

Vehical Access Model

Overview

We used the regression model to predict the number and percent of zero-vehicle households in each zones based on zone-level household and employment characteristics. We found that the work-from-home changes in employment and transit access are not statistically significant for our alternative scenario. Nevertheless, we included these variables to predict the alternative percent of zero-vehicle households in each tract.

Regression Model

Using scatter plots, we visualized how different variables are related to our independent variable of zero-vehicle household for our existing data. Below shows some examples. We could already see that work-from-home population does not show clear correlation with household vehicle ownership (fig.1 &2).

We further used linear regression to confirm this finding. In the model, the variables that are statistically significant at 0.1% level are percentage of big households, percentage of low-income households, and percentage of high-income households. Work-from-home changes in employment and transit access are not statistically significant for our alternative scenario (fig.3).

We did not use alternative model that has only the statistically significant variables as our alternative is on work-from-home populations.

Applying the relationships to our alternative scenarios, we arrived at the alternative percentage of zero-vehicle households.

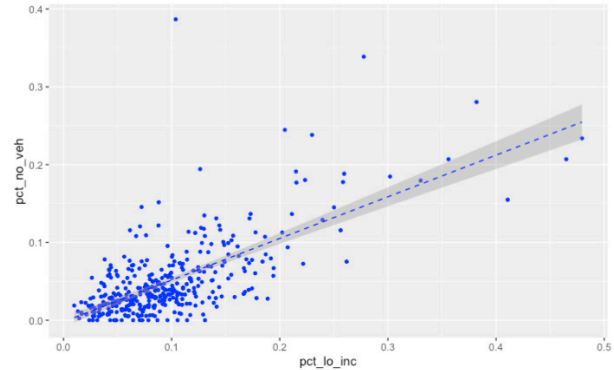


Fig. 1 scatter plot of percentage of zero-vehicle households vs percentage of low-income households

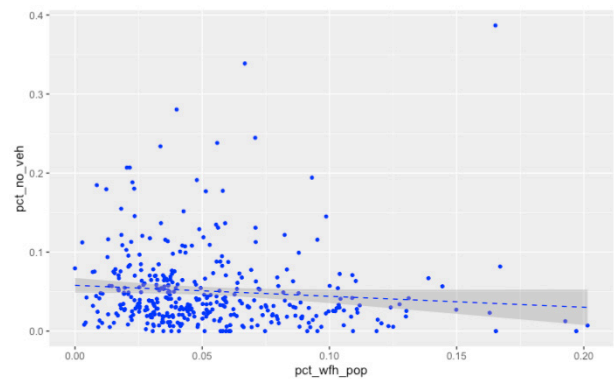


Fig. 2 scatter plot of percentage of zero-vehicle households vs percentage of work-from-home populations

(Intercept)	0.09 *** (0.02)
pct_big_hh	-0.10 *** (0.01)
pct_lo_inc	0.39 *** (0.04)
pct_hi_inc	-0.06 *** (0.02)
pct_wfh_pop	0.04 (0.06)
transit_access_100k	0.02 (0.02)
N	381
R2	0.56

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Fig.3 Regression results

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Model Prediction on Vehicle Ownership

Our model shows that the fewer tracts have no zero-vehicle households in the predicted vehicle ownership distribution (Fig. 3&4). This might be because of the positive linear correlation between wfh population and transit access with zero-vehicle households. The median also increased from 57 zero-vehicle household to 69. Nevertheless, the maximum zero-vehicle households for a tract decreased significantly for the predicted alternative from 860 to 490.

no_veh_hhE	no_vehE
Min. : 0.00	Min. : -Inf
1st Qu.: 29.00	1st Qu.: 40
Median : 57.00	Median : 69
Mean : 87.25	Mean : -Inf
3rd Qu.: 108.00	3rd Qu.: 113
Max. : 860.00	Max. : 490

Fig. 5 Descriptive statistics of existing zero-vehicle households (left) and predicted (right).

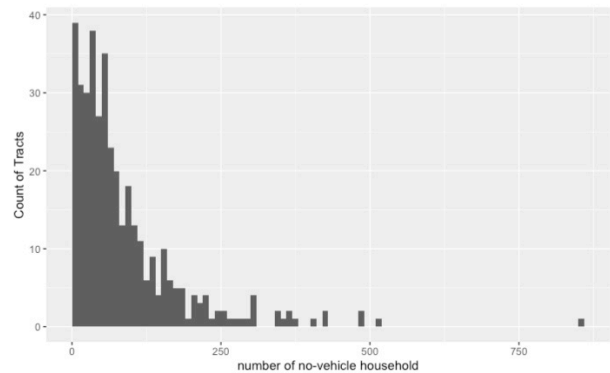


Fig. 3 Existing vehicle ownership histogram

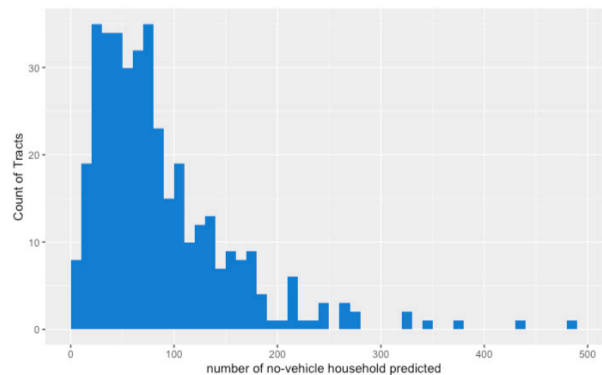


Fig. 4 Predicted vehicle ownership histogram