



User: file
Project: file

	94.17	5.83	100.00
Man	22,643 91.93	1,989 8.07	24,632 100.00
Trans/Non-binary	773 89.78	88 10.22	861 100.00
Total	39,255 92.77	3,058 7.23	42,313 100.00

Pearson $\chi^2(2) = 86.7136$ Pr = 0.000

1 . tab age_group opp_exclusion, row chi2

Key
<i>frequency</i> <i>row percentage</i>

age_group	Rejected education/work opportunity because commuting was difficult		Total
	No	Yes	
Under 18	6,957 93.89	453 6.11	7,410 100.00
18-25	12,600 94.21	775 5.79	13,375 100.00
25-40	12,057 92.67	954 7.33	13,011 100.00
40-60	5,614 91.25	538 8.75	6,152 100.00
Over 60	2,027 85.71	338 14.29	2,365 100.00
Total	39,255 92.77	3,058 7.23	42,313 100.00

Pearson $\chi^2(4) = 252.0615$ Pr = 0.000

2 . tab education opp_exclusion, row chi2

Key
<i>frequency</i> <i>row percentage</i>

education	Rejected education/work opportunity because commuting was difficult		Total
	No	Yes	
Below 10th	8,973 92.03	777 7.97	9,750 100.00
10th-12th pass	13,028 92.04	1,127 7.96	14,155 100.00
Diploma	3,071 91.34	291 8.66	3,362 100.00
Undergraduate	6,532 93.92	423 6.08	6,955 100.00
Graduate	5,473 94.79	301 5.21	5,774 100.00
Postgraduate equivale	1,553 94.06	98 5.94	1,651 100.00
Doctoral and above	625 93.84	41 6.16	666 100.00
Total	39,255 92.77	3,058 7.23	42,313 100.00

Pearson $\chi^2(6) = 83.4200$ Pr = 0.000

3 . tab occupation opp_exclusion, row χ^2

Key
<i>frequency</i> <i>row percentage</i>

occupation	Rejected education/work opportunity because commuting was difficult		Total
	No	Yes	
Student	7,576 95.60	349 4.40	7,925 100.00
Self-employed/own-acc	4,914 92.02	426 7.98	5,340 100.00
Gig/platform worker	735 87.09	109 12.91	844 100.00
Employer	4,614 89.66	532 10.34	5,146 100.00
Regular wage/salaried	5,973 91.30	569 8.70	6,542 100.00

Casual/contract worke	4,217 94.45	248 5.55	4,465 100.00
Domestic duties only	3,751 89.39	445 10.61	4,196 100.00
Seeking work	6,520 94.73	363 5.27	6,883 100.00
Other	955 98.25	17 1.75	972 100.00
Total	39,255 92.77	3,058 7.23	42,313 100.00

Pearson $\chi^2(8) = 407.5346$ Pr = 0.000

4 . tab hh_income_cat opp_exclusion, row chi2

Key
<i>frequency</i> <i>row percentage</i>

hh_income_cat	Rejected education/work opportunity because commuting was difficult		Total
	No	Yes	
Below INR 15,000	9,414 93.78	624 6.22	10,038 100.00
INR 15,001-30,000	9,288 92.90	710 7.10	9,998 100.00
INR 30,001-50,000	8,286 91.87	733 8.13	9,019 100.00
INR 50,001-100,000	7,812 91.60	716 8.40	8,528 100.00
Above INR 100,000	4,455 94.19	275 5.81	4,730 100.00
Total	39,255 92.77	3,058 7.23	42,313 100.00

Pearson $\chi^2(4) = 57.8930$ Pr = 0.000

5 . tab disability_bin opp_exclusion, row chi2

Key
<i>frequency</i> <i>row percentage</i>

Reports a difficulty /disabilit y	Rejected education/work opportunity because commuting was difficult		Total
	No	Yes	
No	35,302 92.33	2,931 7.67	38,233 100.00
Yes	1,974 94.68	111 5.32	2,085 100.00
Total	37,276 92.45	3,042 7.55	40,318 100.00

Pearson chi2(1) = 15.5518 Pr = 0.000

6 . tab regular_pt_user opp_exclusion, row chi2

Key
<i>frequency</i> <i>row percentage</i>

Uses public transport regularly	Rejected education/work opportunity because commuting was difficult		Total
	No	Yes	
No	9,107 83.57	1,790 16.43	10,897 100.00
Yes	30,148 95.96	1,268 4.04	31,416 100.00
Total	39,255 92.77	3,058 7.23	42,313 100.00

Pearson chi2(1) = 1.9e+03 Pr = 0.000

7 . tab any_vehicle opp_exclusion, row chi2

Key
<i>frequency</i> <i>row percentage</i>

Household has at least one vehicle	Rejected education/work opportunity because commuting was difficult		Total
	No	Yes	
No	2,999 93.72	201 6.28	3,200 100.00
Yes	36,256 92.70	2,857 7.30	39,113 100.00
Total	39,255 92.77	3,058 7.23	42,313 100.00

Pearson chi2(1) = 4.6191 Pr = 0.032

```

8 .
9 . *****
10 . * 4. REPORTED BARRIERS AMONG RESPONDENTS WITH OPPORTUNITY EXCLUSION
11 . *****
12 .
13 . mean opp_availability_bin opp_pettycrime_bin opp_gender_safety_bin ///
    >     opp_affordability_bin opp_travel_time_bin opp_accessibility_bin ///
    >     opp_reliability_bin opp_comfort_bin ///
    >     if opp_exclusion == 1

```

Mean estimation

Number of obs = 3,058

	Mean	Std. err.	[95% conf. interval]	
opp_availability_bin	.5075213	.0090422	.4897919	.5252506
opp_pettycrime_bin	.676259	.0084627	.6596659	.6928521
opp_gender_safety_bin	.0676913	.0045436	.0587825	.0766001
opp_affordability_bin	.3652714	.0087087	.3481959	.382347
opp_travel_time_bin	.0477436	.0038564	.0401821	.0553051
opp_accessibility_bin	.2547417	.0078805	.23929	.2701933
opp_reliability_bin	.557881	.0089824	.5402688	.5754931
opp_comfort_bin	.0650752	.0044612	.056328	.0738224

14 .
 15 . summarize opportunity_barrier_count if opp_exclusion == 1, detail

Number of commuting barriers reported after
 opportunity exclusion

	Percentiles	Smallest		
1%	1	1		
5%	1	1		
10%	1	1	Obs	3,058
25%	2	1	Sum of wgt.	3,058
50%	3		Mean	2.542184
		Largest	Std. dev.	.9801861
75%	3	6		
90%	3	6	Variance	.9607649
95%	4	6	Skewness	-.2628807
99%	5	6	Kurtosis	2.72978

16 .
 17 . *****
 18 . * 5. SCORE DESCRIPTIVES
 19 . *****
 20 .
 21 . summarize mobility_qol_100 accessibility_100 ptuser_accessibility_100 ///
 > reliability_100 pt_safety_100 comfort_100 affordability_100 ///
 > road_quality_100 pedestrian_quality_100 cycle_quality_100, detail

Mobility-related quality-of-life proxy, 0-100

	Percentiles	Smallest		
1%	27.97619	17.85714		
5%	33.63095	17.85714		
10%	36.90476	17.85714	Obs	42,735
25%	41.96429	17.85714	Sum of wgt.	42,735
50%	47.81746		Mean	47.67341
		Largest	Std. dev.	8.347894
75%	53.57143	75		
90%	58.33333	75.89286	Variance	69.68733
95%	61.30952	77.08334	Skewness	-.096821
99%	66.07143	77.08334	Kurtosis	2.836211

Public-transport accessibility score, 0-100

	Percentiles	Smallest		
1%	8.333334	0		
5%	16.66667	0		
10%	25	0	Obs	42,735
25%	33.33333	0	Sum of wgt.	42,735
50%	45.83333		Mean	46.26955
		Largest	Std. dev.	16.74833
75%	58.33333	100		
90%	66.66667	100	Variance	280.5066
95%	75	100	Skewness	-.0264421
99%	83.33334	100	Kurtosis	2.827467

Accessibility score among regular public-transport
users, 0-100

	Percentiles	Smallest		
1%	20.83333	6.25		
5%	31.25	6.25		
10%	34.375	6.25	Obs	31,416
25%	43.75	6.25	Sum of wgt.	31,416
50%	52.08333		Mean	51.98602
		Largest	Std. dev.	13.28272
75%	62.5	93.75		
90%	68.75	93.75	Variance	176.4307
95%	75	96.875	Skewness	-.0354469
99%	81.25	100	Kurtosis	2.847312

Public-transport reliability/time score, 0-100

	Percentiles	Smallest		
1%	12.5	0		
5%	25	0		
10%	31.25	0	Obs	42,735
25%	41.66667	0	Sum of wgt.	42,735
50%	54.16667		Mean	52.41071
		Largest	Std. dev.	16.10248
75%	62.5	100		
90%	72.22222	100	Variance	259.2899
95%	75	100	Skewness	-.3593696
99%	87.5	100	Kurtosis	3.257558

Public-transport safety score, 0-100

	Percentiles	Smallest		
1%	0	0		
5%	12.5	0		
10%	18.75	0	Obs	42,735
25%	31.25	0	Sum of wgt.	42,735
50%	50		Mean	45.6669
		Largest	Std. dev.	20.73096
75%	62.5	100		
90%	75	100	Variance	429.7728
95%	75	100	Skewness	-.1155902
99%	87.5	100	Kurtosis	2.760919

Public-transport comfort score, 0-100

	Percentiles	Smallest		
1%	12.5	0		
5%	25	0		
10%	29.16666	0	Obs	42,735
25%	37.5	0	Sum of wgt.	42,735
50%	50		Mean	50.55078
		Largest	Std. dev.	16.97011
75%	62.5	100		
90%	75	100	Variance	287.9848
95%	75	100	Skewness	-.1335325
99%	87.5	100	Kurtosis	3.281281

Public-transport affordability score, 0-100

	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	12.5	0	Obs	42,735
25%	25	0	Sum of wgt.	42,735
50%	50		Mean	46.17478
		Largest	Std. dev.	25.74277
75%	62.5	100		
90%	75	100	Variance	662.69
95%	91.66666	100	Skewness	.0515557
99%	100	100	Kurtosis	2.414513

Road-condition score, 0-100

	Percentiles	Smallest		
1%	6.25	0		
5%	12.5	0		
10%	18.75	0	Obs	50,488
25%	25	0	Sum of wgt.	50,488
50%	50		Mean	47.10674
		Largest	Std. dev.	24.66306
75%	75	100		
90%	81.25	100	Variance	608.2666
95%	87.5	100	Skewness	.2159149
99%	100	100	Kurtosis	1.92129

Pedestrian-infrastructure score, 0-100

	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	8.333334	0	Obs	50,488
25%	25	0	Sum of wgt.	50,488
50%	50		Mean	45.16271
		Largest	Std. dev.	24.33019
75%	58.33333	100		
90%	75	100	Variance	591.958
95%	83.33334	100	Skewness	-.1134066
99%	100	100	Kurtosis	2.481695

Cycle-infrastructure score, 0-100

	Percentiles	Smallest		
1%	0	0		
5%	16.66667	0		
10%	25	0	Obs	36,458
25%	33.33333	0	Sum of wgt.	36,458
50%	50		Mean	47.97838
		Largest	Std. dev.	20.10664
75%	58.33333	100		
90%	75	100	Variance	404.2769
95%	83.33334	100	Skewness	.0907262
99%	91.66666	100	Kurtosis	2.6075

```

22 .
23 . tabstat mobility_qol_100 accessibility_100 reliability_100 ///
>     pt_safety_100 comfort_100 affordability_100, ///
>     by(gender) statistics(n mean sd p50) columns(statistics)

```

Summary for variables: mobility_qol_100 accessibility_100 reliability_100 pt_safety_100 comfort_100 affordability_100
Group variable: gender

gender	N	Mean	SD	p50
Woman	16982	47.72772	8.311709	47.91667
	16982	46.30409	16.71906	45.83333
	16982	52.39199	16.19453	54.16667
	16982	46.02158	20.69501	50
	16982	50.5604	17.03299	50
	16982	46.4379	25.86677	50
Man	24879	47.62794	8.375606	47.71825
	24879	46.22635	16.76839	45.83333
	24879	52.47102	16.03563	54.16667
	24879	45.39538	20.74795	50
	24879	50.55678	16.9013	50
	24879	46.02593	25.63634	50
Trans/Non-binary	874	47.91275	8.257856	48.21429
	874	46.82812	16.75286	47.22222
	874	51.05756	16.16578	50
	874	46.50434	20.84223	50
	874	50.19308	17.70149	50
	874	45.29939	26.32122	50
Total	42735	47.67341	8.347894	47.81746
	42735	46.26955	16.74833	45.83333
	42735	52.41071	16.10248	54.16667
	42735	45.6669	20.73096	50
	42735	50.55078	16.97011	50
	42735	46.17478	25.74277	50

```

24 .
25 . tabstat mobility_qol_100 accessibility_100 reliability_100 ///
>     pt_safety_100 comfort_100 affordability_100, ///
>     by(hh_income_cat) statistics(n mean sd p50) columns(statistics)

```

Summary for variables: mobility_qol_100 accessibility_100 reliability_100 pt_safety_100 comfort_100 affordability_100
Group variable: hh_income_cat

hh_income_cat	N	Mean	SD	p50
Below INR 15,000	10154	47.82949	8.290418	47.91667
	10154	46.33915	16.76376	45.83333
	10154	52.95518	15.73229	54.16667
	10154	45.50629	20.6533	50
	10154	50.62003	16.71122	50
	10154	46.55103	25.58172	50
INR 15,001-30,00	10098	47.64548	8.343048	47.61905
	10098	46.68086	16.80915	45.83333
	10098	51.53186	16.19897	52.77778
	10098	46.17148	20.70794	50
	10098	50.62306	16.95513	50
	10098	46.85004	26.25232	50

INR 30,001-50,00	9102	47.73624	8.344895	47.91667
	9102	46.51908	16.52983	47.22222
	9102	52.55461	16.15346	54.16667
	9102	45.74956	20.78756	50
	9102	50.51317	17.12282	50
	9102	45.81044	25.58131	50
INR 50,001-100,0	8603	47.5657	8.257643	47.61905
	8603	45.81703	16.59596	45.83333
	8603	52.35972	16.06681	52.77778
	8603	45.18167	20.20697	45.83334
	8603	50.42693	16.85224	50
	8603	45.70257	25.64753	50
Above INR 100,00	4778	47.47501	8.6384	47.91667
	4778	45.59177	17.23416	45.83333
	4778	52.92864	16.56275	54.16667
	4778	45.65805	21.72791	50
	4778	50.54547	17.46545	50
	4778	45.49236	25.43674	50
Total	42735	47.67341	8.347894	47.81746
	42735	46.26955	16.74833	45.83333
	42735	52.41071	16.10248	54.16667
	42735	45.6669	20.73096	50
	42735	50.55078	16.97011	50
	42735	46.17478	25.74277	50

26 .

```
27 . tabstat mobility_qol_100 accessibility_100 reliability_100 ///
> pt_safety_100 comfort_100 affordability_100, ///
> by(disability_bin) statistics(n mean sd p50) columns(statistics)
```

Summary for variables: mobility_qol_100 accessibility_100 reliability_100 pt_safety_100 comfort_100 affordability_100
Group variable: disability_bin (Reports a difficulty/disability)

disability_bin	N	Mean	SD	p50
No	38575	47.65016	8.351313	47.81746
	38575	46.0889	16.71038	45.83333
	38575	52.62135	16.04906	54.16667
	38575	45.64766	20.72339	50
	38575	50.5789	16.81976	50
	38575	46.06611	25.50657	50
Yes	2092	46.7949	8.008973	46.72619
	2092	44.15233	17.46904	44.44444
	2092	51.74873	15.73429	50
	2092	43.5568	20.37213	43.75
	2092	51.62225	17.22886	50
	2092	45.69989	26.54989	50
Total	40667	47.60616	8.336092	47.61905
	40667	45.98927	16.75548	45.83333
	40667	52.57646	16.03398	54.16667
	40667	45.5401	20.71037	50
	40667	50.63258	16.84241	50
	40667	46.04727	25.56107	50

```

28 .
29 . *****
30 . * 6. SCALE AND ASSOCIATION CHECKS
31 . *****
32 .
33 . alpha road_wide road_no_congestion road_no_potholes road_illuminated, ///
> item std

```

Test scale = mean(standardized items)

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Average interitem correlation	alpha
road_wide	50488	+	0.9466	0.8902	0.3337	0.6004
road_no_co~n	50488	+	0.8804	0.7653	0.4034	0.6698
road_no_po~s	50488	+	0.5616	0.2840	0.7392	0.8948
road_illum~d	50488	+	0.7712	0.5813	0.5184	0.7635
Test scale					0.4987	0.7992

```

34 .
35 . alpha footpath_good crossings_adequate footpath_illuminated, ///
> item std

```

Test scale = mean(standardized items)

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Average interitem correlation	alpha
footpath_g~d	50488	+	0.7347	0.3840	0.3173	0.4818
crossings_~e	50488	+	0.7357	0.3856	0.3152	0.4794
footpath_i~d	50488	+	0.7389	0.3911	0.3080	0.4710
Test scale					0.3135	0.5781

```

36 .
37 . pwcorr mobility_qol_100 accessibility_100 reliability_100 ///
> pt_safety_100 comfort_100 affordability_100 ///
> road_quality_100 pedestrian_quality_100 ///
> commute_total_min ln_transport_burden, sig obs

```

	mobility~100	acce~100	reli~100	pt_s~100	comf~100	affo~100	road~100
mobility~100	1.0000						
	42735						
accessib~100	0.4174	1.0000					
	0.0000						
	42735	42735					
reliabil~100	0.0203	-0.0800	1.0000				
	0.0000	0.0000					
	42735	42735	42735				
pt_safet~100	0.5543	0.3257	-0.1220	1.0000			
	0.0000	0.0000	0.0000				
	42735	42735	42735	42735			

comfort_100	0.1241	-0.3057	-0.1240	-0.2248	1.0000		
	0.0000	0.0000	0.0000	0.0000			
	42735	42735	42735	42735	42735		
affordab~100	0.6134	0.2916	-0.3563	0.4318	0.0791	1.0000	
	0.0000	0.0000	0.0000	0.0000	0.0000		
	42735	42735	42735	42735	42735	42735	
road_qua~100	0.4511	0.0123	-0.0067	0.0214	0.0078	0.0196	1.0000
	0.0000	0.0111	0.1670	0.0000	0.1072	0.0001	
	42735	42735	42735	42735	42735	42735	50488
pedestri~100	0.4279	-0.0183	0.0160	0.0136	-0.0071	0.0070	0.0016
	0.0000	0.0002	0.0009	0.0050	0.1415	0.1493	0.7139
	42735	42735	42735	42735	42735	42735	50488
commute_to~n	-0.0794	-0.0971	-0.0705	0.0110	-0.0009	0.0075	-0.0496
	0.0000	0.0000	0.0000	0.0232	0.8597	0.1195	0.0000
	42676	42676	42676	42676	42676	42676	42976
ln_transpo~n	-0.0117	-0.0465	0.0216	-0.0122	0.0135	-0.0230	0.0042
	0.0166	0.0000	0.0000	0.0122	0.0055	0.0000	0.3457
	42238	42238	42238	42238	42238	42238	49773
	pede~100 co~l_min ln_tra~n						
pedestri~100	1.0000						
	50488						
commute_to~n	-0.0420	1.0000					
	0.0000						
	42976	42976					
ln_transpo~n	0.0012	0.0031	1.0000				
	0.7869	0.5241					
	49773	42368	49773				

```

38 .
39 . *****
40 . * 7. CITY-LEVEL SUMMARY AND GRAPH
41 . *****
42 .
43 . preserve

44 .
45 . keep if !missing(city) & !missing(opp_exclusion)
    (8,175 observations deleted)

```

```

46 .
47 . collapse (count) valid_n=opp_exclusion ///
    >         (sum) excluded_n=opp_exclusion ///
    >         (mean) mobility_qol_mean=mobility_qol_100 ///
    >                 accessibility_mean=accessibility_100 ///
    >                 reliability_mean=reliability_100 ///
    >                 safety_mean=pt_safety_100 ///
    >                 comfort_mean=comfort_100 ///
    >                 affordability_mean=affordability_100, by(city)

48 .
49 . gen double exclusion_pct = 100 * excluded_n / valid_n

50 . format exclusion_pct mobility_qol_mean accessibility_mean ///
    >         reliability_mean safety_mean comfort_mean affordability_mean %9.2f

51 .
52 . gsort -exclusion_pct

53 . export delimited using "urban_mobility_city_summary.csv", replace
    (file urban_mobility_city_summary.csv not found)
    file urban_mobility_city_summary.csv saved

54 .
55 . graph hbar exclusion_pct, over(city, sort(1) descending label(labsize(vsmall))) ///
    >         ytitle("Opportunity exclusion among valid responses (%)") ///
    >         title("Commuting-related opportunity exclusion by city") ///
    >         note("Outcome: rejected an education or work opportunity because commuting was difficult") ///
    >         name(city_exclusion, replace)

56 .
57 . graph export "figure_opportunity_exclusion_by_city.png", ///
    >         replace width(2400)
    (file figure_opportunity_exclusion_by_city.png not found)
    file figure_opportunity_exclusion_by_city.png saved as PNG format

58 .
59 . restore

60 .
61 . *****
62 . * 8. STANDARDIZED CONTINUOUS VARIABLES
63 . *****
64 .
65 . capture drop z_mobility_qol z_accessibility z_reliability z_pt_safety ///
    >         z_comfort z_affordability z_road_quality z_pedestrian_quality ///
    >         z_commute_total z_transport_burden z_vehicle_count

66 .
67 . egen z_mobility_qol = std(mobility_qol_100)
    (7,753 missing values generated)

```

```
68 . egen z_accessibility = std(accessibility_100)
    (7,753 missing values generated)

69 . egen z_reliability = std(reliability_100)
    (7,753 missing values generated)

70 . egen z_pt_safety = std(pt_safety_100)
    (7,753 missing values generated)

71 . egen z_comfort = std(comfort_100)
    (7,753 missing values generated)

72 . egen z_affordability = std(affordability_100)
    (7,753 missing values generated)

73 . egen z_road_quality = std(road_quality_100)

74 . egen z_pedestrian_quality = std(pedestrian_quality_100)

75 . egen z_commute_total = std(commute_total_min)
    (7,512 missing values generated)

76 . egen z_transport_burden = std(ln_transport_burden)
    (715 missing values generated)

77 . egen z_vehicle_count = std(vehicle_count)

78 .
79 . label variable z_mobility_qol "Mobility-related QoL proxy, standard deviations"

80 . label variable z_accessibility "Accessibility, standard deviations"

81 . label variable z_reliability "Reliability/time quality, standard deviations"

82 . label variable z_pt_safety "Public-transport safety, standard deviations"

83 . label variable z_comfort "Public-transport comfort, standard deviations"

84 . label variable z_affordability "Public-transport affordability, standard deviations"

85 . label variable z_road_quality "Road quality, standard deviations"

86 . label variable z_pedestrian_quality "Pedestrian quality, standard deviations"

87 . label variable z_commute_total "Total commute time, standard deviations"

88 . label variable z_transport_burden "Log transport burden, standard deviations"

89 . label variable z_vehicle_count "Approximate vehicle count, standard deviations"

90 .
```

```

91 . *****
92 . * 9. DEFINE A COMMON COMPLETE-CASE SAMPLE
93 . *****
94 .
95 . capture drop main_missing main_sample

96 .
97 . egen main_missing = rowmiss( ///
>   opp_exclusion city_id gender age_group education occupation ///
>   hh_income_cat disability_bin hh_size z_vehicle_count ///
>   regular_pt_user z_mobility_qol z_accessibility z_reliability ///
>   z_pt_safety z_comfort z_affordability z_road_quality ///
>   z_pedestrian_quality z_commute_total z_transport_burden)

98 .
99 . gen byte main_sample = main_missing == 0

100 . label variable main_sample "Complete-case sample for main multilevel models"

101 .
102 . tab main_sample, missing

```

Complete-case sample for main multilevel models	Freq.	Percent	Cum.
0	10,637	21.07	21.07
1	39,851	78.93	100.00
Total	50,488	100.00	

```

103 . tab opp_exclusion if main_sample, missing

```

Rejected education/w ork opportunity because commuting was difficult	Freq.	Percent	Cum.
No	36,836	92.43	92.43
Yes	3,015	7.57	100.00
Total	39,851	100.00	

```

104 . tab city if main_sample

```

city	Freq.	Percent	Cum.
Agartala	381	0.96	0.96
Ahmedabad	1,925	4.83	5.79
Aizawl	338	0.85	6.63
Bengaluru	3,049	7.65	14.29
Bhopal	592	1.49	15.77
Bhubaneswar	214	0.54	16.31
Chandigarh	368	0.92	17.23
Chennai	2,544	6.38	23.62
Coimbatore	257	0.64	24.26
Dehradun	190	0.48	24.74

Delhi	4,886	12.26	37.00
Gurugram	371	0.93	37.93
Guwahati	239	0.60	38.53
Hyderabad	2,324	5.83	44.36
Indore	922	2.31	46.67
Jabalpur	431	1.08	47.76
Jaipur	1,263	3.17	50.92
Jammu	299	0.75	51.67
Kanpur	1,056	2.65	54.32
Kochi	252	0.63	54.96
Kohima	373	0.94	55.89
Kolkata	1,201	3.01	58.91
Lucknow	1,181	2.96	61.87
Ludhiana	675	1.69	63.56
Mumbai	4,592	11.52	75.09
Mysore	331	0.83	75.92
Nagpur	966	2.42	78.34
Nashik	639	1.60	79.95
Panaji-Goa	348	0.87	80.82
Patna	799	2.00	82.82
Pune-Pimpri Chinchwad	2,096	5.26	88.08
Raipur	316	0.79	88.88
Ranchi	356	0.89	89.77
Shimla	403	1.01	90.78
Surat	1,772	4.45	95.23
Thiruvananthapuram	344	0.86	96.09
Udaipur	386	0.97	97.06
Varanasi	545	1.37	98.43
Vijayawada	66	0.17	98.59
Visakhapatnam	561	1.41	100.00
Total	39,851	100.00	

```

105 .
106 . *****
107 . * 10. REFERENCE CATEGORIES
108 . *****
109 .
110 . * Man; age 25-40; graduate; salaried employee; middle-income group;
111 . * four-person household; no disability; non-regular PT user.
112 .
113 . fvset base 2 gender

114 . fvset base 3 age_group

115 . fvset base 5 education

116 . fvset base 5 occupation

117 . fvset base 3 hh_income_cat

```

```
118 . fvset base 4 hh_size
```

```
119 . fvset base 0 disability_bin
```

```
120 . fvset base 0 regular_pt_user
```

```
121 .
```

```
122 . *****
```

```
123 . * 11. MULTICOLLINEARITY DIAGNOSTIC FOR DOMAIN MODEL
```

```
124 . *****
```

```
125 .
```

```
126 . regress opp_exclusion ///
```

```
> z_accessibility z_reliability z_pt_safety z_comfort ///
```

```
> z_affordability z_road_quality z_pedestrian_quality ///
```

```
> if main_sample
```

Source	SS	df	MS	Number of obs	=	39,851
Model	16.5222585	7	2.36032264	F(7, 39843)	=	33.95
Residual	2770.37242	39,843	.069532225	Prob > F	=	0.0000
				R-squared	=	0.0059
				Adj R-squared	=	0.0058
Total	2786.89468	39,850	.069934622	Root MSE	=	.26369

opp_exclusion	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
z_accessibility	-.0116727	.001495	-7.81	0.000	-.014603	-.0087425
z_reliability	.0003514	.0014211	0.25	0.805	-.0024341	.0031369
z_pt_safety	.0013296	.00156	0.85	0.394	-.001728	.0043873
z_comfort	.0089496	.0014644	6.11	0.000	.0060793	.0118198
z_affordability	-.0079326	.0016355	-4.85	0.000	-.0111382	-.004727
z_road_quality	.0060237	.0013068	4.61	0.000	.0034623	.0085851
z_pedestrian_quality	.0030159	.0013183	2.29	0.022	.000432	.0055997
_cons	.0753006	.0013213	56.99	0.000	.0727109	.0778903

```
127 .
```

```
128 . estat vif
```

Variable	VIF	1/VIF
z_affordab~y	1.52	0.658935
z_pt_safety	1.40	0.715106
z_accessib~y	1.28	0.779963
z_comfort	1.22	0.822473
z_reliabil~y	1.15	0.869690
z_pedestri~y	1.00	0.998283
z_road_qua~y	1.00	0.999165
Mean VIF	1.22	

```

129 .
130 . *****
131 . * 12. MULTILEVEL LOGISTIC MODELS
132 . *****
133 .
134 . * M0: empty random-intercept model, common analytical sample.
135 . melogit opp_exclusion if main_sample ///
>      || city_id:, or

```

Fitting fixed-effects model:

```

Iteration 0:  log likelihood = -10985.637
Iteration 1:  log likelihood = -10682.038
Iteration 2:  log likelihood = -10681.323
Iteration 3:  log likelihood = -10681.323

```

Refining starting values:

```

Grid node 0:  log likelihood = -9130.505

```

Fitting full model:

```

Iteration 0:  log likelihood = -9130.505
Iteration 1:  log likelihood = -9109.8631
Iteration 2:  log likelihood = -9087.2227
Iteration 3:  log likelihood = -9069.5457
Iteration 4:  log likelihood = -9064.5458
Iteration 5:  log likelihood = -9061.8675
Iteration 6:  log likelihood = -9060.6688
Iteration 7:  log likelihood = -9060.2786
Iteration 8:  log likelihood = -9060.3211
Iteration 9:  log likelihood = -9060.3756
Iteration 10: log likelihood = -9060.4093
Iteration 11: log likelihood = -9060.4269
Iteration 12: log likelihood = -9060.4355
Iteration 13: log likelihood = -9060.4395
Iteration 14: log likelihood = -9060.4414
Iteration 15: log likelihood = -9060.4422

```

Mixed-effects logistic regression
Group variable: **city_id**

```

Number of obs    =    39,851
Number of groups =     40

```

Obs per group:

```

min =    66
avg =   996.3
max =  4,886

```

Integration method: **mvaghermite**

```

Integration pts. =    7

```

Log likelihood = **-9060.4422**

```

Wald chi2(0)    =    .
Prob > chi2     =    .

```

opp_exclusion	Odds	Std. err.	z	P> z	[95% conf. interval]	
_cons	.0048061	.0028248	-9.08	0.000	.0015188	.0152084
city_id var(_cons)	15.22132	5.742369			7.266572	31.88417

Note: Estimates are transformed only in the first equation to odds.

LR test vs. logistic model: chibar2(01) = 3241.76 Prob >= chibar2 = **0.0000**

136 . estimates store M0

137 . estat icc

Intraclass correlation

Level	ICC	Std. err.	[95% conf. interval]	
city_id	.8222768	.0551316	.6883544	.9064689

138 .

139 . * M1: respondent and household characteristics.

140 . melogit opp_exclusion ///

> i.gender i.age_group i.education i.occupation ///

> i.hh_income_cat i.hh_size i.disability_bin ///

> c.z_vehicle_count ///

> if main_sample ///

> || city_id:, or

note: The following factor variables in the model have a base preference set using **fvset**. This can affect the base level and which factor levels will participate in interactions.

Factor variables: age_group, disability_bin, education, gender, hh_income_cat, hh_size, occupation.

Fitting fixed-effects model:

Iteration 0: log likelihood = -10738.151

Iteration 1: log likelihood = -10205.882

Iteration 2: log likelihood = -10200.957

Iteration 3: log likelihood = -10200.886

Iteration 4: log likelihood = -10200.886

Refining starting values:

Grid node 0: log likelihood = -8707.6219

Fitting full model:

Iteration 0: log likelihood = -8707.6219

Iteration 1: log likelihood = -8640.4043

Iteration 2: log likelihood = -8601.1789

Iteration 3: log likelihood = -8582.7197

Iteration 4: log likelihood = -8577.467

Iteration 5: log likelihood = -8575.7324

Iteration 6: log likelihood = -8574.5401

Iteration 7: log likelihood = -8573.3013

Iteration 8: log likelihood = -8572.8987

Iteration 9: log likelihood = -8572.9523

Iteration 10: log likelihood = -8573.0201

Iteration 11: log likelihood = -8573.0633

Iteration 12: log likelihood = -8573.0868

Iteration 13: log likelihood = -8573.0986

Iteration 14: log likelihood = -8573.1043

Iteration 15: log likelihood = -8573.107

Iteration 16: log likelihood = -8573.1084

Iteration 17: log likelihood = -8573.109

Mixed-effects logistic regression

Group variable: city_id

Number of obs = 39,851

Number of groups = 40

Obs per group:

min = 66
 avg = 996.3
 max = 4,886

Integration method: mvaghermite

Integration pts. = 7

Log likelihood = -8573.109

Wald chi2(31) = 890.66
 Prob > chi2 = 0.0000

opp_exclusion	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
gender						
Woman	.6881527	.0298647	-8.61	0.000	.6320393	.7492479
Trans/Non-binary	1.513158	.1936811	3.24	0.001	1.177423	1.944627
age_group						
Under 18	1.155695	.0836705	2.00	0.046	1.002807	1.331892
18-25	.9685267	.0541295	-0.57	0.567	.868039	1.080647
40-60	1.265583	.0791673	3.77	0.000	1.119553	1.430661
Over 60	1.748997	.1355031	7.22	0.000	1.502597	2.035803
education						
Below 10th	1.367823	.1084377	3.95	0.000	1.170978	1.597759
10th-12th pass	1.374945	.1004292	4.36	0.000	1.191548	1.586569
Diploma	1.726046	.159799	5.90	0.000	1.439618	2.069462
Undergraduate	1.369988	.1164732	3.70	0.000	1.15971	1.618393
Postgraduate equivalent	.9059069	.1172773	-0.76	0.445	.7028915	1.167559
Doctoral and above	.8942833	.1667945	-0.60	0.549	.620463	1.288945
occupation						
Student	.2959264	.0254263	-14.17	0.000	.250062	.3502029
Self-employed/own-account worker	.7584831	.0567558	-3.69	0.000	.6550164	.8782936
Gig/platform worker	1.198979	.1477221	1.47	0.141	.941755	1.526459
Employer	.7594186	.0533705	-3.92	0.000	.6616989	.8715696
Casual/contract worker	.4854633	.041888	-8.38	0.000	.409931	.5749129
Domestic duties only	.8236713	.0636122	-2.51	0.012	.7079712	.9582796
Seeking work	.3151678	.0248727	-14.63	0.000	.2700014	.3678897
Other	.1860657	.0494576	-6.33	0.000	.1105123	.3132723
hh_income_cat						
Below INR 15,000	.8013665	.0487776	-3.64	0.000	.7112467	.9029051
INR 15,001-30,000	.9579486	.0566782	-0.73	0.468	.8530604	1.075733
INR 50,001-100,000	1.064969	.0632313	1.06	0.289	.9479767	1.196399
Above INR 100,000	.5965863	.0471593	-6.53	0.000	.5109601	.6965617
hh_size						
1 person	.6285413	.064651	-4.51	0.000	.5137836	.7689309
2 people	.9739997	.0662642	-0.39	0.699	.8524109	1.112932
3 people	1.30976	.0831017	4.25	0.000	1.156604	1.483197
5 people	.7121758	.0456893	-5.29	0.000	.6280277	.8075987
More than 5	1.019882	.0696995	0.29	0.773	.8920277	1.166062
disability_bin						
Yes	.6701558	.0715452	-3.75	0.000	.5436286	.8261317
z_vehicle_count	1.00067	.0202062	0.03	0.974	.9618401	1.041068
_cons	.0064984	.0039757	-8.23	0.000	.0019591	.0215558
city_id						
var(_cons)	16.35488	6.196632			7.782859	34.3681

Note: Estimates are transformed only in the first equation to odds ratios.

Note: _cons estimates baseline odds (conditional on zero random effects).

LR test vs. logistic model: $\text{chibar2}(01) = 3255.55$ Prob >= $\text{chibar2} = 0.0000$

141 . estimates store M1

142 . estat icc

Residual intraclass correlation

Level	ICC	Std. err.	[95% conf. interval]	
city_id	.8325319	.0528252	.7028855	.9126382

143 .

144 . * M2: add the combined mobility-related QoL proxy.

145 . melogit opp_exclusion ///

> i.gender i.age_group i.education i.occupation ///

> i.hh_income_cat i.hh_size i.disability_bin ///

> c.z_vehicle_count c.z_mobility_qol ///

> if main_sample ///

> || city_id:, or

note: The following factor variables in the model have a base preference set using fvset. This can affect the base level and which factor levels will participate in interactions.

Factor variables: age_group, disability_bin, education, gender, hh_income_cat, hh_size, occupation.

Fitting fixed-effects model:

Iteration 0: log likelihood = -10736.998

Iteration 1: log likelihood = -10203.56

Iteration 2: log likelihood = -10198.629

Iteration 3: log likelihood = -10198.558

Iteration 4: log likelihood = -10198.558

Refining starting values:

Grid node 0: log likelihood = -8717.8672

Fitting full model:

Iteration 0: log likelihood = -8717.8672

Iteration 1: log likelihood = -8636.6482

Iteration 2: log likelihood = -8592.3309

Iteration 3: log likelihood = -8573.7324

Iteration 4: log likelihood = -8568.4373

Iteration 5: log likelihood = -8566.6871

Iteration 6: log likelihood = -8565.4828

Iteration 7: log likelihood = -8564.2295

Iteration 8: log likelihood = -8563.8196

Iteration 9: log likelihood = -8563.8742

Iteration 10: log likelihood = -8563.9443

Iteration 11: log likelihood = -8563.9892

Iteration 12: log likelihood = -8564.0137

Iteration 13: log likelihood = -8564.0262

Iteration 14: log likelihood = -8564.0322

Iteration 15: log likelihood = -8564.0351

Iteration 16: log likelihood = -8564.0365

Iteration 17: log likelihood = -8564.0372

Mixed-effects logistic regression

Group variable: city_id

Number of obs = 39,851

Number of groups = 40

Obs per group:

min = 66
 avg = 996.3
 max = 4,886

Integration method: mvaghermite

Integration pts. = 7

Log likelihood = -8564.0372

Wald chi2(32) = 905.95
 Prob > chi2 = 0.0000

opp_exclusion	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
gender						
Woman	.6870911	.0298326	-8.64	0.000	.6310392	.7481218
Trans/Non-binary	1.506124	.1929935	3.20	0.001	1.171624	1.936123
age_group						
Under 18	1.153686	.0835502	1.97	0.048	1.001022	1.329633
18-25	.9738438	.0544767	-0.47	0.636	.8727165	1.086689
40-60	1.272338	.0796138	3.85	0.000	1.125487	1.43835
Over 60	1.757711	.1362373	7.28	0.000	1.509983	2.04608
education						
Below 10th	1.385088	.1099857	4.10	0.000	1.185457	1.618336
10th-12th pass	1.3822	.101079	4.43	0.000	1.197631	1.595212
Diploma	1.736563	.1608537	5.96	0.000	1.448258	2.082262
Undergraduate	1.385341	.1179104	3.83	0.000	1.172488	1.636835
Postgraduate equivalent	.903209	.1170729	-0.79	0.432	.700578	1.164448
Doctoral and above	.886578	.1652687	-0.65	0.518	.6152376	1.277589
occupation						
Student	.2931714	.0252081	-14.27	0.000	.2477033	.3469857
Self-employed/own-account worker	.7563616	.0566183	-3.73	0.000	.6531484	.875885
Gig/platform worker	1.221461	.1505002	1.62	0.104	.9594009	1.555102
Employer	.7604009	.053467	-3.90	0.000	.6625078	.8727588
Casual/contract worker	.48458	.0418366	-8.39	0.000	.4091441	.5739244
Domestic duties only	.824526	.0637046	-2.50	0.013	.7086614	.9593342
Seeking work	.3124724	.0246932	-14.72	0.000	.2676365	.3648194
Other	.1828974	.0487276	-6.38	0.000	.1085001	.3083082
hh_income_cat						
Below INR 15,000	.8025066	.0488669	-3.61	0.000	.7122239	.9042337
INR 15,001-30,000	.9607089	.0568688	-0.68	0.498	.8554709	1.078893
INR 50,001-100,000	1.064606	.063247	1.05	0.292	.9475889	1.196073
Above INR 100,000	.5961858	.0471458	-6.54	0.000	.5105866	.6961356
hh_size						
1 person	.6225794	.0640761	-4.60	0.000	.5088488	.7617295
2 people	.9647955	.0657247	-0.53	0.599	.844207	1.102609
3 people	1.313068	.0833325	4.29	0.000	1.159489	1.48699
5 people	.7048977	.0452793	-5.44	0.000	.6215111	.7994721
More than 5	1.011005	.06916	0.16	0.873	.8841479	1.156063
disability_bin						
Yes	.6749153	.0721464	-3.68	0.000	.5473415	.8322237
z_vehicle_count	1.000446	.0202213	0.02	0.982	.9615877	1.040874
z_mobility_qol	1.088342	.0216325	4.26	0.000	1.046758	1.131577
_cons	.0063875	.0039244	-8.23	0.000	.0019159	.021296
city_id						
var(_cons)	16.53044	6.264789			7.864877	34.74378

Note: Estimates are transformed only in the first equation to odds ratios.

Note: **_cons** estimates baseline odds (conditional on zero random effects).
 LR test vs. logistic model: chibar2(01) = 3269.04 Prob >= chibar2 = **0.0000**

146 . estimates store M2

147 . estat icc

Residual intraclass correlation

Level	ICC	Std. err.	[95% conf. interval]	
city_id	.8340153	.0524643	.7050701	.9135011

148 .

149 . * M3: replace the combined proxy with separate mobility domains.

150 . melogit opp_exclusion ///

```
> i.gender i.age_group i.education i.occupation ///  
> i.hh_income_cat i.hh_size i.disability_bin ///  
> c.z_vehicle_count ///  
> c.z_accessibility c.z_reliability c.z_pt_safety ///  
> c.z_comfort c.z_affordability ///  
> c.z_road_quality c.z_pedestrian_quality ///  
> if main_sample ///  
> || city_id:, or
```

note: The following factor variables in the model have a base preference set using **fvset**. This can affect the base and which factor levels will participate in interactions.

Factor variables: age_group, disability_bin, education, gender, hh_income_cat, hh_size, occupation.

Fitting fixed-effects model:

```
Iteration 0: log likelihood = -10687.226  
Iteration 1: log likelihood = -10105.589  
Iteration 2: log likelihood = -10100.211  
Iteration 3: log likelihood = -10100.143  
Iteration 4: log likelihood = -10100.143
```

Refining starting values:

```
Grid node 0: log likelihood = -8735.6215
```

Fitting full model:

```
Iteration 0: log likelihood = -8735.6215  
Iteration 1: log likelihood = -8579.3946  
Iteration 2: log likelihood = -8558.2286  
Iteration 3: log likelihood = -8546.0328  
Iteration 4: log likelihood = -8544.0195  
Iteration 5: log likelihood = -8542.6166  
Iteration 6: log likelihood = -8541.6811  
Iteration 7: log likelihood = -8540.7633  
Iteration 8: log likelihood = -8540.5505  
Iteration 9: log likelihood = -8540.623  
Iteration 10: log likelihood = -8540.6851  
Iteration 11: log likelihood = -8540.7222  
Iteration 12: log likelihood = -8540.7418  
Iteration 13: log likelihood = -8540.7516  
Iteration 14: log likelihood = -8540.7564  
Iteration 15: log likelihood = -8540.7586  
Iteration 16: log likelihood = -8540.7597  
Iteration 17: log likelihood = -8540.7602
```

Mixed-effects logistic regression
Group variable: **city_id**

Number of obs = 39,851
Number of groups = 40

Obs per group:
min = 66
avg = 996.3
max = 4,886

Integration method: **mvaghermite**

Integration pts. = 7

Log likelihood = **-8540.7602**

Wald chi2(38) = 947.73
Prob > chi2 = 0.0000

opp_exclusion	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
gender						
Woman	.6856115	.0298175	-8.68	0.000	.6295918	.7466158
Trans/Non-binary	1.492812	.1913242	3.13	0.002	1.161213	1.919102
age_group						
Under 18	1.144922	.0830694	1.87	0.062	.9931554	1.31988
18-25	.9670498	.054183	-0.60	0.550	.8664764	1.079297
40-60	1.272051	.0797471	3.84	0.000	1.124971	1.438361
Over 60	1.737137	.1349828	7.11	0.000	1.491737	2.022907
education						
Below 10th	1.377516	.1096708	4.02	0.000	1.178496	1.610145
10th-12th pass	1.384346	.1014069	4.44	0.000	1.199201	1.598075
Diploma	1.747366	.162175	6.01	0.000	1.456743	2.095969
Undergraduate	1.375794	.117324	3.74	0.000	1.164033	1.626079
Postgraduate equivalent	.9304682	.1207447	-0.56	0.579	.7215112	1.199941
Doctoral and above	.9041387	.1686712	-0.54	0.589	.6272483	1.303259
occupation						
Student	.2986726	.0257468	-14.02	0.000	.2522426	.3536489
Self-employed/own-account worker	.7431268	.0558284	-3.95	0.000	.6413797	.8610148
Gig/platform worker	1.209785	.1494909	1.54	0.123	.9495695	1.541309
Employer	.7549018	.0531804	-3.99	0.000	.6575458	.8666722
Casual/contract worker	.4781174	.0413918	-8.52	0.000	.4035005	.5665329
Domestic duties only	.8239306	.0637828	-2.50	0.012	.7079405	.9589248
Seeking work	.3169922	.0251069	-14.51	0.000	.2714129	.3702258
Other	.1877686	.0499978	-6.28	0.000	.1114219	.3164284
hh_income_cat						
Below INR 15,000	.8066758	.0491918	-3.52	0.000	.7158006	.9090882
INR 15,001-30,000	.9585985	.0568469	-0.71	0.476	.8534119	1.07675
INR 50,001-100,000	1.068169	.0635496	1.11	0.268	.950602	1.200277
Above INR 100,000	.5980294	.0473785	-6.49	0.000	.5120197	.6984871
hh_size						
1 person	.6165768	.063601	-4.69	0.000	.5037142	.7547275
2 people	.9692015	.0661388	-0.46	0.647	.8478669	1.1079
3 people	1.310443	.0833418	4.25	0.000	1.156867	1.484407
5 people	.7003881	.0450851	-5.53	0.000	.61737	.7945697
More than 5	.9959055	.0683349	-0.06	0.952	.870587	1.139263
disability_bin						
Yes	.6723623	.0720021	-3.71	0.000	.5450667	.8293867
z_vehicle_count	.9999536	.0202367	-0.00	0.998	.9610668	1.040414
z_accessibility	1.023002	.0256018	0.91	0.364	.9740343	1.074432
z_reliability	.950942	.0204318	-2.34	0.019	.9117279	.9918427
z_pt_safety	1.091917	.0321967	2.98	0.003	1.030602	1.156881
z_comfort	1.129788	.0263572	5.23	0.000	1.079293	1.182647

z_affordability	.9601824	.0296402	-1.32	0.188	.9038113	1.020069
z_road_quality	1.095049	.0218707	4.55	0.000	1.053011	1.138764
z_pedestrian_quality	1.045555	.0220744	2.11	0.035	1.003173	1.089727
_cons	.006322	.0038877	-8.23	0.000	.0018941	.0211011
city_id						
var(_cons)	16.54989	6.274806			7.871661	34.79556

Note: Estimates are transformed only in the first equation to odds ratios.

Note: _cons estimates baseline odds (conditional on zero random effects).

LR test vs. logistic model: chibar2(01) = 3118.76 Prob >= chibar2 = **0.0000**

151 . estimates store M3

152 . estat icc

Residual intraclass correlation

Level	ICC	Std. err.	[95% conf. interval]	
city_id	.834178	.0524452	.7052493	.9136187

153 .

154 . * M4: add observed travel burden, commute time and regular PT use.

155 . melogit opp_exclusion ///

```
> i.gender i.age_group i.education i.occupation ///  
> i.hh_income_cat i.hh_size i.disability_bin ///  
> c.z_vehicle_count i.regular_pt_user ///  
> c.z_accessibility c.z_reliability c.z_pt_safety ///  
> c.z_comfort c.z_affordability ///  
> c.z_road_quality c.z_pedestrian_quality ///  
> c.z_commute_total c.z_transport_burden ///  
> if main_sample ///  
> || city_id:, or
```

note: The following factor variables in the model have a base preference set using **fvset**. This can affect the base level and which factor levels will participate in interactions.

Factor variables: age_group, disability_bin, education, gender, hh_income_cat, hh_size, occupation, regular_pt_user

Fitting fixed-effects model:

```
Iteration 0: log likelihood = -10209.991  
Iteration 1: log likelihood = -9305.5208  
Iteration 2: log likelihood = -9289.1882  
Iteration 3: log likelihood = -9289.0814  
Iteration 4: log likelihood = -9289.0813
```

Refining starting values:

```
Grid node 0: log likelihood = -8084.078
```

Fitting full model:

Iteration 0: log likelihood = **-8084.078**
 Iteration 1: log likelihood = **-7966.6412**
 Iteration 2: log likelihood = **-7911.3604**
 Iteration 3: log likelihood = **-7894.4217**
 Iteration 4: log likelihood = **-7891.5905**
 Iteration 5: log likelihood = **-7889.5475**
 Iteration 6: log likelihood = **-7888.1177**
 Iteration 7: log likelihood = **-7887.1591**
 Iteration 8: log likelihood = **-7886.5535**
 Iteration 9: log likelihood = **-7886.0151**
 Iteration 10: log likelihood = **-7885.9452**
 Iteration 11: log likelihood = **-7885.9997**
 Iteration 12: log likelihood = **-7886.0427**
 Iteration 13: log likelihood = **-7886.0667**
 Iteration 14: log likelihood = **-7886.0786**
 Iteration 15: log likelihood = **-7886.0842**
 Iteration 16: log likelihood = **-7886.0868**
 Iteration 17: log likelihood = **-7886.088**
 Iteration 18: log likelihood = **-7886.0885**

Mixed-effects logistic regression
 Group variable: **city_id**

Number of obs = **39,851**
 Number of groups = **40**

Obs per group:
 min = **66**
 avg = **996.3**
 max = **4,886**

Integration method: **mvaghermite**

Integration pts. = **7**

Log likelihood = **-7886.0885**

Wald chi2(41) = **2015.85**
 Prob > chi2 = **0.0000**

opp_exclusion	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
gender						
Woman	.6706948	.0304236	-8.81	0.000	.6136395	.7330549
Trans/Non-binary	1.599288	.2138681	3.51	0.000	1.230546	2.078525
age_group						
Under 18	1.160708	.0871599	1.98	0.047	1.001854	1.34475
18-25	.9552526	.0557193	-0.78	0.433	.852056	1.070948
40-60	1.27408	.0831819	3.71	0.000	1.121047	1.448004
Over 60	1.904326	.1557171	7.88	0.000	1.622327	2.235344
education						
Below 10th	1.396471	.1158657	4.02	0.000	1.186882	1.643072
10th-12th pass	1.511618	.1152891	5.42	0.000	1.301734	1.755343
Diploma	1.775616	.1712563	5.95	0.000	1.469778	2.145095
Undergraduate	1.311541	.1160123	3.07	0.002	1.10278	1.559821
Postgraduate equivalent	.9139992	.1232036	-0.67	0.505	.70179	1.190377
Doctoral and above	.8265503	.1595262	-0.99	0.324	.5662203	1.206572
occupation						
Student	.5361485	.0487108	-6.86	0.000	.4486945	.640648
Self-employed/own-account worker	.6289638	.0498098	-5.86	0.000	.5385376	.7345735
Gig/platform worker	1.173128	.152387	1.23	0.219	.9094439	1.513264
Employer	.6209674	.0462317	-6.40	0.000	.5366559	.7185247
Casual/contract worker	.4037545	.0367583	-9.96	0.000	.3377714	.4826272
Domestic duties only	.6867658	.0563068	-4.58	0.000	.5848171	.8064867
Seeking work	.6711756	.0570314	-4.69	0.000	.5682081	.7928021
Other	.2596287	.0701491	-4.99	0.000	.1528856	.4408987

hh_income_cat						
Below INR 15,000	.7792409	.0493722	-3.94	0.000	.6882405	.8822736
INR 15,001-30,000	.9853872	.060936	-0.24	0.812	.8729089	1.112359
INR 50,001-100,000	1.081537	.0671748	1.26	0.207	.9575746	1.221546
Above INR 100,000	.5801808	.0478388	-6.60	0.000	.4936028	.6819446
hh_size						
1 person	.5684407	.061222	-5.24	0.000	.4602665	.7020386
2 people	.9048571	.0646085	-1.40	0.161	.7866881	1.040776
3 people	1.350721	.0896128	4.53	0.000	1.186024	1.53829
5 people	.726196	.0486789	-4.77	0.000	.6367889	.8281561
More than 5	.9541041	.0682361	-0.66	0.511	.8293142	1.097671
disability_bin						
Yes	.6188923	.06914	-4.30	0.000	.4971902	.7703847
z_vehicle_count	.92485	.0199887	-3.61	0.000	.886491	.9648687
regular_pt_user						
Yes	.1528501	.0086679	-33.12	0.000	.1367715	.1708189
z_accessibility	1.029864	.0268091	1.13	0.258	.9786373	1.083773
z_reliability	1.041001	.0227155	1.84	0.066	.9974179	1.086488
z_pt_safety	1.082448	.0332162	2.58	0.010	1.019264	1.149548
z_comfort	1.113266	.0274279	4.36	0.000	1.060786	1.168343
z_affordability	.9821633	.0316527	-0.56	0.577	.9220438	1.046203
z_road_quality	1.060035	.0220326	2.81	0.005	1.01772	1.10411
z_pedestrian_quality	1.065686	.0231714	2.93	0.003	1.021225	1.112082
z_commute_total	1.020147	.0213041	0.96	0.340	.9792344	1.062768
z_transport_burden	1.219868	.0279191	8.68	0.000	1.166357	1.275835
_cons	.0185633	.0110251	-6.71	0.000	.0057957	.0594569
city_id						
var(_cons)	15.04907	5.639807			7.219586	31.36945

Note: Estimates are transformed only in the first equation to odds ratios.

Note: _cons estimates baseline odds (conditional on zero random effects).

LR test vs. logistic model: chibar2(01) = 2805.99 Prob >= chibar2 = **0.0000**

156 . estimates store M4

157 . estat icc

Residual intraclass correlation

Level	ICC	Std. err.	[95% conf. interval]	
city_id	.8206075	.0551689	.6869611	.9050798

158 .

159 . display as result "MULTILEVEL MODELS COMPLETED."
MULTILEVEL MODELS COMPLETED.

```

160 .
161 . *****
162 . * 13. MODEL COMPARISON
163 . *****
164 .
165 . estimates table M0 M1 M2 M3 M4, ///
>      b(%9.3f) se(%9.3f) stats(N ll) eform

```

Variable	M0	M1	M2	M3	M4
opp_exclus~n					
gender					
Woman		0.688	0.687	0.686	0.671
		0.030	0.030	0.030	0.030
gender					
Trans/Non~y		1.513	1.506	1.493	1.599
		0.194	0.193	0.191	0.214
age_group					
Under 18		1.156	1.154	1.145	1.161
		0.084	0.084	0.083	0.087
18-25		0.969	0.974	0.967	0.955
		0.054	0.054	0.054	0.056
age_group					
40-60		1.266	1.272	1.272	1.274
		0.079	0.080	0.080	0.083
Over 60		1.749	1.758	1.737	1.904
		0.136	0.136	0.135	0.156
education					
Below 10th		1.368	1.385	1.378	1.396
		0.108	0.110	0.110	0.116
10th-12th..		1.375	1.382	1.384	1.512
		0.100	0.101	0.101	0.115
Diploma		1.726	1.737	1.747	1.776
		0.160	0.161	0.162	0.171
Undergrad~e		1.370	1.385	1.376	1.312
		0.116	0.118	0.117	0.116
education					
Postgradu..		0.906	0.903	0.930	0.914
		0.117	0.117	0.121	0.123
Doctoral ..		0.894	0.887	0.904	0.827
		0.167	0.165	0.169	0.160
occupation					
Student		0.296	0.293	0.299	0.536
		0.025	0.025	0.026	0.049
Self-empl..		0.758	0.756	0.743	0.629
		0.057	0.057	0.056	0.050
Gig/platf..		1.199	1.221	1.210	1.173
		0.148	0.151	0.149	0.152
Employer		0.759	0.760	0.755	0.621
		0.053	0.053	0.053	0.046
occupation					
Casual/co..		0.485	0.485	0.478	0.404
		0.042	0.042	0.041	0.037
Domestic ..		0.824	0.825	0.824	0.687
		0.064	0.064	0.064	0.056

Seeking w..	0.315	0.312	0.317	0.671
	0.025	0.025	0.025	0.057
Other	0.186	0.183	0.188	0.260
	0.049	0.049	0.050	0.070
hh_income~t				
Below INR..	0.801	0.803	0.807	0.779
	0.049	0.049	0.049	0.049
INR 15,00..	0.958	0.961	0.959	0.985
	0.057	0.057	0.057	0.061
hh_income~t				
INR 50,00..	1.065	1.065	1.068	1.082
	0.063	0.063	0.064	0.067
Above INR..	0.597	0.596	0.598	0.580
	0.047	0.047	0.047	0.048
hh_size				
1 person	0.629	0.623	0.617	0.568
	0.065	0.064	0.064	0.061
2 people	0.974	0.965	0.969	0.905
	0.066	0.066	0.066	0.065
3 people	1.310	1.313	1.310	1.351
	0.083	0.083	0.083	0.090
hh_size				
5 people	0.712	0.705	0.700	0.726
	0.046	0.045	0.045	0.049
More than 5	1.020	1.011	0.996	0.954
	0.070	0.069	0.068	0.068
disability~n				
Yes	0.670	0.675	0.672	0.619
	0.072	0.072	0.072	0.069
z_vehicle~t	1.001	1.000	1.000	0.925
	0.020	0.020	0.020	0.020
z_mobility~l		1.088		
		0.022		
z_accessib~y			1.023	1.030
			0.026	0.027
z_reliabil~y			0.951	1.041
			0.020	0.023
z_pt_safety			1.092	1.082
			0.032	0.033
z_comfort			1.130	1.113
			0.026	0.027
z_affordab~y			0.960	0.982
			0.030	0.032
z_road_qua~y			1.095	1.060
			0.022	0.022
z_pedestri~y			1.046	1.066
			0.022	0.023
regular_pt~r				
Yes				0.153
				0.009
z_commute~l				1.020
				0.021
z_transpor~n				1.220
				0.028
_cons	0.005	0.006	0.006	0.019

	0.003	0.004	0.004	0.004	0.011
var(_cons[cit~d])	4.08e+06 2.34e+07	1.27e+07 7.85e+07	1.51e+07 9.46e+07	1.54e+07 9.66e+07	3.43e+06 1.94e+07
Statistics					
N	39851	39851	39851	39851	39851
ll	-9060.442	-8573.109	-8564.037	-8540.760	-7886.089

Legend: b/se

166 .

167 . lrtest M0 M1

Likelihood-ratio test

Assumption: M0 nested within M1

LR chi2(31) = 974.67

Prob > chi2 = 0.0000

168 . lrtest M1 M2

Likelihood-ratio test

Assumption: M1 nested within M2

LR chi2(1) = 18.14

Prob > chi2 = 0.0000

169 . lrtest M1 M3

Likelihood-ratio test

Assumption: M1 nested within M3

LR chi2(7) = 64.70

Prob > chi2 = 0.0000

170 . lrtest M3 M4

Likelihood-ratio test

Assumption: M3 nested within M4

LR chi2(3) = 1309.34

Prob > chi2 = 0.0000

171 .

172 . *****

173 . * 14. PREDICTED PROBABILITIES

174 . *****

175 .

176 . estimates restore M2

(results M2 are active now)

```
177 .
178 . margins, at(z_mobility_qol=(-2 -1 0 1 2)) predict(mu fixedonly)
```

Predictive margins Number of obs = 39,851
Model VCE: OIM

Expression: Predicted mean, fixed portion only, predict(mu fixedonly)

```
1._at: z_mobility_qol = -2
2._at: z_mobility_qol = -1
3._at: z_mobility_qol = 0
4._at: z_mobility_qol = 1
5._at: z_mobility_qol = 2
```

	Delta-method				[95% conf. interval]	
	Margin	std. err.	z	P> z		
_at						
1	.003604	.0021858	1.65	0.099	-.0006801	.0078882
2	.0039206	.0023726	1.65	0.098	-.0007296	.0085708
3	.0042648	.0025779	1.65	0.098	-.0007877	.0093174
4	.0046391	.0028036	1.65	0.098	-.0008559	.0101341
5	.0050459	.0030521	1.65	0.098	-.0009361	.011028

```
179 .
180 . marginsplot, ///
> xdimension(z_mobility_qol) ///
> ytitle("Predicted probability of opportunity exclusion") ///
> xtitle("Mobility-related QoL proxy (standard deviations)") ///
> title("Opportunity exclusion across mobility conditions") ///
> name(qol_probability, replace)
```

Variables that uniquely identify margins: **z_mobility_qol**

```
181 .
182 . graph export "figure_mobility_qol_probability.png", ///
> replace width(2000)
(file figure_mobility_qol_probability.png not found)
file figure_mobility_qol_probability.png saved as PNG format
```

```
183 .
184 . estimates restore M4
(results M4 are active now)
```

```
185 .
186 . margins, at(z_accessibility=(-2 -1 0 1 2)) predict(mu fixedonly)
```

Predictive margins Number of obs = 39,851
Model VCE: OIM

Expression: Predicted mean, fixed portion only, predict(mu fixedonly)

```
1._at: z_accessibility = -2
2._at: z_accessibility = -1
3._at: z_accessibility = 0
4._at: z_accessibility = 1
5._at: z_accessibility = 2
```

	Delta-method				[95% conf. interval]	
	Margin	std. err.	z	P> z		
_at						
1	.00492	.002859	1.72	0.085	-.0006835	.0105236
2	.0050648	.0029312	1.73	0.084	-.0006803	.01081
3	.0052139	.0030111	1.73	0.083	-.0006878	.0111155
4	.0053672	.0030992	1.73	0.083	-.000707	.0114414
5	.005525	.003196	1.73	0.084	-.000739	.011789

```

187 .
188 . marginsplot, ///
    > xdimension(z_accessibility) ///
    > ytitle("Predicted probability of opportunity exclusion") ///
    > xtitle("Accessibility score (standard deviations)") ///
    > title("Opportunity exclusion across accessibility levels") ///
    > name(access_probability, replace)

```

Variables that uniquely identify margins: **z_accessibility**

```

189 .
190 . graph export "figure_accessibility_probability.png", ///
    > replace width(2000)
(file figure_accessibility_probability.png not found)
file figure_accessibility_probability.png saved as PNG format

191 .
192 . *****
193 . * 15. SENSITIVITY ANALYSES
194 . *****
195 .
196 . * Larger sample model that excludes commute time and transport burden.
197 . capture drop sensitivity_missing sensitivity_sample

198 .
199 . egen sensitivity_missing = rowmiss( ///
    > opp_exclusion city_id gender age_group education occupation ///
    > hh_income_cat disability_bin hh_size z_vehicle_count ///
    > z_accessibility z_reliability z_pt_safety z_comfort ///
    > z_affordability z_road_quality z_pedestrian_quality)

200 .
201 . gen byte sensitivity_sample = sensitivity_missing == 0

202 .
203 . melogit opp_exclusion ///
    > i.gender i.age_group i.education i.occupation ///
    > i.hh_income_cat i.hh_size i.disability_bin ///
    > c.z_vehicle_count ///
    > c.z_accessibility c.z_reliability c.z_pt_safety ///
    > c.z_comfort c.z_affordability ///
    > c.z_road_quality c.z_pedestrian_quality ///
    > if sensitivity_sample ///
    > || city_id:, or
note: The following factor variables in the model have a base preference set using fvset. This can affect the base
and which factor levels will participate in interactions.
Factor variables: age_group, disability_bin, education, gender, hh_income_cat, hh_size, occupation.
Fitting fixed-effects model:

```

Iteration 0: log likelihood = **-10795.599**
 Iteration 1: log likelihood = **-10205.022**
 Iteration 2: log likelihood = **-10199.362**
 Iteration 3: log likelihood = **-10199.285**
 Iteration 4: log likelihood = **-10199.285**

Refining starting values:

Grid node 0: log likelihood = **-8824.0358**

Fitting full model:

Iteration 0: log likelihood = **-8824.0358**
 Iteration 1: log likelihood = **-8666.7032**
 Iteration 2: log likelihood = **-8645.4744**
 Iteration 3: log likelihood = **-8633.2431**
 Iteration 4: log likelihood = **-8631.2219**
 Iteration 5: log likelihood = **-8629.813**
 Iteration 6: log likelihood = **-8628.873**
 Iteration 7: log likelihood = **-8627.9499**
 Iteration 8: log likelihood = **-8627.7349**
 Iteration 9: log likelihood = **-8627.8076**
 Iteration 10: log likelihood = **-8627.87**
 Iteration 11: log likelihood = **-8627.9075**
 Iteration 12: log likelihood = **-8627.9273**
 Iteration 13: log likelihood = **-8627.9372**
 Iteration 14: log likelihood = **-8627.942**
 Iteration 15: log likelihood = **-8627.9443**
 Iteration 16: log likelihood = **-8627.9454**
 Iteration 17: log likelihood = **-8627.9459**

Mixed-effects logistic regression
 Group variable: **city_id**

Number of obs = **40,318**
 Number of groups = **40**

Obs per group:
 min = **77**
 avg = **1,008.0**
 max = **5,004**

Integration method: **mvaghermite**

Integration pts. = **7**

Log likelihood = **-8627.9459**
 Wald chi2(38) = **965.31**
 Prob > chi2 = **0.0000**

opp_exclusion	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
gender						
Woman	.6859002	.0297001	-8.71	0.000	.6300908	.7466528
Trans/Non-binary	1.534095	.1949141	3.37	0.001	1.195923	1.967893
age_group						
Under 18	1.15941	.0836176	2.05	0.040	1.006579	1.335446
18-25	.9620667	.0536868	-0.69	0.488	.8623927	1.073261
40-60	1.285708	.0802208	4.03	0.000	1.137712	1.452956
Over 60	1.734856	.1343942	7.11	0.000	1.49047	2.019312
education						
Below 10th	1.363329	.1083387	3.90	0.000	1.166699	1.593098
10th-12th pass	1.375181	.1005937	4.36	0.000	1.191503	1.587175
Diploma	1.778136	.1642037	6.23	0.000	1.483747	2.130934
Undergraduate	1.383655	.1175916	3.82	0.000	1.171352	1.634437
Postgraduate equivalent	.9442883	.1205666	-0.45	0.653	.7352302	1.212791
Doctoral and above	.9039408	.1685277	-0.54	0.588	.6272561	1.302672

occupation						
Student	.2982659	.0255763	-14.11	0.000	.2521233	.3528532
Self-employed/own-account worker	.741069	.0554691	-4.00	0.000	.6399501	.8581658
Gig/platform worker	1.184345	.1460218	1.37	0.170	.9301025	1.508085
Employer	.7570786	.0531349	-3.97	0.000	.6597815	.8687241
Casual/contract worker	.4756899	.0411007	-8.60	0.000	.4015855	.5634686
Domestic duties only	.8267721	.0636038	-2.47	0.013	.7110541	.9613221
Seeking work	.3136645	.0247882	-14.67	0.000	.2686562	.3662131
Other	.1804902	.0479992	-6.44	0.000	.1071734	.3039627
hh_income_cat						
Below INR 15,000	.8025806	.0487768	-3.62	0.000	.7124542	.9041081
INR 15,001-30,000	.9567516	.0564768	-0.75	0.454	.8522225	1.074102
INR 50,001-100,000	1.074523	.0636861	1.21	0.225	.9566782	1.206885
Above INR 100,000	.601941	.0473974	-6.45	0.000	.5158572	.7023902
hh_size						
1 person	.6161603	.0634826	-4.70	0.000	.5034947	.7540367
2 people	.9675032	.0658357	-0.49	0.627	.8467022	1.105539
3 people	1.309805	.0829266	4.26	0.000	1.156952	1.482853
5 people	.7015277	.0449324	-5.53	0.000	.6187653	.7953599
More than 5	.9986857	.0680888	-0.02	0.985	.8737661	1.141465
disability_bin						
Yes	.6790389	.0723991	-3.63	0.000	.5509848	.8368541
z_vehicle_count	1.000697	.0201857	0.03	0.972	.9619057	1.041053
z_accessibility	1.015082	.0252669	0.60	0.548	.9667489	1.065832
z_reliability	.948663	.0203196	-2.46	0.014	.9096618	.9893364
z_pt_safety	1.090734	.0320511	2.96	0.003	1.02969	1.155397
z_comfort	1.126253	.0261802	5.11	0.000	1.076092	1.178753
z_affordability	.9646504	.0296735	-1.17	0.242	.9082098	1.024598
z_road_quality	1.095135	.0217698	4.57	0.000	1.053288	1.138645
z_pedestrian_quality	1.047805	.0219976	2.22	0.026	1.005566	1.091819
_cons	.0062508	.0038459	-8.25	0.000	.0018717	.020876
city_id						
var(_cons)	16.57293	6.285707			7.880602	34.85293

Note: Estimates are transformed only in the first equation to odds ratios.

Note: _cons estimates baseline odds (conditional on zero random effects).

LR test vs. logistic model: chibar2(01) = 3142.68 Prob >= chibar2 = 0.0000

204 . estimates store S1

205 .

206 . * Regular public-transport users only, using stop-access-inclusive score.

207 . capture drop z_ptuser_accessibility

208 . egen z_ptuser_accessibility = std(ptuser_accessibility_100)
(19,072 missing values generated)

209 .

```

210 . melogit opp_exclusion ///
> i.gender i.age_group i.education i.occupation ///
> i.hh_income_cat i.hh_size i.disability_bin ///
> c.z_vehicle_count ///
> c.z_ptuser_accessibility c.z_reliability c.z_pt_safety ///
> c.z_comfort c.z_affordability ///
> c.z_commute_total c.z_transport_burden ///
> if main_sample & regular_pt_user == 1 ///
> || city_id:, or

```

note: The following factor variables in the model have a base preference set using **fvset**. This can affect the base level and which factor levels will participate in interactions.

Factor variables: age_group, disability_bin, education, gender, hh_income_cat, hh_size, occupation.

note: **7.education** != 0 predicts failure perfectly;

7.education omitted and 384 obs not used.

Fitting fixed-effects model:

```

Iteration 0: log likelihood = -5569.7764
Iteration 1: log likelihood = -4532.2161
Iteration 2: log likelihood = -4471.4442
Iteration 3: log likelihood = -4465.9896
Iteration 4: log likelihood = -4465.89
Iteration 5: log likelihood = -4465.8898

```

Refining starting values:

```

Grid node 0: log likelihood = -3561.8933

```

Fitting full model:

```

Iteration 0: log likelihood = -3561.8933
Iteration 1: log likelihood = -3534.013
Iteration 2: log likelihood = -3494.9685
Iteration 3: log likelihood = -3452.2236
Iteration 4: log likelihood = -3420.5482
Iteration 5: log likelihood = -3398.0196
Iteration 6: log likelihood = -3397.3692
Iteration 7: log likelihood = -3396.2272
Iteration 8: log likelihood = -3395.2672
Iteration 9: log likelihood = -3394.4396
Iteration 10: log likelihood = -3393.713
Iteration 11: log likelihood = -3393.0663
Iteration 12: log likelihood = -3392.4849
Iteration 13: log likelihood = -3391.958
Iteration 14: log likelihood = -3391.4776
Iteration 15: log likelihood = -3391.0374
Iteration 16: log likelihood = -3390.6329
Iteration 17: log likelihood = -3390.26
Iteration 18: log likelihood = -3389.9157
Iteration 19: log likelihood = -3389.5976
Iteration 20: log likelihood = -3389.3034
Iteration 21: log likelihood = -3389.0314
Iteration 22: log likelihood = -3388.78
Iteration 23: log likelihood = -3388.3418
cannot compute an improvement -- discontinuous region encountered
r(430);

```

end of do-file

r(430);

```
211 . graph save "city_exclusion" "D:\Urban_Mobility\city_exclusion.gph"  
    file D:\Urban_Mobility\city_exclusion.gph saved  
  
212 . graph save "qol_probability" "D:\Urban_Mobility\qol_probability.gph"  
    file D:\Urban_Mobility\qol_probability.gph saved  
  
213 . graph save "access_probability" "D:\Urban_Mobility\access_probability.gph"  
    file D:\Urban_Mobility\access_probability.gph saved  
  
214 . graph save "access_probability" "D:\Urban_Mobility\accesslevel_probability.gph"  
    file D:\Urban_Mobility\accesslevel_probability.gph saved  
  
215 .
```