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ABSTRACT

Low-income neighborhoods in urban-metrot areas are often subject to disproportionate levels of road repair and transit avenues which remain under permit for longer than in higher income areas. Given the tenuous economic balance residents of such neighborhood maintain costly automotive repairs due to damage and wear from road conditions become doubly problematic to financially cover. Additionally, low-income exposure to major arterials, and a higher likelihood of incidence of four-way interactions: the two biggest maintenance factors for any city. Routine use of roads in these neighborhoods by high volumes of traffic as well as higher percentage of industrial vehicles, combined with the resulting trend of longer periods of repair dures, create a set of conditions which make probability of auto impact or personal injury much higher than in better-off areas.

The purpose of this study is to provide a critical glimpse into this issue as it applies to the greater Portland metro area. Using Portland City’s Bureau of Transportation Engineering and Development (BTEC) Section 3: road plan initiative to obtain a clearer picture of the City’s economic street health, the study seeks to obtain key statistical indications of spatially disproportionate road repair levels in the bottom twenty percent of income neighborhoods. Such data can be used by planners to effectively mitigate road issues specifically related to the neighborhoods in question. This is not intended as a comprehensive source of information, rather the results are intended as a planning tool alongside other data sources.

Keywords: Portland, Oregon, Income, Road Repair, Transportation, Census, Planning.

METHODOLOGY

1. Road Data Obtained from the 2013 City of Portland, Office of Management & Finance’s Bureau of Transportation’s 2013 road health data package. The four components were individually isolated and monthly and yearly days under permit for road repairs were field-calculated.

2. Median Income data drawn from 2010 US Census and American Community Survey 2011 5-year projected estimate for income via the ACS Fastfinder Engine. The Portland Metro Area was clipped from Oregon State data, and field “B19113e: MEDIAN INCOME IN THE PAST 12 MONTHS (IN 2011 INFLATION-ADJUSTED DOLLARS) [Estimate]” was isolated.

3. The four road permit layers were merged and clipped with total yearly ‘days under permit’ retained as the primary analysis factor.

4. Spatial Query used to isolate individual income ranges by 20%, 40%, 60%, 80% and 100% cut points extracted.

5. Varies used with Inverse Erase layers to isolate specific road coverages.

6. Distance of combined segments / Whole calculated for each income bracket

7. Feature-to-Raster used to create sampling probability raster, assigning “1” to the roads coinciding with the income blocks they underlie, and “NULL” for all non-road features.

8. Create Spatially Balanced Points Tool (Geostatistical Analysis) used to create 50 random samples of 50 points each.

9. Samples used to determine mean probability of a given road repair point being in the bottom 20% of Portland Metro income blocks.

10. Standard Linear Regression Test used to infer statistical significance of results / determine a line of probable determination.

RESULTS

CONCLUSION

While only slight Statistical Evidence was found for a correlation between Income Block and Yearly Days Under Permit of Roads in each income block. It is still telling that 30.2% of all permit issued fell in neighborhoods reporting the lowest 20% of incomes. Given sufficient time, additional current data, and a robust sampling model it is probable that a greater degree of relation would be found.

While only the Regression Test only assumes accuracy at the 90% confidence level, (x = 0.1) the data is still meaningful by virtue of probability of instance that a permit repair contract, limit job, or moratorium would occur in the lowest 20% of income neighborhoods.

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