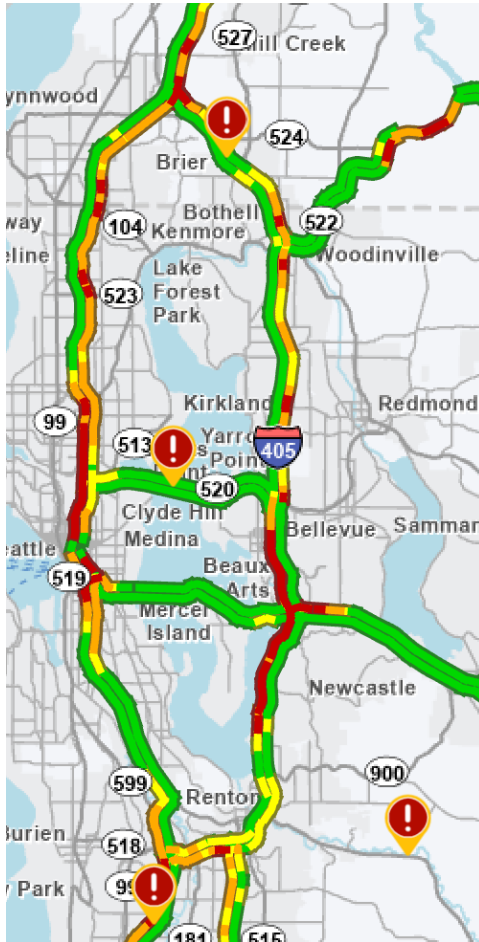


Estimating a Demographic Profile for Central Puget Sound Freeways

Samuel Ricord
samuelsr@uw.edu



Motivation



Introduction to Ecological Regression/Inference

$$\text{logit}(p_{ij}) = \mu_i + \sum_r \alpha_r x_{ir} + \sum_r \beta_r z_{ijr} + \gamma_{s_{ij}}$$

Where: p_{ij} is the total risk

j is each individual

i is each area

x_{ij} is each group level covariate

z_{ijr} is each individual level covariate

μ_i is the baseline risk

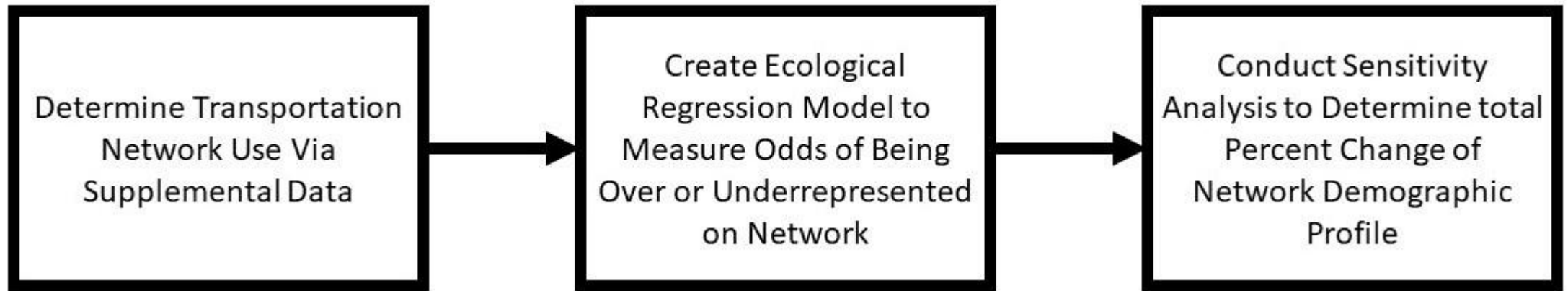
$\gamma_{s_{ij}}$ is the multistrata risk

$$p_i = \int p_{ij}(x) f_i(x) dx = E_x(p_{ij}|i)$$

From this equation we can calculate the odds ratios $\exp(\alpha)$ and $\exp(\beta)$

-Note the model used here is non-conditional Goodmans Method of Bounds

Study Methodology

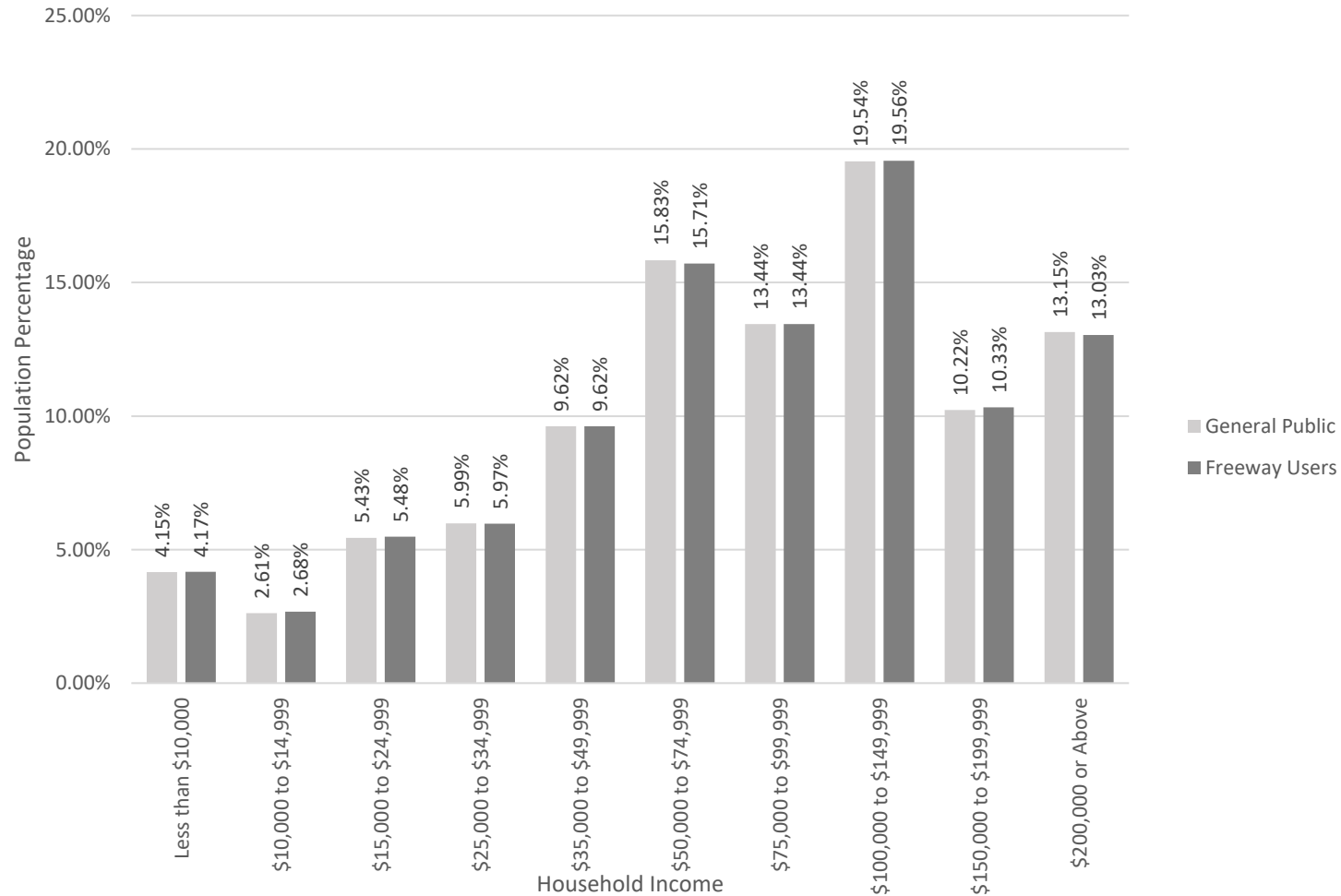


Study Data

- Combine PSRC O/D data and county census data
- O/D data is recorded per trip
- Estimate Freeway trips
- Create Ecological Regression Model with the O/D and Census Data

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1	40	74	53	94	17	14	25	16	4	9
2	85	184	212	283	77	37	60	36	6	19
3	58	186	526	420	215	99	124	66	42	51
4	103	299	448	875	200	105	216	130	39	55
5	25	73	205	191	125	56	110	70	40	32
6	11	36	111	101	64	45	51	43	19	36
7	24	61	125	219	113	59	96	57	17	22
8	19	38	58	114	72	56	73	108	46	53
9	5	13	26	36	46	24	20	42	10	44
10	9	17	48	49	34	36	24	53	44	67

Study Results – Calculated Demographic Profile



Study Results – Model Results

Income Level	Odds Ratio of the Income Bracket using the Freeway
Intercept	2.30560
Less than \$10,000	1.00430
\$10,000 to \$14,999	1.02366
\$15,000 to \$24,999	1.00908
\$25,000 to \$34,999	0.99796
\$35,000 to \$49,999	0.99957
\$50,000 to \$74,999	0.99270
\$75,000 to \$99,999	1.00018
\$100,000 to \$149,999	1.00105
\$150,000 to \$199,999	1.01051
\$200,000 or Above	0.99114
-2 Log Likelihood: 1352545	

Study Results – Percent Changes

Income Level	Relative Percent Change in Freeway use form General Travel
Less than \$10,000	0.4185%
\$10,000 to \$14,999	2.3542%
\$15,000 to \$24,999	0.8968%
\$25,000 to \$34,999	0.2154%
\$35,000 to \$49,999	0.0536%
\$50,000 to \$74,999	0.7406%
\$75,000 to \$99,999	0.0066%
\$100,000 to \$149,999	0.0943%
\$150,000 to \$199,999	1.0401%
\$200,000 or Above	0.8973%
Total Weighted Percent Change: 0.5066%	



Conclusions and Future Work

- Key Takeaway: The Demographic Profile for users of the Central Puget Sound freeway network is very similar to that of the region
- Future Work:
 - Equity studies of the freeway network
 - Equity studies of the data that describe the freeway network
 - Similar equity studies applied to other networks
 - Other uses for ecological regression

Thank you!

samuelsr@uw.edu

