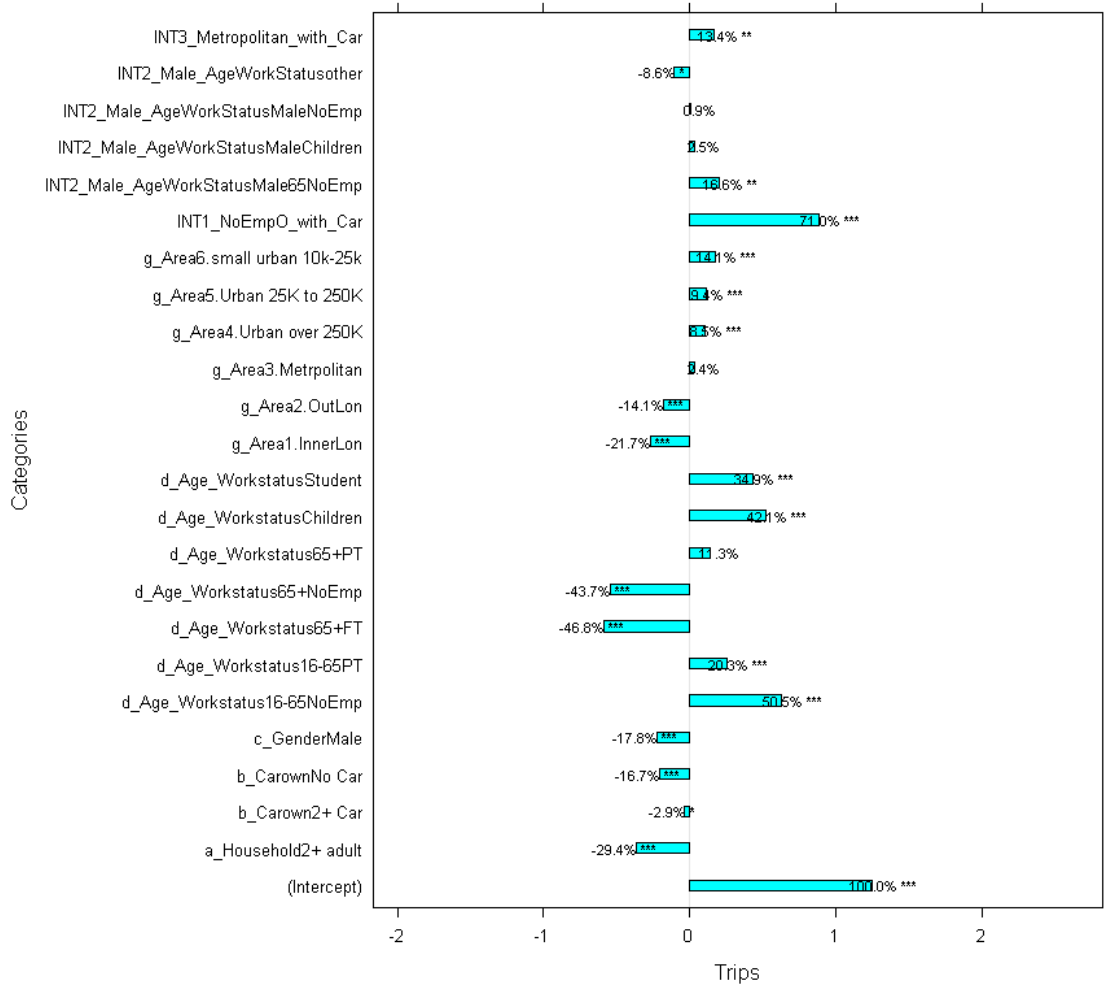


Figure E.8.3 Visiting Friends simple model plus interaction terms (AIC: 250835)

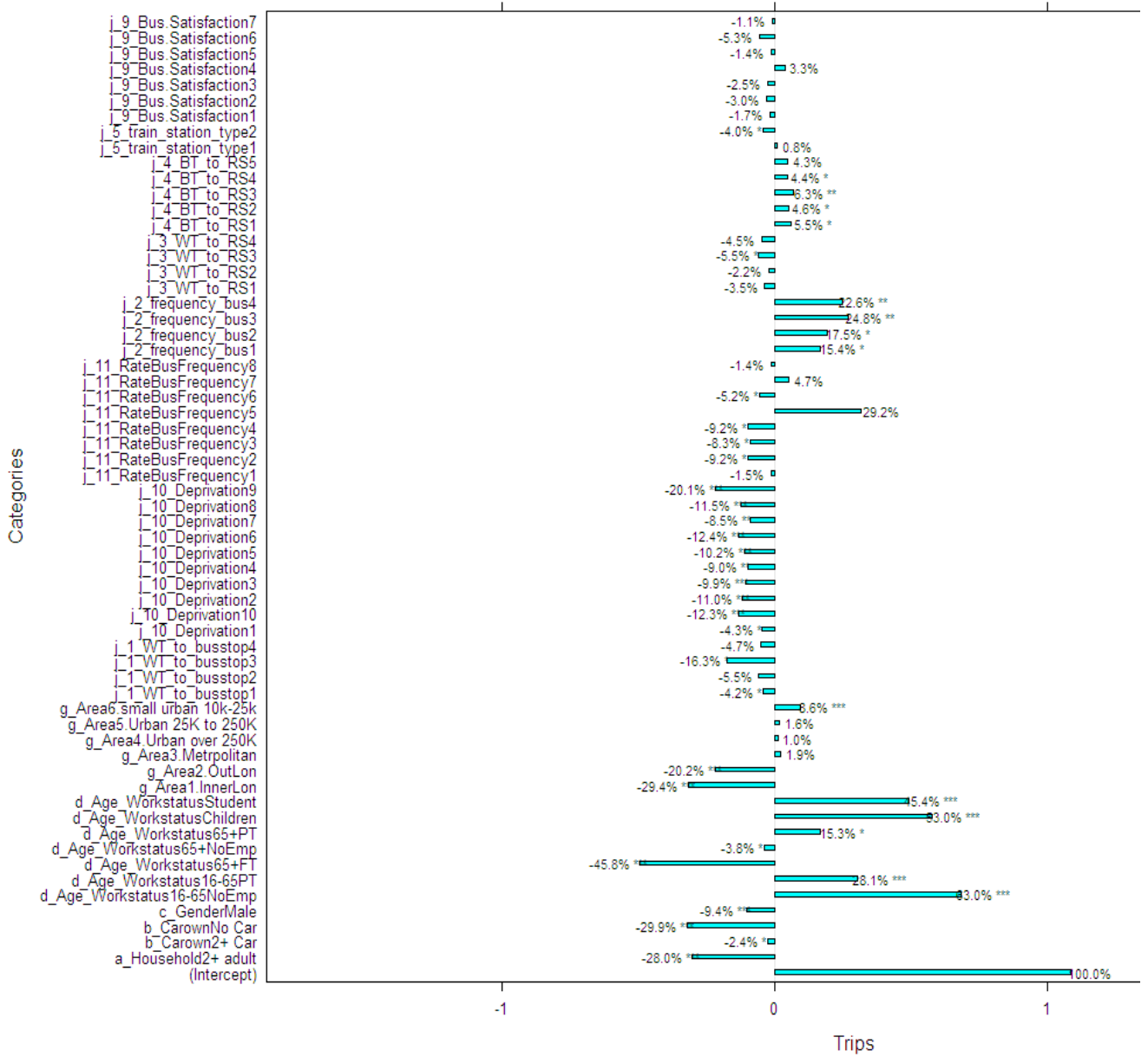


Figure E.8.4 Visiting Friends model of accessibility variables with area type (AIC: 251010)

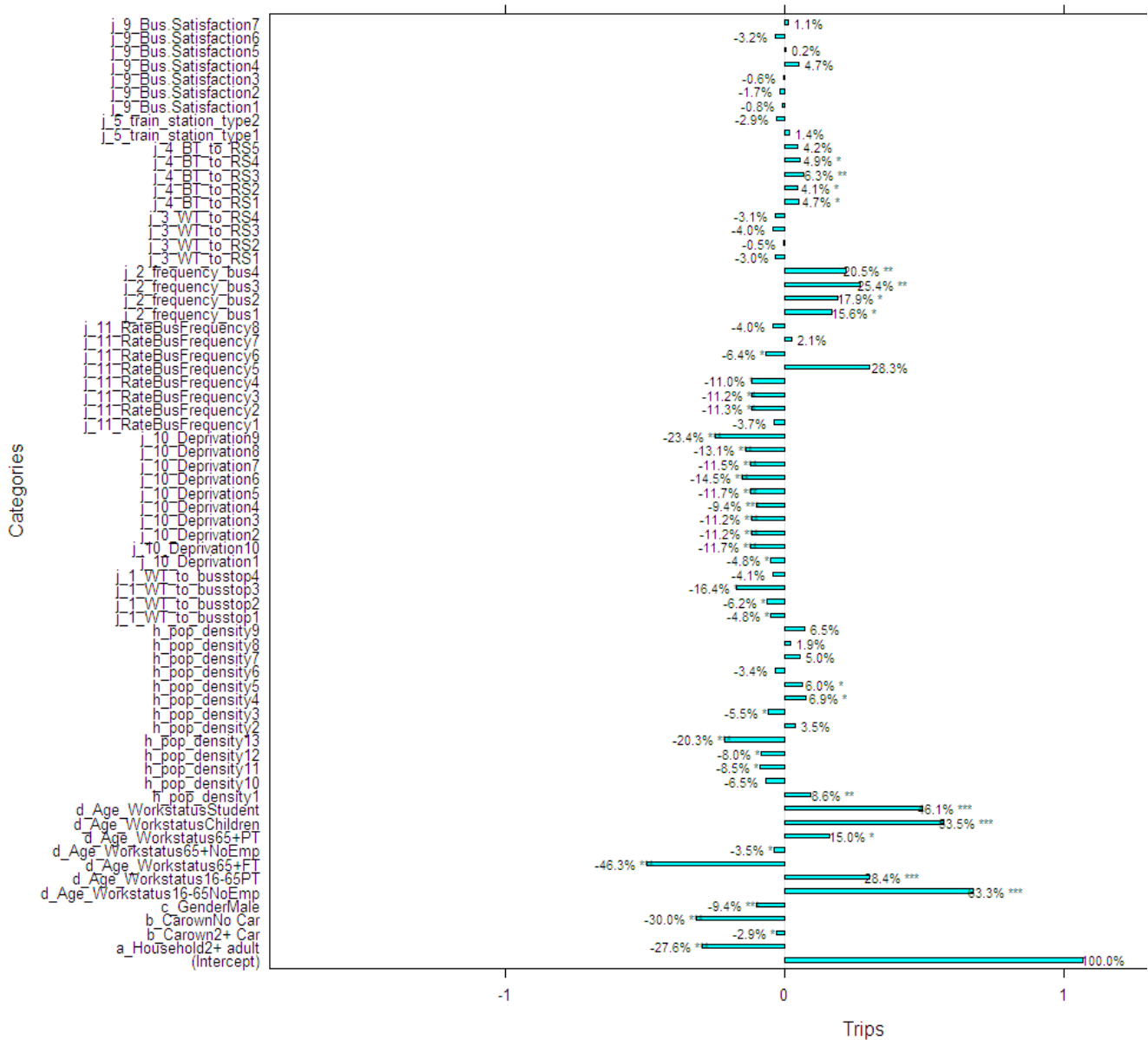


Figure E.8.5 Visiting Friends model of accessibility variables with population density (AIC: 251111)

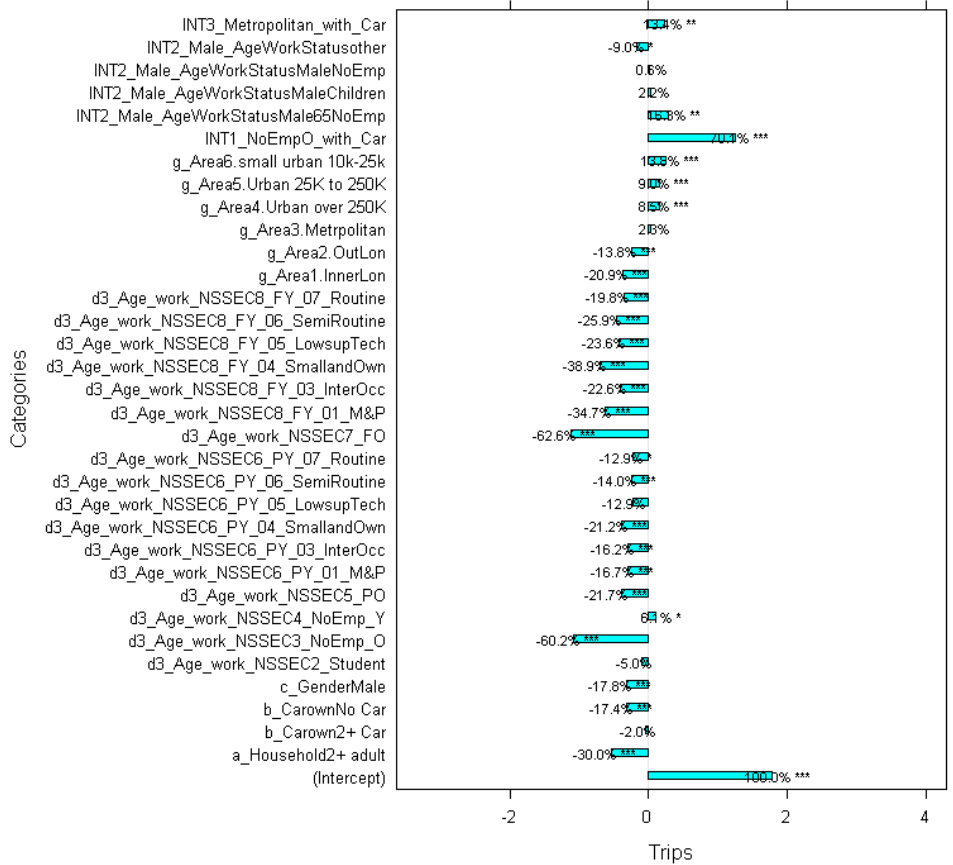


Figure E.8.6 Visiting Friends simple model plus NS-SeC (AIC: 250757)

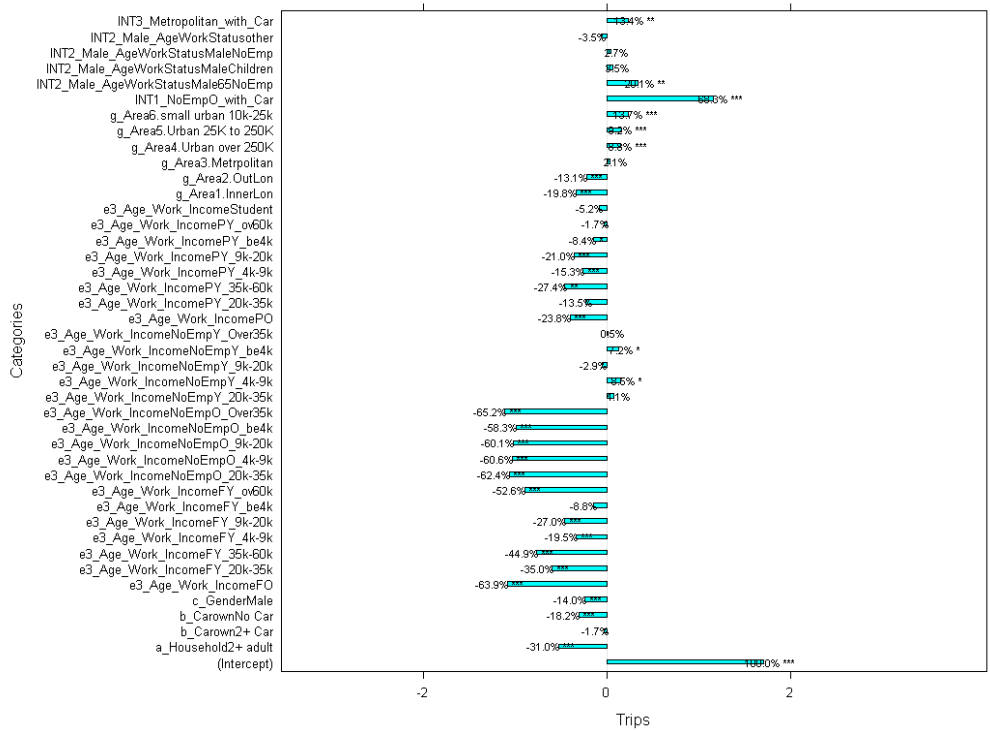


Figure E.8.7 Visiting Friends simple model plus income (AIC: 250661)

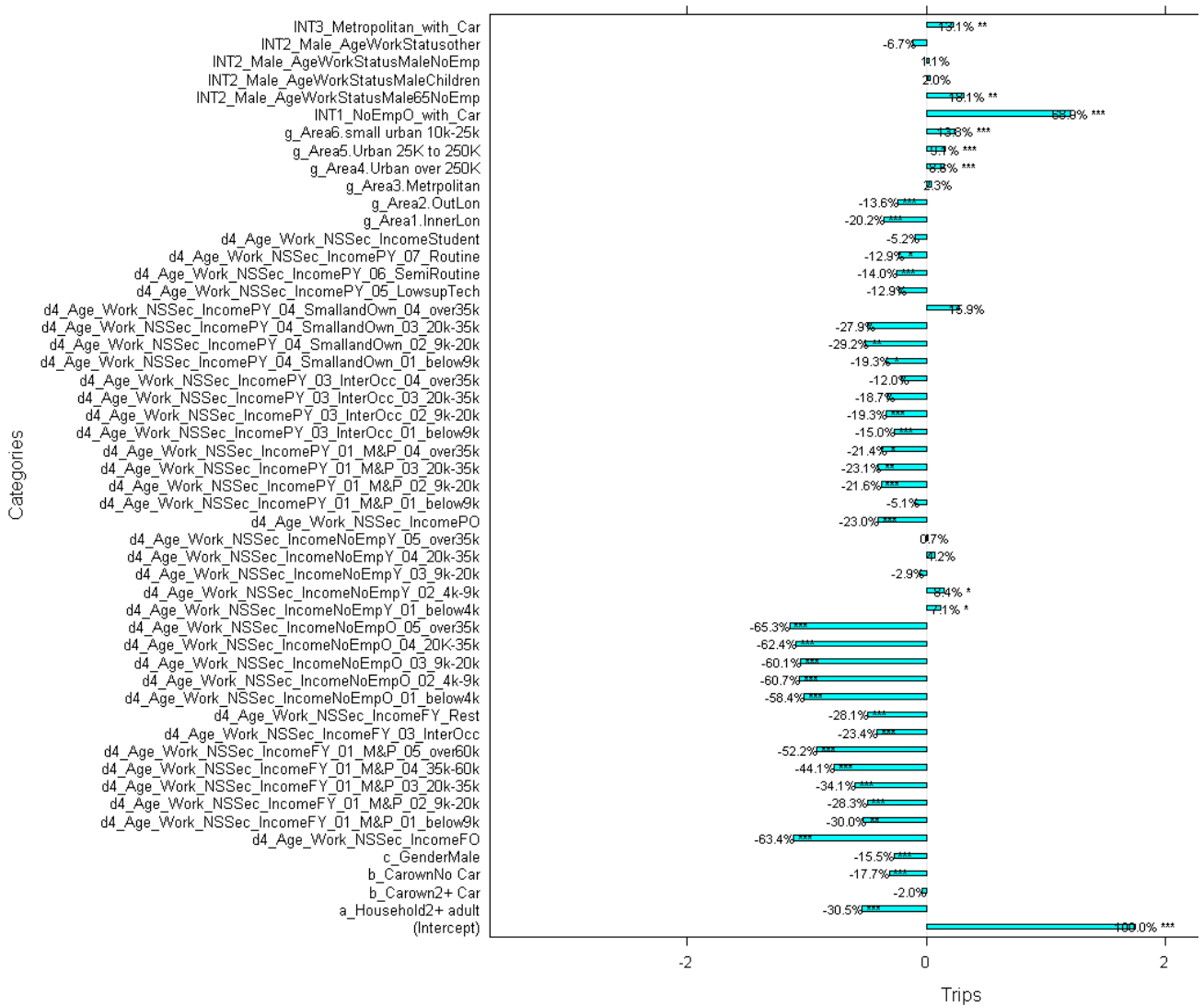


Figure E.8.8 Visiting Friends simple model plus Income and NS-SeC (AIC: 250751)



E.9 EDUCATION

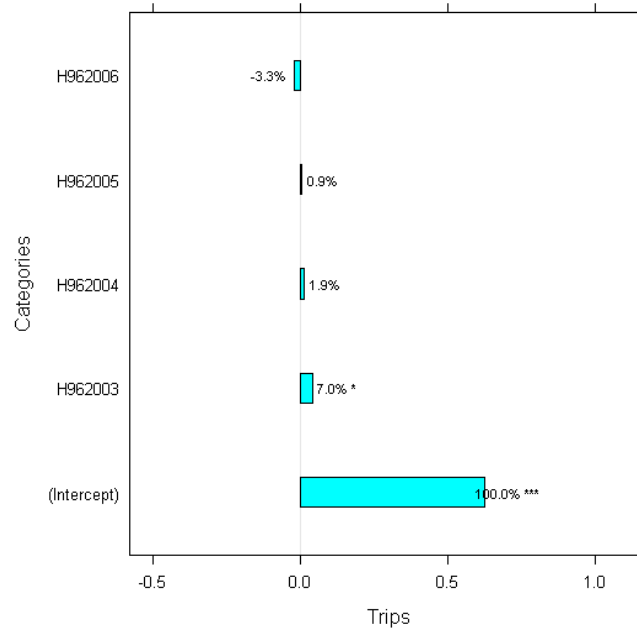


Figure A.9.1 Education model of year alone (AIC: 148754)

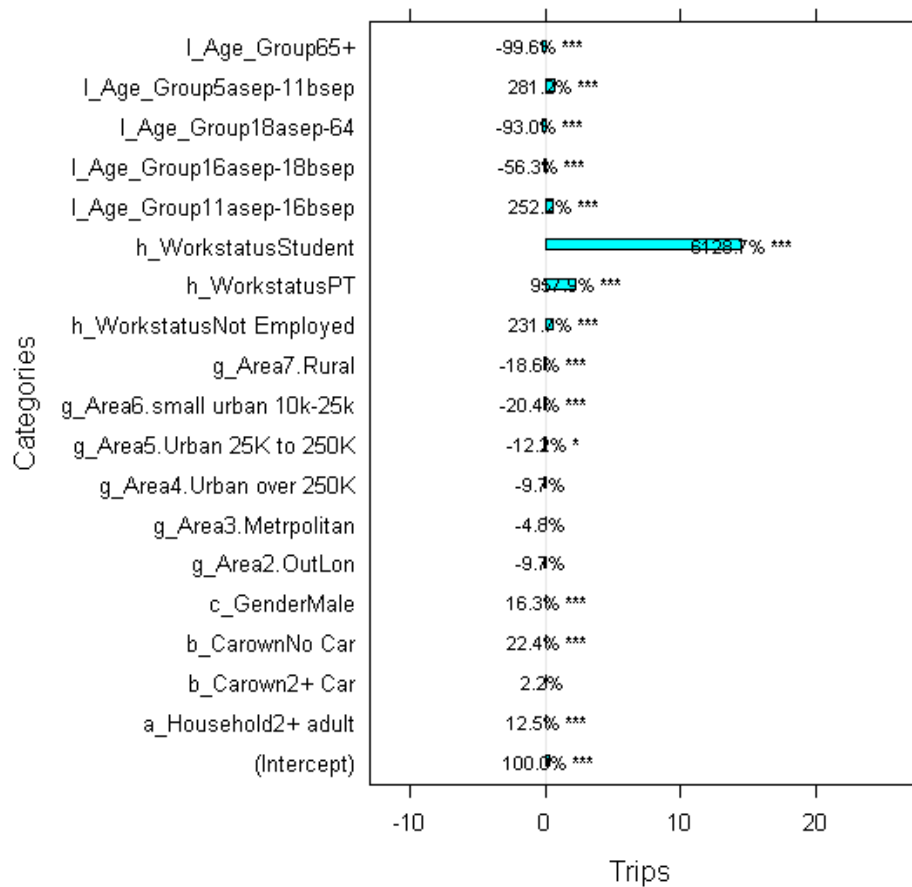


Figure E.9.2 Education simple model (AIC: 113872)