

## INTRODUCTION

The Bipartisan Infrastructure Law (BIL) is one of the largest long-term investments in transportation in the U.S. history. Among the BIL requirements is the focus on low-income and underserved communities. The National Highway Traffic Safety Administration (NHTSA) final rule (NHTSA-2022-0036), mandated by BIL, also focuses on the same communities. Moreover, a wide variety of tools are available to determine these disadvantaged communities including those from the U.S. Department of Transportation. Many states, metropolitan regions, counties, etc. have also developed guidelines to comply with these requirements, tools, maps, etc.

## Desirable Features of the Composite Equity Indicator for Transportation Safety

- 1. Be intuitive, transparent, and easy to understand for diverse audiences:** The composite indicator should be clear and easy to understand even though the socio-economic and transportation safety disadvantage is a complex issue. This also implies that we should avoid transforming the original data in a way that prevents the simple interpretation of the result.
- 2. Have small number of components** that represent different sides of the problem and are not redundant or correlated. The number of components should be relatively small but sufficient to address different sides of the problem. Preliminary analysis and selection of the components may involve statistical analysis to evaluate the degree of correlation, uniqueness, and importance of the components. Three to five components in most cases should be sufficient to address the problem and provide the basis for creating the indicator.
- 3. Be specific and sensitive enough** for practical purposes. One of the most important features of the indicator is to be specific and sensitive enough for practical purposes. The indicator should not classify most of the units of observation as highly disadvantaged or not disadvantaged. Prioritization of areas based on the indicator is of paramount importance to state HSO, given budget and other constraints. In addition, the indicator should be sensitive enough to reflect changes in the small number of components selected to represent inequality. Lastly, the indicator will be evaluated every year and it should reflect changes in components due to changing demographics and safety considerations. The label "very disadvantaged" area is not meant as a permanent characteristic but rather to flag the area for countermeasures. For example, historic redlined areas may continue to face safety challenges, although some of these areas may now be home to a much different and prosperous demographic.
- 4. Give direction for action.** Finally, the indicator should be able to hint or point the HSO in a specific direction for action so the cause of the inequality is treated. This is particularly important when we have to distinguish between the socio-economic disadvantage and the transportation safety disadvantage. For example, two units of observation may have the same rank but due to different causes. One unit may have disproportionately more crashes while the other has disproportionately more low-income carless households. The former unit may need speed enforcement as a countermeasure, while the latter may need better non-motorist infrastructure and public transport.

**Table 1. COMPONENTS OF THE INDICATOR**

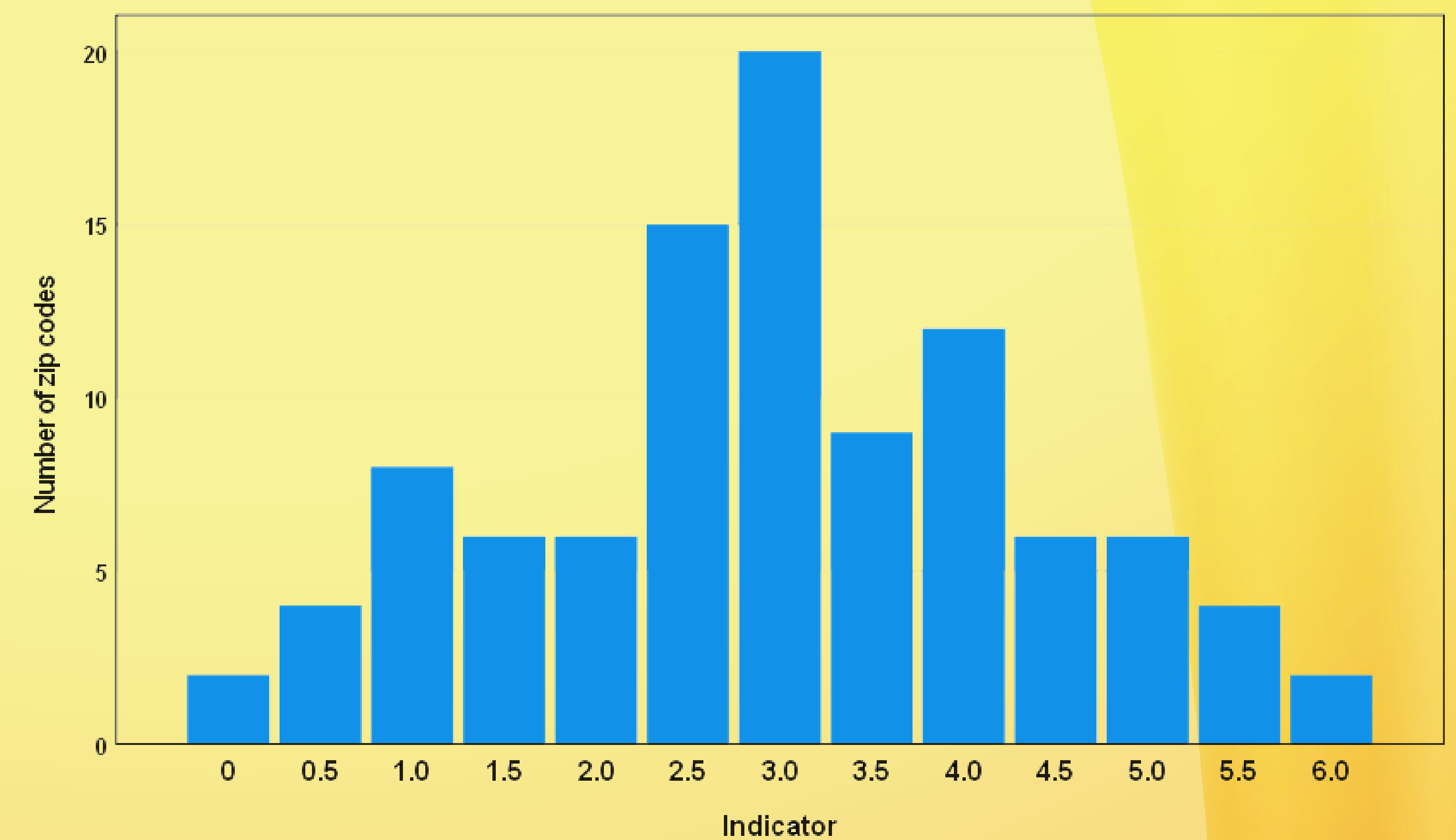
#	COMPONENT	SCORE Stratified by Rural/Urban Area	
<b>SOCIO-ECONOMIC DISADVANTAGE</b>			
1	<b>POVERTY</b> Percent of population with income less than 200% of federal poverty guidelines.	1 = If greater than THRESHOLD	0 = otherwise
2	<b>RACE</b> Percent non-white population.	1 = If greater than THRESHOLD	0 = otherwise
3	<b>RISK (alcohol density):</b> Number of liquor licenses per 10,000 population.	1 = If greater than THRESHOLD	0 = otherwise
<b>TRANSPORTATION SAFETY DISADVANTAGE</b>			
4	<b>CRASHES</b> Annual number of injury crashes (KABCO 2 through 5).	1 = If greater than THRESHOLD	0 = otherwise
5	<b>TRAFFIC VIOLATIONS (Citations)</b> Annual number of traffic stops with moving violations divided by population. Use offender's zip code of residence as opposed to where the offense occurs.	1 = If greater than THRESHOLD	0 = otherwise
6	<b>YOUNGER AND OLDER DRIVERS</b> A. Percent of drivers 20 and younger per 10,000 licensed drivers, or per population. B. Percent of drivers 65 and older per 10,000 licensed drivers, or per population.	A. 0.5 = If greater than THRESHOLD B. 0.5 = If greater than THRESHOLD	0 = otherwise 0 = otherwise
<b>OUTCOME MEASURE</b>			
	<b>SCORE</b>	<b>RANGE</b>	
1	Total Indicator Score = 1+2+3+4+5+6	0 = not disadvantaged area 6 = most disadvantaged area	
2	Socio-Economic Area Indicator Score = 1+2+3	0 = not disadvantaged area 3 = most disadvantaged area	
3	Transportation Safety Area Indicator Score = 4+5+6	0 = not disadvantaged area 3 = most disadvantaged area	

## RESULTS

Simulation data are used for this analysis because the data collection for Maryland is still ongoing. When the actual data become available the analysis will be repeated with the real data.

For this analysis we have a sample of 100 observation units (e.g., zip codes) and the composite indicator was computed as well as the two areas indicators (socio-economic disadvantage and transportation safety disadvantage). Figure 1 below represents the distribution of the composite indicator.

**Figure 1. Composite Indicator Scores**



As we can see from Figure 1 this indicator covers the whole possible range from 0 to 6. In many circumstances, we would expect very few cases in the 0-1 range and 5-6 but the empirical analysis will be the judge for this assumption.

There are two big groups of cases (observational units) here. One big group (39% of all cases) can be labeled as "low disadvantage" because the total indicator is between 0.5 and 2.5, out of 6.

The second big group has 41% of the cases and it can be labeled as "Disadvantaged" group because the indicator varies from 3.0 to 4.0.

The last group has 18% of the cases and it is truly high disadvantaged group with indicator from 4.0 (2+2 components) to 6.0. In most cases we expect this group to be even smaller because of the extremely high disadvantage across the board. The resulting composite indicator and the corresponding action plan for HSO are presented in Table 2.

**Table 2. Composite Indicator Results and Action Plan**

Categories	Total Indicator 0-6	Zip n	Socio-Economic Disadvantage (SED)	Transportation Safety Disadvantage (TSD)	Highway Safety Office (HSO)	
					General	Specific
<b>Not disadvantaged (2%)</b>	0	2	None	None	None	None
<b>Low disadvantage (39%)</b>	0.5	4	Low	Low	Not a priority	Not a priority
	1.0	8				
	1.5	6				
	2.0	6				
	2.5	15				
<b>Disadvantaged (41%)</b>	3.0	5	All 3 components	None	Targeted action	Focus only on SED
		4	None	All 3 components		Focus only on SED
		10	2 components	1 component		Focus on SED with one TSD component
		1	1 component	2 components		Focus on TSD with one SED component
	3.5	3	All 3 components	Young drivers		Focus only on SED and Young drivers
		3	1 component	3 components (4,5, 6A)		Focus on TSD and 1 component from SED
		3	2 components	Traffic Violations & Young drivers		Focus on the 2 specific components for SED & TSD
	4.0	6	All 3 components	1 component		Focus on SED and 1 component of TSD
		3	1 component	All 3 components		Focus on TSD and 1 component of SED
		3	2 components	2 components		
3		1 component	All 3 components			
<b>Highly Disadvantaged (18%)</b>	4.0	3	2 components	2 components	High Priority	Full review of possible actions for both socio-economic and transportation safety
	4.5	6				
	5.0	6				
	5.5	4				
	6.0	2				
<b>Total</b>	-	100				

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